

IN THIS ISSUE

RESEARCH HIGHLIGHT:

“UDOT’s CIR Research Recognized as High Value by AASHTO RAC”
Cold-in-Place Recycling wins Sweet Sixteen Award. [p. 5]

“Reducing Project Costs Due to Utility Relocations”
Recommendations provided for how to better measure these costs.
[p. 6]

“Utilizing LiDAR Data to Analyze Access Management Criteria in Utah”
Access management safety hotspots identified for State Street in Orem, Utah. [p. 7]

UPDATES:

“Welcome to the Division, Patrick Cowley”
New Innovation and Implementation Manager joins the Research and Innovation Division. [p. 2]

“UDOT and Partners Purchase STRAVA Metro Dataset”
Informing decisions for active transportation facilities through quantitative data analysis. [p. 3]

“UDOT Utilizes Socrata Online Platform to Communicate Management Data”
Relying on data to guide its future. [p. 4]

“UDOT Hosts South Dakota Department of Transportation Employees”
Aim to glean information regarding UDOT’s innovative approaches. [p. 2]

INNOVATION:

“Finding New Ways to Analyze Driver Behavior on Urban Freeways”
Immediate actions taken for increased safety. [p. 8]

“New Utah Wildlife Escape Ramp Designs Prove Successful”
Summary of TRB idea implementations for 2017. [p. 9]

NATIONAL INNOVATIONS FUNDING OPPORTUNITIES WEBINARS

ACCESS UDOT RESEARCH:

www.udot.utah.gov/go/research

CONTACT EDITORIAL STAFF:

Joni DeMille
jdemille@utah.gov

David Stevens
davidstevens@utah.gov

A MESSAGE FROM THE RESEARCH DIRECTOR

By Cameron Kergaye, Ph.D., PMP, P.E.

Research at UDOT has a new mission and a new name: **Research and Innovation**. The goal is to **seek, share and implement innovations** throughout UDOT. Many of our research projects have resulted in new and innovative practices such as reducing project delays due to utility relocations, streamlining our access permitting process, and simplifying prediction of liquefaction effects. Other innovations are developed by our Central or Region professionals. For example, Project Development is testing unmanned aircraft systems for landslide monitoring and infrastructure management. And Region Three’s Lehi Maintenance Station recently manufactured a safer grate lifter for maintaining drainage boxes.

Our new Research and Innovation Division also has a **new employee**, Patrick Cowley, who will manage the communication and implementation of innovations such as those in the recent Innovation and Efficiencies Report. We will now **actively seek and support innovations** throughout the year, even as we continue to work on traditional UTRAC projects.

Opportunities for innovation exist throughout the Department, and we are forming an **Innovation Working Group** that will support the development of new practices and creative solutions. Additional sub-groups, such as the newly formed TRB implementation committee, will help internally communicate and navigate road blocks to implementation.

We are also eagerly anticipating the opening of the **new UDOT Learning Center** along with the renovated Lester Wire Library. This new area will allow for greater opportunity to share information and support the Department’s emphasis areas of Education, Collaboration, and Innovation. It is expected to open later in July.

From formal research projects to implementation groups, we look forward to **take your innovative ideas from principle to practice**. If you have an idea to share, please email us at ideas@utah.gov. Your ideas keep us moving in the right direction.

UPDATE

Welcome to Research and Innovation

By Patrick Cowley, P.E.

This 'Welcome to the Division' article will be a little different than ones you are used to. I was given the assignment to write my own, which isn't totally out of the norm, because, hey, who knows more about me than, well, me. However, welcoming yourself to your new duties is kind of like throwing your own welcome home party. Yea, I'm happy to see me, and you should be too.



The difference with this article is that I've decided not to write it in the third person. As such, I won't be able to hide behind a phantom writer and say all sorts of nice things about myself and pretend that's how other people feel. Without that protection, if I end up writing nice things about myself, I may cross the line of self-assurance into narcissism. Gratefully, there are plenty of you out there that help keep me grounded. Thank you one and all.

Some background: I come from a family of six kids and was raised in the wilds of Wyoming. (Let's be real, are there many civilized parts of Wyoming?) I am married with two daughters, 12 and 9. I studied at Utah State and graduated with a Master's Degree in Civil Engineering. After three and a half years working in Southern California in the Geotechnical field, I returned to Utah to the State Dept. of Natural Resources for a brief stint in the Water Resources Division. I've been with UDOT for the past ten plus years in various capacities and have enjoyed every minute of it. For fun, I've taken up playing the ukulele.

I love to learn and like many of you, I like to take on new challenges and find better ways to do things. I'm grateful for this opportunity to join our research folks where I will now be immersed in this regularly with all of you in your challenges and successes.

With that said, the Research Division is expanding our focus to include a **greater emphasis on innovation and implementation**. I've been tasked with working with your groups across the State **to help get your ideas off the ground and across the finish line**. Ideas come from everywhere and we recognize that each of you do your own research on ideas every day. You want to try new things and to be more efficient. We want to help. From research projects submitted through UTRAC, to experimental features, to improving processes; there are a number of ways to test and try your ideas.

