Utah Transportation Center
2010-11 Annual Report

“Innovative Engineering Against Hazards”

Celebrating Five Years
2006-2011
About the Utah Transportation Center

The theme for the Utah Transportation Center (UTC) is “Innovative Engineering Against Hazards” and comes from the core expertise of the initial group of colleagues associated with the Center. For more than a decade, the transportation research expertise within the Department of Civil and Environmental Engineering (CEE) at Utah State University has been in areas addressing natural hazards such as earthquakes, landslides, and flooding. It was decided to mold the Center around this expertise and then reach out to other colleagues to provide expertise that can be applied to both hazards and other areas of transportation—congestion and transit being two prime examples.

This approach has been very successful during the first five years of the Center. In particular, the association of colleagues in Utah State University’s Department of Electrical and Computer Engineering (ECE), College of Natural Resources and most recently, the Energy Dynamics Laboratory and the Department of Consumer Sciences, has expanded the Center’s ability to look at transportation issues from a wide variety of perspectives. We anticipate continued expansion of these cross-discipline partnering efforts in the future.

The educational activities of the Center continue to be centered primarily around instruction by CEE faculty associated with the Center. These faculty teach an array of transportation-related courses in many disciplines of civil engineering: surveying, structures, hydraulics, operations, transportation design, planning, and engineering economics. Center research activities continue to focus on “engineering against hazards,” and also include transit and wildlife transportation corridor users. The Center’s principal research partner continues to be the Utah Department of Transportation (UDOT) and has grown to include the Utah Transit Authority (UTA). Our partnership with the Federal Highway Administration (FHWA) has continued as work on the Long Term Bridge Performance (LTBP) Program moves forward. Work with local agencies has continued through the Utah Local Technical Assistance Program (LTAP). Throughout all of our activities, the underlying emphasis on undergraduate and graduate student development continues to be a focus beyond the classroom. Students learn hands-on as they participate with Center faculty in their real-world research projects, serve local agency needs by providing technical assistance through the Utah LTAP Center, and learn from classroom instruction based on the latest in the ever-changing transportation field.

The technology transfer activities of the Center this past year have been three-pronged: (1) the presentation of papers at professional conferences—the annual Transportation Research Board meeting being the principal medium for these presentations; (2) peer reviewed journal publications (see page 8-11 for the list of presentations and publications); and (3) research dissemination to local agencies through the Utah LTAP Center.
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It is with some melancholy that I sit and write what will be my last “From the Director” letter for the Utah Transportation Center. As with all major changes in one’s life this one is bittersweet. I am looking forward with great anticipation to my new role as the Associate Administrator for Research, Development and Technology within the Research and Innovative Technology Administration of the USDOT. The great thing about this position is that it covers the University Transportation Centers program, so I will continue to be associated with all of you, my fellow Center directors and colleagues, though in a very different role.

The difficult part of this transition will be to leave my great colleagues here at Utah State University, all of whom are great friends and have done so much to make the past five years of the Utah Transportation Center so successful. It is with pride that I can outline such great achievements for a Tier II university transportation center.

Over the past five years the Utah Transportation Center has developed new external relationships with:

- Rutgers University, the Center for Advanced Infrastructure and Transportation;
- Virginia Tech;
- Utah Transit Authority;
- University of Utah;
- Oak Ridge National Laboratory;
- Cache Metropolitan Planning Organization; and,
- Cache Valley Transit District.

Internally, we have developed new relationships with other departments on campus:

- Electrical and Computer Engineering;
- Wildlife Resources;
- Energy Dynamics Laboratory; and,
- Consumer Sciences;

In concert with the development of these new relationships, some of the major accomplishments of the Center’s colleagues include:

- Receiving a $1 million special state appropriation for bridge research;
• Membership in the winning consortium for the Long Term Bridge Performance Program (with CAIT as lead);
• UTA research projects;
• Construction of a new structures testing (SMASH) laboratory;
• Renewal of the Local Technical Assistance Program contract (twice); and,
• New Transportation Infrastructure Management and Engineering Laboratory (TIMELab).

Over the past five years the numbers for the Utah Transportation Center are impressive:

- Total Budgeted Expenditures, $9,675,699;
- Base federal UTC funding, $2,221,600;
- Leverage of UTC funding, 3.36:1;
- Research projects initiated, 24;
- Research projects completed, 15;
- Graduate students graduated, Masters–40, Ph.D.–8;
- Papers presented, 85; and,
- Papers published, 50.

Part of this great success has been the effort that Center colleagues have made to branch out into other areas of research which include transit operations, land use planning and the environment, automated and electric transportation systems, and resiliency of transportation systems.

So as I look forward to the next era of my career, I can certainly look back at the past five years, as the Director of the Utah Transportation Center, and say that the successes of my colleagues have been great and that it has been my privilege to have been associated with so many great and hard working people.

