I wanted to take this opportunity to introduce myself as the new Director of the Utah Transportation Center. I am an Associate Professor in the Department of Civil & Environmental Engineering at Utah State University. I received my bachelor’s degree from Utah State University in 1995. Subsequently, I received a masters of science and PhD from the University of Washington in 1998 and 2000, respectively. My research has primarily been focused on the behavior of bridges with a recent emphasis on their long-term behavior.

I am excited to serve as the new Director of the Utah Transportation Center. Dr. Kevin Womack will be sorely missed in our department. During the past five years, Dr. Womack has provided the Center with leadership and guidance in many transportation areas. He has cultivated many relationships with valued partners such as the Utah Transit Authority, Oak Ridge National Laboratory, Rutgers University and Virginia Tech to name just a few. He has also increased the collaboration of the Center to include projects with the Department of Electrical and Computer Engineering, the Department of Wildlife Resources and the Energy Dynamics Lab. It has been due to Dr. Womack’s long-term vision that the Center has experienced the great success that it has over the past five years. I hope that I am able to help maintain the success that the Center has experienced under his leadership.

I am also pleased to announce that Dr. Kevin Heaslip has agreed to serve as the Associate Director of the Center. Dr. Heaslip brings a wealth of experience in the transportation area and will be instrumental in expanding the Center’s relationship with the Utah Transit Authority as well as within the area of electric vehicles.

In the upcoming year, we have many new and exciting projects that we will be focused on. The researchers that are involved with the long-term bridge performance program will look to expand from the pilot phase of the project to the long-term implementation phase. This will involve the testing of many bridges in multiple states across the country. Dr. Anthony Chen is working on a two-stage approach for estimating a statewide trick trip table. In addition, Dr. John Rice will continue his work quantifying seepage rates in the nation’s levees.

Lastly, the faculty that are involved with the Center will continue to focus on educating the future engineers of this nation. The Center will continue to provide funding opportunities to students that are interested in pursuing careers in the many aspects of transportation. This funding will come in the form of funded research as well as scholarships. It is the Center’s hope that the funding provided will attract the best and brightest to this exciting field.
Research Underway: Testing of Curved-Bolt vs. Post-Tensioned Transverse Connections on Full-Scale Composite Deck Systems
by Dr. Marvin W. Halling, Ph.D., P.E.

Transverse connections and joints are a significant function of a composite deck system. The transverse joints are often the weakest portion of the deck. From prior testing done by a number of institutions it has been noted that the strongest transverse joint is one that is post-tensioned. Currently the Utah Department of Transportation (UDOT) has a post-tension system that they use for certain bridge decks throughout Utah. This system requires that a series of panels be linked together with threaded rod running through the transverse joints. Although this system is the strongest it is not always the most convenient. Due to the nature of its assembly the post-tension systems make it rather impossible to replace deteriorating or failed panels without completely altering the entire deck. For this reason, and often on smaller bridges, the post-tension system is not used. A welded stud connection or the shear key (NCHRP 584) connection has often been used when post-tensioning isn’t ideal. These joints unfortunately provide no post-tensioning support and are known to crack and fail under smaller loads.

Utah State University has previously conducted a series of tests on a new post-tensioned type system called the Curved-Bolt connection. This connection has been calculated to provide 300 psi post tension support across the transverse joint making it comparable in strength to the current post-tension connection currently used by UDOT. Its primary purpose is to make partial deck replacement possible much like the non-post-tensioned systems of UDOT but maintain significant strength provided by a post-tension system.

Full-scale testing of this new system is now underway at Utah State University. The testing will be comprised of two separate composite deck systems,
each supported by two W21 X 122 girders. Each composite deck system will be made up of two deck panels forming one transverse joint. The size of these panels were designed after standard UDOT specifications and will be 12 feet wide in the transverse direction with a length of 8 feet in the longitudinal direction while maintaining the standard thickness of 8 ¾ inches. One composite deck system will be joined at the transverse joint with UDOT’s typical post tension system space 2 feet from each edge and 4 feet between each connection. The second composite deck will be joined in the transverse joint by the new Curved-Bolt connection. The will be spaced similar to the first post-tensioned deck but two curved-bolts will be apparent in every connection as to maintain 300 psi throughout the joint.