You have enough to do and finding a way through a bureaucratic maze to implement your innovations or efficiencies shouldn't be part of that. Let us help you to find funding, cut red tape, and get your idea implemented. We are organizing efforts to make submission and implementation easier. If you have an idea, we want to know about it.

Contact us anytime through our [Innovation and Efficiencies website](#), by email patrickcowley@utah.gov, or if you're really adventurous, give me a call at 801-648-5459. Welcome to the Research and Innovation group.

UDOT Hosts South Dakota DOT Employees

By Patrick Cowley, P.E.

In early May we had a great opportunity to host employees from the South Dakota Department of Transportation. This was a scan tour unlike others that we had done or hosted in the past. It was unique in that they brought a large group that represented a cross section of their Department. Their **aim was to glean as much information regarding UDOT's innovative approaches** in as many areas as they could while on their visit and to establish relationships with UDOT employees in the various disciplines.

We had 12 meetings over a single day to address as many of their areas of interest as we could. It was an exciting day with meetings being held at Region 2, the TOC, and the Complex. It was informative to hear the conversations that took place between individuals with similar roles but at different DOTs. Areas covered ranged from Variable Speed Limits, TOC functions, through Management Approaches.

They traveled by bus and also visited the Wyoming DOT on their road trip. This approach allowed for greater discussion between their participants (I-80 through Wyoming provides ample time for conversation) and for work to be done remotely while on the road.

While we don't currently have plans to undertake a similar effort, if you think this may be of value to you and your discipline, we'd like to know. Are there nearby states that have practices that you'd like to explore further? Do you see benefit in coordinating efforts within the Department and with other DOTs for greater innovation and implementation possibilities?

Email me at patrickcowley@utah.gov to express interest or to ask additional questions about the South Dakota visit.



Visitors from South Dakota DOT meet with UDOT staff.

UPDATE

UDOT and Partners Purchase STRAVA Metro Dataset

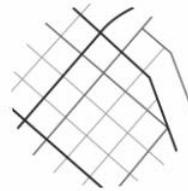
By Heidi Goedhart

UDOT and our partners (WFRC, MAG, and UTA) have jointly purchased the STRAVA Metro dataset for the State of Utah. This active transportation-oriented data means that UDOT is taking massive strides towards addressing and considering bicycling and walking throughout our Department.

This purchase is strategic in advancing UDOT’s Mission and Strategic Direction. Our Planning, Research and Traffic & Safety departments as well as our Regions and partners can all utilize this data to address safety, develop infrastructure and optimize mobility for active transportation users. As we work to reduce congestion and optimize mobility, active transportation will play an increasingly important role in creating an integrated transportation system. Having data from STRAVA and other sources will ensure we are making timely and effective investments since we can standardize methods for tiering and/or prioritizing active transportation investments by analyzing actual user metrics rather than relying exclusively on qualitative data or speculation. As we start incorporating data of this nature we will be establishing consistency in planning efforts, opening avenues of collaboration and creating efficiencies throughout the state. The license agreement between UDOT and STRAVA allows us to share with local planning entities, transportation departments, nonprofits and entities focused on improving active transportation throughout Utah.

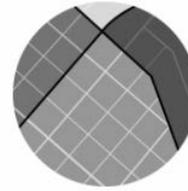
How it Works

STRAVA Metro allows planners and transportation decision makers to make informed decisions through quantitative data analysis. STRAVA provides a platform for users to upload their rides and runs with a smartphone or GPS device. This data is anonymized, aggregated and integrated into UDOTs centerline road network where we can analyze it in UPLAN/GIS to better understand cyclist and pedestrian activity, including: popular or avoided routes, peak commute times, intersection wait times, and origin/destination zones. Key features of analysis include user counts on streets, origin and destination areas by region as well as data gathered at roadway intersections.



