

# Research Newsletter

**Responsive - Accessible - Relevant**

## A MESSAGE FROM THE RESEARCH DIRECTOR

*By: Cameron Kergaye, PhD, PMP, PE*

UDOT Research is pleased to host a transportation research exchange on Research Implementation and Leadership Engagement. Six state DOTs and five national agencies will participate in the peer exchange as well as the UDOT Annual Conference. The state DOT participants will include research leaders from Idaho, Iowa, Minnesota, Montana, South Dakota and Wyoming. The national agency participants will include representatives from FHWA, RITA, SHRP2 and TRB.

The peer exchange will be held October 29-31 to allow these participants to present their research and initiatives at the UDOT Annual Conference on October 30. The state DOT participants will present their DOT's most valuable research while the national agency representatives will present either specific research or nationwide initiatives. There will be an opportunity to interact with each representative in their breakout sessions and afterwards.

The Research Division is also planning to organize another poster session at this year's Annual Conference. This is an opportunity to interact with those involved in current and recently completed research and practical innovations. The event will also take place on

October 30 at the South Towne Expo center in Sandy Utah.

Information about the Research Division and completed research reports and other funding sources can be found on the Research Division website: [www.udot.utah.gov/go/research](http://www.udot.utah.gov/go/research)



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**Completed and Active Research Available at:** [www.udot.utah.gov/go/research](http://www.udot.utah.gov/go/research)

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## Improving Utility Data Management

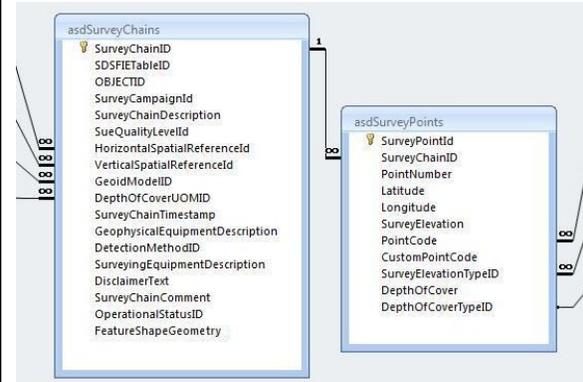
Data on utility location in the UDOT right of way is routinely collected from subsurface utility engineering during project design, contractor construction as-built submittals, and utility permit as-built submittals. However, UDOT has not had a central repository where this data could be stored in digital format. In recent years personnel in the UDOT Right of Way, Engineering Technology Systems (ETS), and Utilities and Railroads Divisions recognized that UDOT could benefit from having a digital utility management system by more effectively using utility data on new projects.

On behalf of UDOT, Utility Mapping Services (UMS) began a research study in 2010 with the objective of developing a proposed standardized method for collecting and storing digital data of utility installations. They reviewed existing policies and practices of UDOT and other agencies, available software tools and standards for geospatial data, and related research efforts at Texas DOT and in the SHRP 2 program.



*Placement of a new pipeline*

The researchers recommended standards to UDOT for submitting digital data for utility infrastructure. They also developed a draft, prototype relational database architecture for a utility data repository. The study results are available in the research [report](#) on the Research Division website.



*Portion of recommended database schema*

Implementing the results of this study at UDOT could improve accuracy and access to utility data for planning, design, and construction of new projects. It could also save significant cost through better utility coordination and less utility damage and project delay. Various ideas for pilot testing, further development, and implementation of a utility database are currently being explored by UDOT leaders.

According to Steve Quinn of UDOT ETS, “UDOT is continuing to pursue efforts to track and manage information about the utilities in our right of way. Many independent efforts have taken place across our Regions and major projects such as I-15 CORE and Mountain View Corridor. Results of these efforts and the recent research study are being evaluated to create a consistent, repeatable, and manageable process which will allow us to capture and store utility information in a central repository. We believe this central repository can be made available via maps and other formats and will be of significant value to UDOT and our partners.”

For more information, contact Richard Manser, UDOT Utilities Engineer at [rmanser@utah.gov](mailto:rmanser@utah.gov); Steve Quinn at [squinn@utah.gov](mailto:squinn@utah.gov); Phil Meis of UMS at [pjmeis@umsi.us](mailto:pjmeis@umsi.us); or David Stevens in the Research Division at [davidstevens@utah.gov](mailto:davidstevens@utah.gov)

## Safety Impacts of Design Exceptions in Utah

Road designers are guided by a set of state-adopted policies that include design criteria. Design exceptions are explored when factors such as cost, environmental impacts, and community impacts make it impractical to meet design policy for one or more of thirteen controlling design criteria. Design exception analysis and documentation is required to show that the design exception is not expected to result in a decrease in relative safety at the location of interest. A survey of state departments of transportation (NCHRP Synthesis 316, *Design Exception Practices*) indicated that safety analysis methods varied and attempts to follow-up on the safety performance of locations with approved design exceptions were limited.

The purpose of this study was to compare safety, in terms of expected crash frequency and severity, of road segments with approved and constructed design exceptions to the safety of road segments where no design exceptions have been approved and constructed.