I have nothing but the greatest respect for the University Transportation Center community, and I anticipate great things in the future and look forward to working with all of you to continue to make this program a national model for other research and education centers programs.

The Utah Transportation Center faculty and staff wish Dr. Womack the very best in his new responsibilities.
The Utah Transportation Center certainly has cause to celebrate as the Transportation Infrastructure Management and Engineering Laboratory (TIMElab) is finally completed, and well under budget! Those funds will now be used to expand traffic camera installation, enhancing the information available to both UDOT and USU transportation researchers.

This lab, funded by the Utah Department of Transportation (UDOT), allows for expanded real-time research on a variety of transportation issues, and allows UDOT to more quickly update signal timing from the control center in the TIMElab. Support from UDOT’s Matthew Smith, in seeing the need for this lab, and the benefits it will provide now and in the future is greatly appreciated.

Our thanks also goes to Brian Christensen and Carl Sundstrom with Horrocks Engineering and our own Dr. Kevin Heaslip who worked tirelessly to make this happen.

At present, more than 12 students work from the lab, tapping into the resources available to complete their transportation research projects under the supervision of Center faculty.
Center colleague, USU Research Assistant Professor Dr. Patty Cramer was honored this past year by the Denver Zoo with its 2010 Conservation Award. She formally received the award and its accompanying $5,000 prize in an October 14, 2010 ceremony.

According to the announcement on the Denver Zoo website [http://www.denverzoo.org/conservation/award.asp], “Dr. Cramer...has advanced the scientific study of wildlife crossing structures and advocates for landscape connectivity in North America. Wildlife crossings are essential for establishing wildlife corridors between areas of fragmented habitat. For years, Denver Zoo has led and supported conservation projects focused on landscape connectivity; much of this work has been possible through the efforts of scientists like Dr. Cramer.”

Dr. Cramer’s work was also honored when she received an award for her work as part of a multi-agency committee that worked to plan the upgrades to Utah’s US 6 along with wildlife mitigation. The committee won a Federal Highways Exemplary Ecosystem Initiative Award for 2010. Ed Woolford of FHWA gave the representatives of the groups plaques at a February US 6 Wildlife Coordination Committee meeting.

The award was given for “outstanding commitment to environmental stewardship for developing an early partnership to ensure wildlife and wildlife habitat mitigation during a long-term improvement project along US 6 in Utah.”

There were 77 applicants for the seven awards given. You can learn more about the award at [http://www.environment.fhwa.dot.gov/strmlng/newsletters/dec10nl.asp]. Project details can be found at [http://www.environment.fhwa.dot.gov/ecosystems/eei/ut10.asp].

Dr. Cramer’s research continues to examine the circumstances and use of wildlife crossing structures by wildlife, including her recent report, “Determining Wildlife Use of Wildlife Crossing Structures Under Different Scenarios,” prepared for the Utah Department of Transportation.
Three USU Transportation Engineering graduate students won awards at the recent Institute of Transportation Engineers (ITE) Intermountain Section Conference in Jackson Hole, Wyoming. Eight schools from the region were eligible for four possible student awards and USU students were awarded three of them.

Derek Freckleton (Masters Student from Bountiful, Utah) won the student paper competition for a paper entitled, “Human Factors and the Challenges Facing AET.” He received a $600 award and was given the opportunity to present his paper at the conference.

James Fishelson (Masters Student from Long Island, New York) and Luis Hidalgo (Masters Student from the Dominican Republic) won both of the Ellis Mathes Scholarships, worth $2000 each, sponsored by the members of the Intermountain Section.

In addition, Mr. Fishelson was recently awarded Honorable Mention from the National Science Foundation’s Graduate Research Fellowship program.

All three students are researchers in Utah State University’s Transportation Infrastructure Management and Engineering Laboratory (TIMELab) under the direction of Dr. Kevin Heaslip, Assistant Professor of Civil & Environmental Engineering.
Center Names Student of the Year: Tomás E. Lindheimer

Tomás E. Lindheimer was born in Buenos Aires, Argentina and raised in Sandy, Utah, until the age of 13. After immigrating to Sandy, Utah, he attended St. Peter’s English School until the age of 18 to pursue the goal of attending a U.S. university. Upon graduation from high school, Tomás decided to pursue an engineering career and chose to attend Utah State University (USU) because of its reputation.

Tomás attended USU for one year, followed by two years in Bulgaria. After his time in Bulgaria, Tomás was tempted to pursue a career in linguistics, but chose to continue pursuing a degree in engineering because it was challenging and interesting.