Streets

Minute-by-minute activity counts across network



Origin/Destination

Activity starting and ending points, by area



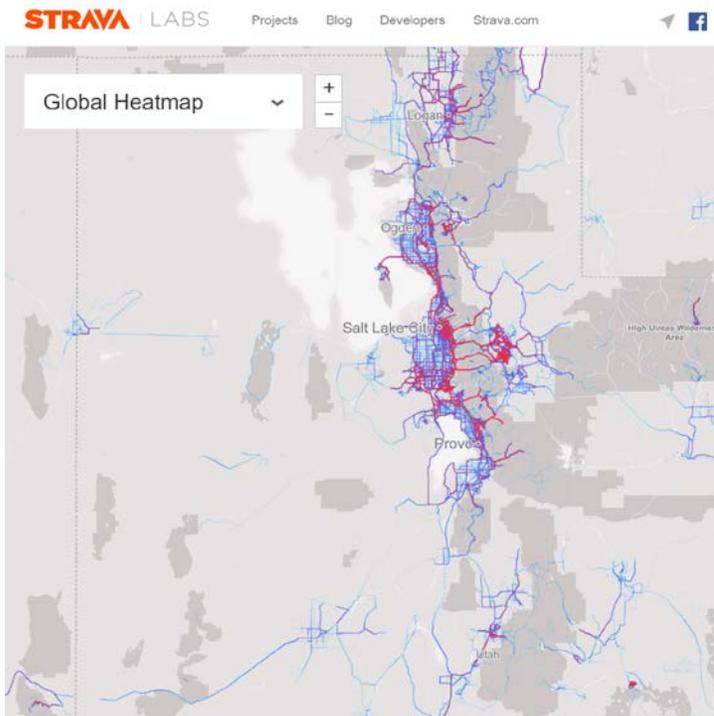
Intersections

Activity counts and wait times at every intersection

How to Access the Data

The STRAVA Metro dataset is accessible to UDOT and our partners. Data will be delivered quarterly by STRAVA and distributed by UDOT and the AGRC. The [STRAVA Global Heatmap](#) is a free visualization tool of the global dataset on STRAVA’s website. Heidi Goedhart, UDOT’s Active Transportation Manager, has hired a new intern, Matthew De Lora, to be the UDOT point person for STRAVA data requests. He can be available as a technical resource and will be able to accommodate data requests from our UDOT Regions and partners.

For more information, please contact Heidi Goedhart (hgoedhart@utah.gov) or Matt De Lora (mde@utah.gov), both with UDOT’s Program Development Group.



UPDATE

Socrata and the Utah Department of Transportation

By Sam Vanous



What is Socrata?

Socrata, in its most basic form, is a cloud-based data solution designed exclusively for city, county, state, and federal government organizations. Government organizations, such as UDOT, generate enormous amounts of data, and in many instances the data is housed in a repository with difficult access to the potential users.

For this data to be useful, it must first be organized and then made available to employees and the stakeholders that they serve. Once the data is made available, analysts must not only have the ability to work with the data to provide insight, but also share their results. To accomplish this Socrata houses the data, which can also be manipulated, and allows for the data to be visualized. Using Socrata, users can also build presentations (stories) to highlight the results of their analysis. Overall, Socrata provides a convenient application package that allows data to be stored, manipulated, and visualized.

How is UDOT Using It?

UDOT collects a huge amount of data each year, consisting of a variety of data sets (traffic, safety, snow plow, project related, etc.) Much of this data is siloed in the area in which it was collected, while the rest of the organization does not have easy access to the data. Data can now be examined simply, rather than using complex data warehouses and knowledge of advanced coding languages (SQL, SAS, etc.)

UDOT, being a complex organization, relies on data to guide its future. Socrata users can gain access to the data to build

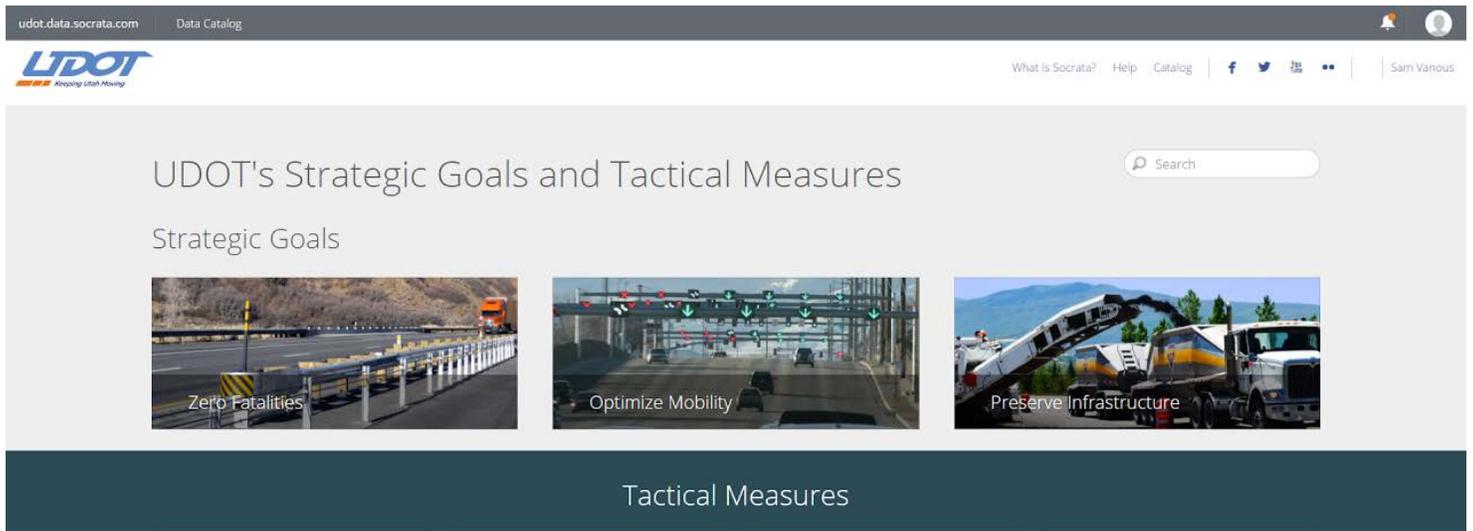
performance indicators that can help guide decision-making strategies. Two of the primary examples of this are the [Strategic Direction](#) and the [Program Delivery Dashboard](#). The Strategic Direction Story contains information regarding the three goals of UDOT: [Zero Fatalities](#), [Optimize Mobility](#), and [Preserve Infrastructure](#). The Program Delivery Dashboard examines how each region is doing regarding construction projects (both future and ongoing).