Data were collected in Utah using historical files of design exception documentation, project databases, online mapping software and images (e.g., Google Maps and Google Earth), traffic counts, and electronically coded crash data. The data included 48 road segments with one or more design exceptions and 132 road segments without design exceptions for a total of 180 road segments. There were a total of 85 design exceptions on the 48 road segments in the former group.

The safety impacts of design exceptions were analyzed using the following methods: 1) binary logistic regression to compute propensity scores and select the most appropriate comparison sites, 2) negative binomial regression to analyze crash frequencies, and 3) multinomial logistic regression to analyze crash severity.

Modeling results indicate that, in Utah, road segments with design exceptions perform the same in terms of expected crash frequency and expected crash severity when compared to road segments that do not have design exceptions. The results for other parameters included in the models were in the directions expected.

The results of this study showed that the UDOT design exception review and approval process, as implemented in years 2001 through 2006 (the years covered by the design exception data collection), was effective from a safety perspective. Findings are not intended to support approving a greater number of design exceptions or fewer design exceptions.

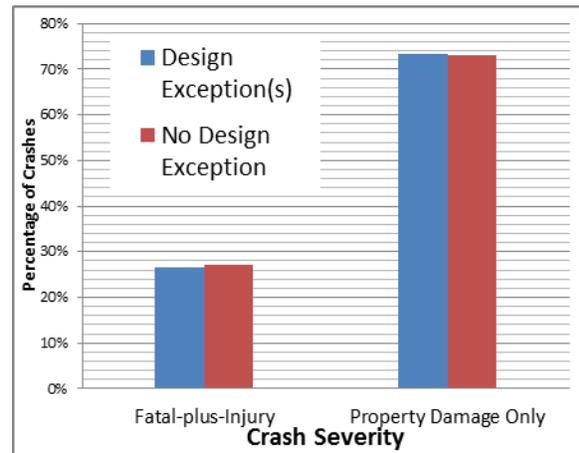


Figure 1 - Crash Distribution from Frequency Model

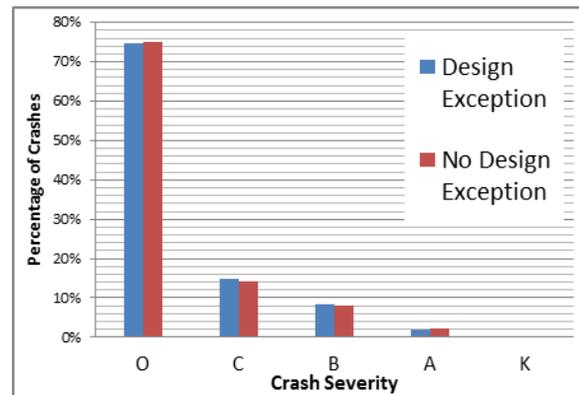


Figure 2 - Crash Distribution from Severity Model

The study results are available in the research [report](#) on the Research Division website. For more information, contact Richard J. Porter, PhD, P.E., - [richard.jon.porter@utah.edu](mailto:richard.jon.porter@utah.edu); or Kevin Nichol, P.E., UDOT Research Division, [knichol@utah.gov](mailto:knichol@utah.gov)

## 100 Year Anniversary of the 1st Traffic Light

2012 marks the centennial of the invention of the first electric traffic signal by Utah's own Lester Farnsworth Wire.

Lester Wire was born on September 3, 1887, and was, in his early years, a police officer with the Salt Lake City Police Department. He wrote Salt Lake City's first traffic rules, and organized and led the first traffic squad in the city. Having taken up the challenge to solve the city's overwhelming traffic problems, he began work on an electric signaling device. But he could only work on his project in his free time because the city's police chief didn't believe Lester's invention would work.

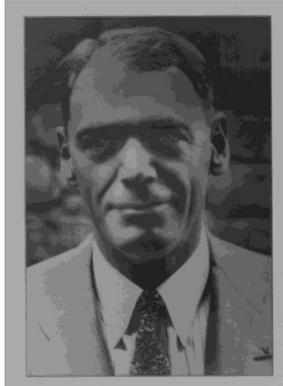


Figure 1:  
Lester Wire

The first model of Lester Wire's traffic signal was a large, yellow, hand-made, wooden box with a slanted roof to protect it from the elements. It was said to resemble a flashing birdhouse. The lights used were Edison's Mazda lamps hand-dipped in red and green watercolors because colored lights were not available. These were set inside two 6-inch circular openings on each side. Lester decided to use red and green lamp colors while watching his sister make decorations for a school Christmas program.

Lester Wire's first traffic light was installed in 1912 at the intersection of Main Street and Second South in Salt Lake City. The finished box was mounted on a 10-foot pole, and wired into the overhead trolley and light wires to obtain electricity. A traffic officer was stationed at the signal to direct the traffic by a twist of the wrist. But it was initially a tough sell to the motoring public. Out-of-towners were impressed that a place like Salt Lake City would have such a modern innovation. But city residents scoffed. Some even said they wouldn't obey the signal because it "infringed on their freedom." Many of these first traffic signals were found wrecked in the early mornings.