After a year in Mechanical Engineering, Tomás matriculated into the Civil Engineering program. In the summer following his entrance to the civil engineering program, he took an internship with the Utah Department of Transportation (UDOT). The internship with UDOT and Dr. Kevin Heaslip’s Introduction to Engineering course piqued his interest in the field of transportation. Upon completion of his bachelor’s degree, he pursued a Master’s in Transportation studying design and safety considerations in highway work zones. His thesis is titled, “Evaluation of Work Zone Practices in Utah.”
NEW PROJECTS

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.*

ONGOING PROJECTS

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.*

COMPLETED PROJECTS

UTC0803  “ABC Deck Connections, Laboratory Testing and Evaluation,” Dr. Marvin Halling, PI. *Co-funded by UDOT and UTC.*

UTC1003  “Highway Wildlife Crossing Design Study,” Dr. Patricia Cramer, PI. *Funded by UTC.*

UTC0702  “UDOT’s Calibration of AASHTO’s New Prestress Loss Design Equations,” Dr. Paul Barr, PI. *Co-funded by UDOT and UTC.*

UTC0703  “Strong Motion Instrumentation Plan for UDOT Bridges: Array Design, Typical Details, and Specifications,” Dr. Marvin Halling, PI. *Co-funded by UDOT and UTC.*

UTC0704  “Failure Modes Analysis of UDOT’s MSE Wall Inventory,” Dr. James Bay, PI. *Co-funded by UDOT and UTC.*

UTC0705  “Logan Bluff Landslide Risk Analysis,” Dr. Robert Pack, PI. *Funded by UDOT.*

UTC0706  “Wireless Broadband for Commuter Rail: ‘River of RF’,” Dr. Chris Winstead, PI. *Funded by UTC.*

UTC0801  “Development of a Decision Support Tool for Assessing Vulnerability of Transportation Networks,” Dr. Anthony Chen, PI. *Co-funded by UDOT and UTC.*

UTC0802  “Synthesis Study and Field Evaluation of In-Situ Culvert Rehabilitation in Utah,” Dr. Blake Tul- lis, PI. *Co-funded by UDOT and UTC.*
UTC0804  “Investigation of the Use of Texel Cameras for Counting Passengers on Public Transportation,”
Dr. Scott Budge, PI.  Funded by UTA.

UTC0805  “Shear Capacity of Pre-stressed Girders,” Dr. Paul Barr, PI.  Co-funded by UDOT and UTC.

UTC0901  “Long Term Bridge Performance Program, Supplemental Funding, Year 1,” Dr. Marvin Halling,
PI.  Funded by UTC and FHWA.

UTC0902  “Cache Valley Transit District (CVTD) Rider Surveys and Analyses,” Dr. Kevin Heaslip, PI.
Funded by the CVTD.

UTC0903  “Cache Metropolitan Planning Organization (CMPO) Traveler Preference Study,” Dr. Kevin
Heaslip, PI.  Funded by the CMPO.

UTC0904  “Quality of Life in Cache Valley Study,” Dr. Kevin Heaslip, PI.  Funded by UTC.

2010-11 Presentations & Publications

Presentations
listed alphabetically by lead author; Utah Transportation Center colleagues in bold

opedness of Knowledge Tables and Learning Outcomes for the Introductory Course in Transportation Engineer-

Electric Transportation Network,” In the Proceedings of the 90th Transportation Research Board Annual
Meeting, Washington, DC, January 2011.

Heaslip, K., Brady, B, Thomas, M. (2011) “The Importance of Road Pricing to the Future of Roadway Infra-
structure.” In the Proceedings of the 2011 Association of Private Enterprise Education International Conference.

simulation of heterogeneous populations. Decision Sciences Institute (DSI) 41st Annual Meeting, Nov. 20-
23, 2010, San Diego, CA., USA.

Manley, M., Kim, Y.S., Christensen, K., Chen, A. (2011) Modeling emergency evacuation of individuals with
disabilities in a densely populated airport. Paper presented for the 90th annual meeting of the Transportation

Petroff, S.M., Halling, M.W., Barr, P.J. (2011) “Monitoring of Long Term Bridge Performance (LTBP) Pro-
gram Bridges.” ASCE Structures Congress. Las Vegas, NV April 2011.

ings of Eastern Asia Society for Transportation Studies, Vol. 8. Presented at the 9th Eastern Asia Society for
Transportation Studies, 20-23 June 2011, Jeju, Korea.


PUBLICATIONS
listed alphabetically by lead author; Utah Transportation Center colleagues in bold


2010-11 FUNDING FACTS & FIGURES

Funding by Source

- U.S. Department of Energy: 27.4%
- U.S. Department of Transportation/ RITA: 13.6%
- Utah State University: 13.9%
- U.S. Department of Transportation/ FHWA: 30.6%
- Special State Appropriations: 5.7%
- Utah Department of Transportation: 6.0%

Total budget for FY2011: $3,399,892 (includes funds from all sources)

Funding by Use

- Research: 53.5%
- Administration: 3.4%
- University Facilities & Administration: 22.9%
- Scholarships: 12.3%
- Education: 7.9%

FUNDING BY USE
includes all funds expended and encumbered during FY2011

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The Utah Transportation Center is housed in the Civil & Environmental Engineering Department in the College of Engineering, on the campus of Utah State University in Logan, Utah.