Transparency, for any government organization, is also important to the public that it serves. UDOT utilizes Socrata to remain transparent to all of its stakeholders. There are a variety of data sets and reports regarding the operations of UDOT, including: Budget, Expenditures, Other Finances, Materials, and Consultant Services. These are updated frequently and provide a quick and easy way to drill down into the operations of UDOT.

Future Directions

While the initial focus of UDOT was to design and build dashboards for immediate management needs, Socrata has slowly been updated with new data sets and functionality. Recently, eight additional data sets from ePM have been uploaded into Socrata, and are being updated daily. These Project datasets include: Ledger, Durations, Encumbrances, Funding, Contract Details, PIN Status, Funding Amendments, and Expense Funding Allocations. Additionally, data from UGate 1.0 (primarily GIS data) will also be moved into Socrata in the near future. This will allow users to display maps, along with the other graphs or charts necessary. With this additional data, UDOT users can explore and manage their projects more efficiently and accurately.

For more information, contact Sam Vanous (samvanous@utah.gov) of UDOT Business Information Technologies.



RESEARCH HIGHLIGHT

UDOT's CIR Research Recognized as High Value by AASHTO RAC

By David Stevens, P.E.

Each year the AASHTO Research Advisory Committee (RAC) coordinates submittals of High-Value Research projects from the four AASHTO Regions, as well as the selection of the year's "Sweet Sixteen" awards for top research projects. Through a voting process, RAC members in each of the AASHTO Regions select submitted research projects for the Sweet Sixteen awards. These top projects, completed in recent years, are selected for their proven implementation value based on each agency's submittal. The Sweet Sixteen research projects for 2017 will be recognized at the upcoming AASHTO RAC/TRB Representative Annual Meeting, the AASHTO Annual Meeting, and the TRB Annual Meeting.

In 2017 one of UDOT's completed research projects, aimed at improving the construction process and specification for Cold-in-Place Recycling (CIR) asphaltic base with solventless emulsion, is included in the high-value, Sweet Sixteen projects.



US-191 Indian Canyon CIR project

UDOT Central Materials initiated this multi-phase CIR research a few years ago. CME Transportation Group performed the research and developed a new approach for the mix design and the parameters that result in good CIR pavement performance. The engineered emulsion CIR material was found to behave more like an unbound material during the construction phase. Understanding this helped UDOT develop a density target based on field 30-gration pucks. The owner-control approach allowed us to use rolling patterns to set up the best compaction effort for mat density and to solve problems that come up in the

field. The specification was completely reworked and performance tests added from the CIR research to indicate if the mat is ready to open to traffic.

UDOT constructed four projects successfully in 2016 with the new specification for a total of approximately 30 centerline miles. Based on historical data, the resulting cost savings with the CIR process are up to 30 percent, or \$1,870,000, on these four projects when compared with typical reconstruction using hot-mix asphalt. At least one CIR project is planned for 2017 using the new specification, and the 2016 projects will continue to be watched for long-term performance.

For more information, contact Howard Anderson (handerson@utah.gov) in Central Materials, or David Stevens (davidstevens@utah.gov) in the Research Division. The Sweet Sixteen research projects for 2017 are listed in the table below, along with links to the research reports or project descriptions.

Arkansas SHTD	Ground Penetrating Radar in Highway Construction
Connecticut DOT	Nonfatal-Injury Crashes with Anti-icing Technology
Georgia DOT	Automatic Sign Inventory and Pavement Condition
Idaho DOT	State of Idaho Port of Entry Study
Indiana DOT	Site Selection for New Lighting Technologies
Louisiana DOTD	Roller Compacted Concrete over Soil Cement
Maine DOT	Rivet Testing on Maine Truss Bridge
Minnesota DOT	Hydraulics Inspection Vehicle Explorer (HIVE)
Missouri DOT	Online Surveys and Facebook for Customer Feedback
New York State DOT	Energy Efficient Highway Lighting Retrofits
Pennsylvania DOT	Bridge Deck Cracking and Effects
Texas DOT	Traffic Signal Timing and Coordination for Congestion Mitigation
Utah DOT	Cold In-Place Recycling Using Solventless Emulsion (and previous reports)
Virginia DOT	Cold Central Plant Recycling at NCAT
Washington State DOT	Earthquake Safety: Building a Flexible Bridge
Wisconsin DOT	Recycled Materials Resource Center

RESEARCH HIGHLIGHT

Reducing Project Costs Due to Utility Relocations

By Pedro Romero, Ph.D., P.E., and David Stevens, P.E.

Delays in relocating utilities can have a big impact on a highway transportation project's schedule and costs. As part of UDOT's effort to understand and reduce project costs incurred due to utility relocations, a study of 415 projects that were active from November 2012 through October 2016 was conducted by a partnership of university and private consultants. The data included 396 design-bid-build projects, 13 CM/GC projects, 4 design-build projects, and 2 other projects (which were emergency repair projects).