Testing of the systems will include a bending test in the negative direction with a purpose of putting the entire deck in tension and testing its tensile capacity. Throughout this test, dynamic loadings will be performed in order to simulate traffic and the significant strains produce by such loadings. Full-scale specimens of both joint configurations will be tested in a direct shear test to determine its ultimate shear capacity.

The goal of this project is to compare the new Curved-Bolt system to the existing post-tension system and to determine if using this new connection will increase the life of a deck system but also make partial deck replacement possible for a post-tension system. Such possibilities could make construction easier as well as save money when the time comes for deck replacement.
Utah LTAP Center Uses Technology to Enhance Service

The Utah LTAP Center, part of the Utah Transportation Center’s Extension mission, has always been forward-thinking when it comes to using technology innovations. This is reflected in our efforts to make the Utah LTAP Center website not only a repository of information, but also an interactive site for our customers whether they are seeking training through our Road Scholar program, or just need help with a particular problem. To that end, many changes have been made this year that update our course listings and registration, e-mail list sign-up process, etc. Although these changes result in only small visual differences for our customers, behind the visual they are a much-needed step toward having an integrated, dynamic website.

We have also recently launched a Utah LTAP “Facebook” page and will integrate it with our e-mail newsletter and other social media efforts. As this process is complete, we will be publicizing these resources to our customers along with pointers to other similar information sources (such as UDOT “Twitter” feeds). We have also launched a “YouTube” channel for portions of our video library, and any other training videos we produce. We are also working to make some of our workshops available online. We want people to receive help from the Center in whatever manner best suits their needs and these technology initiatives are meant to do just that.

The Center also provides simple GIS tools to Utah communities for pavement and signs management, with a host of related add-ons for safety, ADA compliance, etc. Work has begun to update these tools to current standards. These tools are extremely valuable for Utah communities since we all face limited budgets and the purchase of commercial software is often cost-prohibitive.

Spotlight on the Future: Wesley Cook, PhD Candidate

The Utah Transportation Center is pleased to introduce Wesley Cook as a new Ph.D. candidate. Wesley was raised in Las Cruces, New Mexico. In high school he excelled in Cross Country and Choir. He received a full-ride academic scholarship to New Mexico State University (NMSU), where he participated in ASCE steel bridge competitions and worked at the NMSU Center of Transportation and Research performing bridge inspections, graduating in 2006. The experiences at NMSU solidified his desire to conduct research related to bridges. After graduation he worked as a consultant at Forsgren Associates, Inc. for three years. He is a licensed engineer in Utah and is married with two daughters.

In 2010, he completed an MS in structural engineering at Utah State University, focusing his research on full-scale destructive testing of bridge sections that were constructed with an accelerated bridge construction technique (Thesis). His latest work (Dissertation) determines epistemic risk of bridge failures from historical data which quantifiably defines the probability of bridge failures. This latest work has potential to transform vulnerability bridge assessments. He is interested in expanding upon risk assessment with individual cause of failure probabilities, consequences, and consideration of predictors. Mr. Cook hopes to continue in academia after graduation and to use the knowledge that he has gained to improved bridge management systems.
Center Projects in Progress

UTC1001  “Work Zone Design Evaluation,” Dr. Kevin Heaslip, PI. *Co-funded by UDOT and UTC.*

UTC1002  “Forecasting Network Traffic for Small Communities in Utah,” Dr. Anthony Chen, PI. *Funded by UTC.*

UTC1004  “Investigation of the Use of Texel Cameras for Counting Passengers on Public Transportation, Phase II,” Dr. Scott Budge, PI. *Funded by UTC.*

UTC1101  “Parametric Study of the Effects of Seismic Strength Degradation of Fine Grained Soils Beneath Highway Embankments and Bridge Abutments,” Dr. James Bay, PI. *Funded by UTC.*

UTC 1102  “Integrated Corridor Pricing Structure Modeling and Evaluation,” Dr. Kevin Heaslip, PI. *Funded by UTC.*

UTC 1103  “Surveying the Transportation Needs of Low Mobility Individuals in Cache Valley,” Dr. Anthony Chen, PI. *Funded by UTC.*

UTC 1104  “Transportation Network Resiliency Framework Development,” Dr. Kevin Heaslip, PI. *Funded by UTC.*