So the next phase of development was the suspension of the signal from overhead wires, safe from careless (or resentful!) drivers and speeding cars. Then came little 'coops' hanging on the corner light poles where the directing officer sat snugly inside flipping a switch. Lester later recalled that the officer was frequently accused of playing favorites in giving one direction more time than others.

Lester Wire improved upon his first signal several times and considered patenting it, but was distracted when World War I broke out and he left the country to serve in the ambulance corps he had helped found. When he finally returned, he was told it was too late to obtain a patent. He also never received any money for his pioneering invention. He died on April 14, 1958 and is buried in the Salt Lake City Cemetery at 200 North Street.



Figure 2: 1st Traffic Light

Lester Wire's sister, Edith, worked to preserve the memory of her brother's achievements by creating a small museum dedicated to Lester in the family home in Salt Lake City. This museum was later rolled into the Utah Department of Transportation and our library named in Lester Wire's honor.

The Research Division is proud to remember the contributions of one of Utah's greatest innovators and we invite you to view the Lester F. Wire photographs and memorabilia on display inside the library.

For more information, contact Joni DeMille, [jdemille@utah.gov](mailto:jdemille@utah.gov).

## Changes in the UDOT Research Division

Over the last couple of months, the UDOT Research Division has gone through a few internal changes. First and foremost, we would like to thank Abdul Wakil for his ten years of dedicated service in the Research Division. Abdul has transferred to the UDOT Asset Management Division and we wish him all the best.

In addition, we would like to welcome Russ Scovil to the Research Division. Russ is a Project Manager in the Research Division. He has worked with UDOT for 22 years, mostly as a Pavement Condition Engineer. He also has previous engineering work experience at the Bureau of Reclamation and the U.S. Army.

Russ holds an under graduate degree in Civil Engineering and Mathematics from the University of Utah. He retired from the U.S. Army Reserve in 2004, 30 years, where he flew as a Medevac pilot UH-1H and crewed a Cobra Attack helicopter AH-1G. He served in Desert Storm, 1990 and Operation Iraqi Freedom 2003. Russ has an outgoing personality and he has already hit the ground running regarding managing UDOT Research Division projects.



*Russ Scovil*

Additional changes within the UDOT Research Division are:

- David Stevens has taken on the NCHRP and AASHTO TIG duties in addition to his regular responsibilities.
- Joni DeMille is assuming the role of UDOT Librarian.
- Steve Bagley has accepted the role of managing the UDOT Library along side his Technical Writer duties.
- Daniel Hsiao is our LTAP Contract Manager as well as our Program Manager.

Another change involving the Research Division is with regards to our Research and Innovation Poster Session at the UDOT Annual Conference. Due to an overwhelming response last year and limited venue space, we are selecting only the very best posters to participate this year. In addition, we have restructured our poster criteria to allow participants to maximize their technology transfer experience and potential with respects to pitching their projects to guests. The Research Division understands the value of these skill sets and is happy to provide a networking platform.

A small but important change that should be mentioned is that the old mail area on the first floor of UDOT headquarters will be remodeled to display the Research and Innovation posters from the UDOT Annual Conference and from our complete research projects. The start and end date of this project is currently in the finalization stage.

For more information contact Steve Bagley, at [Sbagley@utah.gov](mailto:Sbagley@utah.gov).

## **Research Calendar of Events/Updates**

### **2012 RESEARCH & INNOVATION POSTER SESSION**

The UDOT Annual Conference 2012 is approaching. This year the Annual Conference will be combined with the first ever Trans Tech Conference. The dates for the combined Conference are October 29 - November 1, 2012. For the second year in a row, the UDOT Research Division will be hosting the Research & Innovation Poster Session in the mail hallway of the South Town Expo Center on October 30 from 8:30A.M. until 12:00P.M. (noon).

This is a poster session where new transportation engineering ideas, concepts & professional projects are displayed in the main hall. Meet creative minds and discover new approaches to transportation practices. UDOT engineers, consultants, university professors and students will present transportation challenges and solutions in an informal setting.

For more information about the UDOT Annual Conference please click the link: [UDOT Annual Conference](#)

### **RESEARCH FUNDING OPPORTUNITIES** (click to see the full document)

**November 1, 2012** - Transit IDEA Proposals **DUE**

**December 10, 2012** - U.S. DOT Small Business Innovation Research (SBIR) Program **Solicitation Opens**

### **WEBINARS** (click to see the full document)

**October 4, 2012** - Eat Well to Work

**October 9, 2012** - How to Reach Peak Performance As a Manager

**October 16, 2012** - 2012 Public Release of Interactive Highway Safety Design Model (NHI)

**October 23, 2012** - Performance-Based Sealant Grading (SG) Specifications for Hot-Poured Crack Sealants (TRB)

**November 5, 2012** - The Fundamentals of Public Speaking

**November 5, 2012** - Asset Management for Sustainable & Responsible Infrastructure (NHI)

**November 14, 2012** - Four Leadership Behaviors That Build or Destroy Trust