Example project with utilities

The analysis found that, out of the 415 projects studied, 99 had utilities and 17 had utility cost overruns. Cost overrun was defined as having the actual utility costs exceed the original utility budget by more than one dollar. Out of those projects with utility cost overruns, the average percentage overrun was 23%. A random sample of 10 projects that had utilities and were over budget was selected for detailed analysis and compared to a random sample of projects that were under budget and to a random sample of projects with no utilities.

The analysis resulted in the following recommendations for procedural changes to increase consistency in data collection and better account for utility relocation costs:

- The accounting system should be set up to track utility budgets at three stages: (1) programming, (2) beginning of design, and (3) prior to construction and after the majority of the utility agreements have been signed.
- The level of detail required from utilities for estimates used in preparing the utility agreements should be standardized.

FOCUS: Utility relocation costs

WHAT: Where are utility delays occurring, and how can we better measure the cost of utility relocations?

HOW: Mining and analyzing UDOT project data from PDBS, ePM, and ProjectWise

PRODUCT: Recommendations for procedural and accounting changes

- Separate line items in the accounting system should be set up for (1) utility relocation and (2) providing power to traffic signals, lighting, and signage so that they may be tracked separately.
- A Utility Agreement Log should be set up to track project, date of agreement, utility, amount, status, closeout status, and notes for each utility agreement.
- All of the utility costs incurred by the general contractor should be captured by the accounting system and charged against the utility relocation budget.
- Procedures should be established for closing out the utilities, collecting all of the related documentation, and identifying missing documentation.
- Procedures for documenting delays should be reviewed, and where needed, improved.
- Entering data in two different systems should be avoided, either by combining systems or having the systems share or exchange data.
- The utility relocation budget line item should be set up so that (1) the total utility relocation costs and (2) the utility relocation costs by utility could be easily obtained from the system.

Additional details on the study are available in the [research report](#). UDOT is currently upgrading their construction accounting system. Many of the suggested changes can be incorporated into this upgrade.

For additional information, please contact: David Stevens (davidstevens@utah.gov) of the Research Division or Alana Spendlove (aspendlove@utah.gov) of Statewide Railroad and Utilities. Alana is the current UDOT Champion for this study. Dr. Pedro Romero of the Univ. of Utah was the lead researcher, with Steven Peterson, Mary Watson, and Aaron Watson as assistant researchers. Additional contributors included Michelle Page, PJ Roubinet, Josh Van Jura, Tucker Doak, and Elaine Fanning, all of UDOT, Richard Manser (UDOT retired), and Jeff Mikell (contractor).

RESEARCH HIGHLIGHT

Utilizing LiDAR Data to Analyze Access Management Criteria in Utah

By Grant G. Schultz, Ph.D., P.E., PTOE; Marlee L. Seat, EIT; Mitsuru Saito, Ph.D., P.E.; Wyatt Clegg

UDOT has completed a Light Detection and Ranging (LiDAR) data inventory that includes access locations across the UDOT network. The new data are anticipated to be extremely useful in better defining safety and in completing a systemwide analysis of locations where safety could be improved, or where safety has been improved across the state. The Department of Civil and Environmental Engineering at Brigham Young University (BYU) has worked with the new data to perform a safety analysis of the state related to access management, particularly related to driveway spacing and raised medians.

The primary objective of this research was to increase understanding of the safety impacts across the state related to access management. This was accomplished using the LiDAR database to evaluate driveway spacing to aid in hot spot identification and to develop relationships between access design and location as a function of safety and access category (AC). Utah Administrative Rule R930-6 contains access management guidelines to balance the access found on a roadway with traffic and safety operations. These guidelines were used to find the maximum number of driveways recommended for a roadway. ArcMap 10.3 and Microsoft Excel were used to visualize the data and identify hot spot locations as illustrated in the figure below for State Street in Orem, UT. The analysis compared current roadway characteristics to the R930-6 guidelines to find locations where differences occurred as outlined in the table below for the analysis based on urban code and access density.

FOCUS: Access Management

WHAT: How can we utilize LiDAR data to analyze access management?

HOW: Identify hot spot locations using GIS

PRODUCT: Safety impacts from raised median use for access management

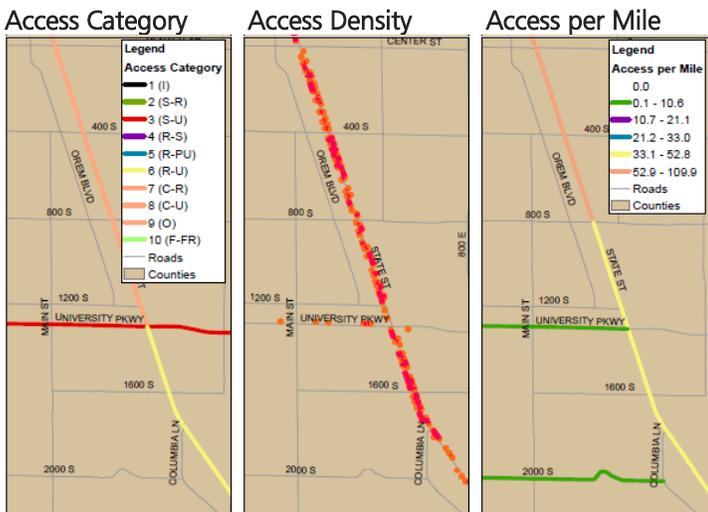
AC	Total AC	New Access Category									
		1	2	3	4	5	6	7	8	9	10
1	336	329	5	0	0	0	0	0	0	0	0
2	331	0	321	0	4	5	0	1	0	0	0
3	203	0	11	106	4	67	3	5	4	3	0
4	484	0	50	0	385	19	7	19	2	2	0
5	313	0	1	0	0	193	53	2	40	24	0
6	145	0	3	0	3	26	78	5	16	14	0
7	274	0	43	0	11	9	0	200	0	11	0
8	82	0	1	0	0	6	0	0	68	7	0
9	12	0	0	0	0	0	0	0	0	12	0
10	-	-	-	-	-	-	-	-	-	-	-
Key:		Green: Current AC Matches Field Data			Light Red Cells: <10% Total AC Segments				Dark Red Cells: >10% Total AC Segments		

New AC assignments based on urban code and access density.

This analysis does not indicate the current AC is incorrect; it simply means that the assigned AC does not meet current roadway characteristics based on the LiDAR data analysis.

A hierarchical Bayesian statistical before-after model, created in previous BYU safety research, was used to analyze locations where raised medians have been installed. Twenty locations where raised medians were installed in Utah between 2002 to 2014 were used in this model. The model analyzed the raised medians by AC. Only three AC were represented in the data. Regression plots depicting a decrease in crashes before and after installation, posterior distribution plots showing the probability of a decrease in crashes after installation, and crash modification factor (CMF) plots presenting the CMF values estimated for different vehicle miles traveled (VMT) values were all created as output from the before-after model. Overall, installing a raised median reduces all crashes by 53 percent. Individual AC analysis yielded results ranging from 32 to 44 percent for all severity groups except severity 4 and 5. When the model was only run for crash severity 4 and 5, a larger reduction of 57 to 58 percent was found.

For more details, see the [research report](#) or contact Kevin Nichol (knichol@utah.gov) of the Research Division or Grant Schultz (gschultz@byu.edu) of BYU.



Map comparing existing AC and line density and spatial join for State Street in Orem, UT.

INNOVATION HIGHLIGHT

Finding New Ways to Analyze Driver Behavior on Urban Freeways

By Juan Medina, Ph.D.

Urban interchanges in close proximity to each other generate weaving traffic as drivers try to enter, exit, and travel through the roadway section between them. There is a significant amount of research on geometric criteria, traffic operations, and signing in the context of freeway ramp spacing. More recently, researchers have started to analyze the safety impacts of ramp spacing and the presence of an auxiliary lane. For example, a 2015 study conducted at the University of Utah developed crash modification factors (CMFs) and severity distribution functions (SDFs), describing how the safety benefit of auxiliary lanes becomes larger as ramp spacing becomes shorter.

While these findings represent statistical associations, they are purely empirical and do not explain the underlying, causative reasons for the crash patterns. Researchers at the University of Utah are now studying naturalistic driving data with the objective of quantifying driving behavior and examining sequences of events that lead to crashes and near crashes. They are also using this data to identify viable implementable countermeasures to improve highway safety from a “cause-effect” perspective.

Given the practical limitations of field and laboratory experiments to capture the complexity of driving behavior around freeway interchanges, data from SHRP2’s naturalistic driving study (NDS) opens unique opportunities to analyze merging, diverging, gap acceptance and other lane-changing and lane-keeping activities. The NDS data includes detailed video of both the driver and the roadway. This data also includes information collected from in-vehicle devices including speed, acceleration, braking and other maneuvers of actual driver behavior during every trip taken by 3,147 volunteer drivers (ages 16-90+) over a one- or two-year period.



Sample sites on I-40 Raleigh, NC, approx. 600 vehicle traversals.

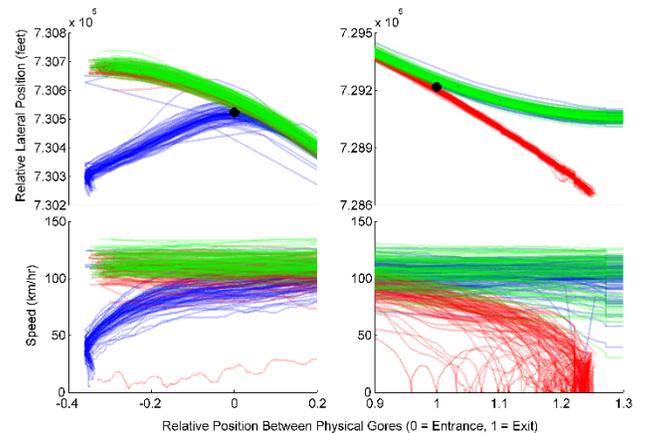
FOCUS: Driver Behavior

WHAT: Studying naturalistic driving data

HOW: NDS for 56 sample sites with urban interchanges in close proximity

PRODUCT: Quantification of driver behavior and event sequences leading to crashes

This study is in Phase 2 and focused on 56 locations in North Carolina and Washington, carefully selected to provide data from through, entering, and exiting maneuvers with balanced distributions of ramp spacing, presence or not of an auxiliary lane, and driver demographic characteristics.



The chart above displays vehicle trajectories (top) and speed profiles (bottom) for the eastbound sample site in the aerial image, to illustrate the variability of the data near entrance (left) and exit (right) points. The physical gores at the entrance and exit ramps are indicated by black circles. The distance along the x-axis is represented using the relative distance between the physical gores. For example, locations before the entrance gore have values less than zero. This scale allows comparisons of time-series data between sites based on the distance traversed between two interchanges.

This research project is part of the FHWA’s SHRP2 Implementation Assistance Program and is led by PI and Research Assistant Professor Dr. Juan Medina (juan.c.medina@utah.edu), and Ph.D. student Jeffrey Taylor (jeff.d.taylor@utah.edu) from the University of Utah, with support from UDOT champions Jason Richins (jrichins@utah.gov) and Scott Jones (wsjones@utah.gov). More information can be found on the [FHWA SHRP2 website](#) and in the Phase 1 [published paper](#).

INNOVATION HIGHLIGHT

New Utah Wildlife Escape Ramp Designs Prove Successful

By Patricia Cramer, Ph.D. and Pam Kramer

Getting wildlife out of fenced highway rights-of-way (ROW) and back to the safety of the wild side is an ongoing challenge. Several gate and ramp designs have been tried over the years, with limited success. In 2013, the Utah Division of Wildlife Resources (UDWR) North Regional Office in Ogden collaborated with UDOT Region 1 to design, install, and monitor two new escape ramp designs along US-91 in the Wellsville Mountains. These new designs realign the ramp so that animals moving parallel to the fence encounter the jump-out perpendicular to their line of movement. These ramps were monitored by Dr. Cramer from 2013 into 2017, and were shown to be 48 to 50 percent effective in allowing mule deer to escape the ROW—significantly higher than standard ramps—and 87 to 100 percent effective in deterring mule deer on the wild side from jumping up and accessing the road ROW. UDOT maintenance personnel also found these designs to be very effective in channelizing animals that they have to herd out of the ROW.

Dr. Cramer placed monitoring cameras on a new two-sided escape ramp, and on two of the high migration ramps. Monitoring results from 2013 into 2017 revealed a high mule deer willingness to jump off these new ramp designs. Also, of the dozens of mule deer and one elk that approached the three ramps from the wild side, there was only one mule deer buck that jumped up onto the ramp to access the right-of-way. That breach lasted just three minutes, after which the buck jumped back to safety and away from the road. Additional details are included in a [longer article](#) by consultant Patricia Cramer (cramerwildlife@gmail.com) and Pam Kramer (pamkramer@utah.gov) of UDWR.

FOCUS: Wildlife escape ramps

WHAT: Are new two-sided and three-sided ramps effective?

HOW: Wildlife camera monitoring

PRODUCT: Proven wildlife escape ramp designs for future projects



Mule Deer on the Wild Side of the Right-of-Way Fence near Mantua Were Never Recorded Breaching the Two-Sided Runway Ramp.



Mule Deer Doe and Later Fawn Jumped to Safety Off the Two-Sided Runway Escape Ramp near Mantua.



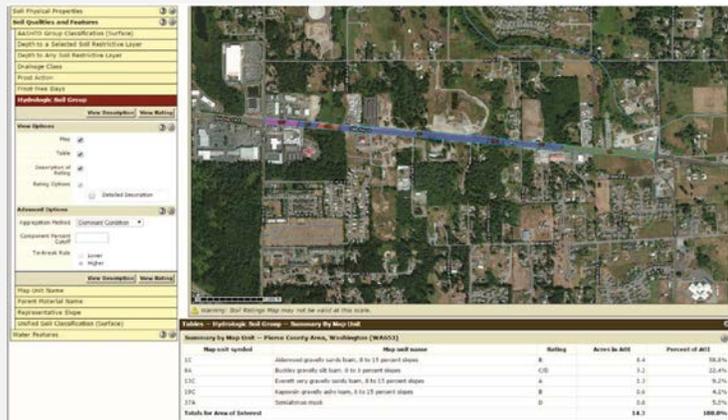
Bull Elk Evaluated the Three-Sided Escape Ramp and did not Jump Up to Access US 91.

NATIONAL INNOVATIONS

*Click on innovation titles for more information.

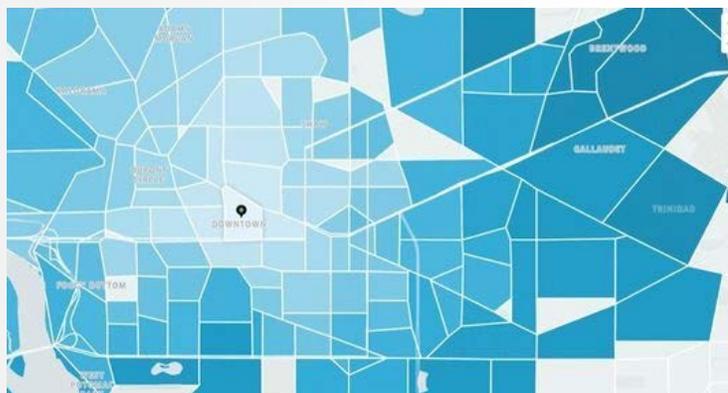
NCHRP Report 840: A Watershed Approach to Mitigating Stormwater Impacts

This report provides a practical decision-making framework that will enable state DOTs to identify and implement offsite cost-effective and environmentally beneficial water quality solutions for stormwater impacts when onsite treatment and/or mitigation is not possible within the right-of-way. This framework and accompanying MS Excel program could help UDOT with planning for mitigation options.



Why is Uber Giving Away Traffic Data?

Uber plans to display data of anonymized travel between points in cities in a public website called Movement. Uber will first invite planning agencies and researchers to access the data. UDOT and municipalities in Utah could consider similar partnering opportunities to aid transportation planning efforts. Below is a map of Washington, D.C. the week of March 16, 2016 showing average travel times. During this period portions of the DC Metro were shut down for emergency safety checks. The map was made using Uber Movement's data.



Colorado in Running for Experiment of Levitation-Based Transportation

Hyperloop One, the Los Angeles-based company that is proposing to build levitation-based technology to carry passenger and cargo systems at speeds of up to 700 mph, has selected the Rocky Mountain Hyperloop team as one of 35 world-wide semifinalists to build the new technology. The team includes Colorado DOT, the firm AECOM, some Colorado municipalities and airports, and other sponsors.



Iowa State Engineers Dive into Big Data to Develop Better System to Manage Traffic Incidents

Iowa State University researchers are helping Iowa DOT by taking large quantities of traffic data, analyzing it, making sense of it, and finding ways to support improved decision making. One example is development of a smart system for managing traffic when there's a crash, a stalled vehicle, or bad weather.

FUNDING OPPORTUNITIES

Month	Description	Day/Date	More Info
Multi-Year	FHWA AID Demonstration Grant Program (under the FAST Act). Applications started in September 2016.	2016-2020	Website
August	NCHRP Project 20-7 Fall Submission Cycle Proposals for Research Projects. NCHRP Project 20-7, Research for the AASHTO Standing Committee on Highways (SCOH), provides SCOH with a means to conduct research needed by the Committee and its Subcommittees to fulfill their responsibilities. Proposals may be submitted by committees reporting to SCOH. Proposals are due to AASHTO on August 25, 2017.	August 25, 2017	Website
September	2017 AASHTO Innovation Initiative Nominations. The purpose of the AASHTO Innovation Initiative is to identify and champion the implementation or deployment of a select few proven technologies, products or processes that are likely to yield significant economic or qualitative benefits to the users. Innovations may be nominated by State and local DOTs, and organizational units of AASHTO. Nominations are due to AASHTO on September 1, 2017.	September 1, 2017	Website
	NCHRP Highway IDEA Proposals. The NCHRP Highway IDEA program seeks innovative proposals with potential to advance the construction, safety, maintenance, and management of highway systems. Proposals are due to NCHRP on September 1, 2017.	September 1, 2017	Website
	2018 US Domestic Scan Program Topic Proposals. In coordination with NCHRP and FHWA, AASHTO announces the CY-2018 Solicitation for the Domestic Scan Program. Scans are intended to accelerate dissemination of particularly promising new practices among transportation agencies. Proposals are due to AASHTO on September 29, 2017.	September 29, 2017	Website
October	NCHRP FY 2019 Problem Statements. NCHRP solicits annually for research project ideas, or problem statements, that could provide highway transportation solutions to multiple states. These are typically larger, multi-year research projects. Only state DOTs, AASHTO committees and subcommittees, and FHWA may submit NCHRP problem statements, and state DOTs later participate in prioritization voting. Problem statements are due to NCHRP on October 15, 2017.	October 15, 2017	Website

[Full 2017 Research Funding Calendar](#)

WEBINARS

Topic	Event	Day/Date	Time	Join
Transportation Research Board Webinars				
Pavement	Pavement Management Practices in the US and Canada	Monday, July 17	11:00 AM – 12:30 PM	Register
Pavement	Application of Intelligent Compaction Technology for Compaction Quality Control of Pavement Layers	Thursday, July 20	12:00 PM – 1:30 PM	Register
Airports	An Integrated Approach to Managing Regulatory Compliance	Tuesday, July 25	12:00 PM – 1:30 PM	Register
Roundabouts	Accessibility Guidance for Roundabouts and Channelized Turn Lanes	Wednesday, July 26	11:00 AM – 12:30 PM	Register
Slope Stability	Guidelines for Geofoam Applications in Slope Stability Projects	Thursday, July 27	12:00 PM – 1:30 PM	Register
Personal Development Webinars				
Management	Connect Then Lead: How to Get Influence and Use It	On Demand	On Demand	Register
Communication	Develop Your Signature Voice	On Demand	On Demand	Register
Communication	Effective Communication Techniques to Steer and Influence Any Conversation	Tuesday, Aug 8	11:00 AM – 12:00 PM	Register

*Webinars are open to all interested employees to view from your own computer. Please register individually for TRB webinars before the event. Register instantly for on-demand webinars, which may be viewed at your convenience. Contact Joni DeMille at jdemille@utah.gov with any questions.

[Webinar Details](#)