

# Research Newsletter

**Responsive - Accessible - Relevant**

## A MESSAGE FROM THE RESEARCH DIRECTOR

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

UDOT Research is excited to enter the New Year with bold objectives for innovative research and implementation. We are also making plans for our next research workshop in March to identify important research for next fiscal year.

DOTs around the country received some good news last month with passage of the FAST Act. Along with investing in our nation's surface transportation infrastructure, the bill provides good support for transportation research through a general continuation of research funds. It also provides funding for deploying new technologies, studying maintenance needs of the Interstate Highway System, and piloting user fee-based alternative revenue mechanisms. The bill also supports the University Transportation Centers program with matching funds for transportation research.

For the TRB Annual Meeting, which takes place in DC the week of January 10, UDOT will send about a dozen engineers and leaders to attend and present advances in research and practice. Many innovative ideas, proven methods, and more efficient and safer technologies will be presented. UDOT attendees return with specific advancements to deploy.

Early this month NCHRP requested state DOTs to vote on 102 new research problem statements for FY 2017 funding. UDOT developed or co-developed two of those problem statements. There is approximately \$35 million for new and continuation projects. Each funded project is generally several times larger than the average UDOT Research project. This March I will attend an NCHRP meeting to assist in the selection of first round balloting.

Every year TRB sends one of their Technical Activities Division program officers to visit with UDOT's divisions. In October, we met Dr. James Bryant, who coordinates TRB research projects relating to Maintenance and Preservation. During his visit we met with the Maintenance, Asset Management, Research, Learning & Development, Traffic Management, and Weather groups. Dr. Bryant also toured the Traffic Operations Center, visited a maintenance station, and presented at the UDOT Annual Conference. We appreciate Dr. Bryant and everyone who helped with his visit.



*Dr. Bryant of TRB (L) with Cameron Kergaye*

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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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2016 UTRAC

# RESEARCH

## WORKSHOP

**March 28<sup>th</sup>**  
**Salt Lake Community College – Miller Campus**  
**9750 South 300 West**  
**Sandy, Utah**

**Subject Areas:** *Materials & Pavements, Maintenance, Traffic Management & Safety, Pre-Construction, and Planning.*

We need your ideas for new UDOT research projects and will prioritize these at the Workshop. The Problem Statement form is online and will be due by **March 14, 2016**. Please contact Tom Hales (tahales@utah.gov) for more information.

◆ **Keynote Speaker:** Ogden Mayor, Mike Caldwell

UTRAC website: <http://www.udot.utah.gov/main/f?p=100:pg::::1:T,V:234>

***WE HOPE TO SEE YOU THERE!***

## Highlights from the 2015 Annual Efficiencies Report

Efficiencies within UDOT often generate cost savings for the public and the Department through better utilization of resources and innovative technologies. At the end of each year, UDOT prepares an efficiencies report which summarizes key efficiency initiatives from the year. The annual report fulfills a requirement for UDOT to describe the efficiencies and significant accomplishments achieved during the past year to the State Legislature. UDOT Senior Leaders use the report in presentations during legislative committee meetings.

Following are the key efficiency initiatives summarized in the FY 2015 report:

- SUCCESS Framework Initiative
  - Statewide Access Management Program
  - Preconstruction Project Scoping
  - Ports of Entry Truck Processing
  - Snow and Ice Control
  - Procurement System
  - Heavy Duty Truck Maintenance
- Walking School Bus Mobile App
- Crash Analysis Reporting Tool
- Flashing Right Turn Arrow
- Freeway Performance Measurement Website
- Utah State Rail Plan
- Specification Generator and Other Tools
- Moving To An Intelligent Design and Construction Environment
- Hydrodemolition Bridge Rehabilitation Treatment
- Tow Plow Sander Improvements
- Tablet-Based Mobile MMQA Collection
- Utility Agreement Tracking Tool

One example from the 2015 report is the SUCCESS Framework Initiative, a set of management principles from the Governor's Office of Management and Budget, designed to boost the quality and efficiency of government services, with the goal of improving government operations and services by 25% by the end of 2016. One of the six major systems that UDOT is focusing on for the SUCCESS Framework is the Procurement System. The UDOT Procurement Division improved procurement requisition quality throughput by 50.4% in FY 2015 with requisition process improvements through procurement training sessions, revision of policies, and develop-

ment of purchasing and contract guides for end-users.

Another example from 2015 is the Tablet-Based Mobile MMQA Collection. UDOT collects maintenance asset condition data biannually using significant personnel resources. Utilizing a tablet-based mobile application, UDOT's Maintenance Management Quality Assurance (MMQA) field data collection efficiency and accuracy was increased over previous hand collection methods. The mobile tablets also improved data transfer to the business system and resulting spatial representation of the results. The resulting cost savings of approximately \$200,000 per year comes from a 25% reduction in data collection time and costs.



*Example of fence assets included in semiannual, tablet-based, asset condition data collection*

The UDOT Research Division coordinates each year with UDOT Senior Leaders and the Communications Office to collect and compile write-ups on the past year's key efficiency initiatives. We appreciate all of the UDOT Regions and Groups that submitted FY 2015 efficiencies topics and write-ups on the key items. This process will start again in August for FY 2016.

The 2015 and earlier annual reports are available online at [www.udot.utah.gov/go/efficiencies](http://www.udot.utah.gov/go/efficiencies). For more information, contact David Stevens ([davidstevens@utah.gov](mailto:davidstevens@utah.gov)) or Joni DeMille ([jdemille@utah.gov](mailto:jdemille@utah.gov)) of the Research Division.

## Impact of Bicycle Corridors on Travel Demand in Utah

Bicycling as an alternate mode of transportation has been on the rise. It is environmentally friendly in nature and the associated health benefits have made it a popular choice for many types of trips. With the implementation of the UDOT *Inclusion of Active Transportation* policy, information on type and level of impact of bicycle facilities has become more important to UDOT. The purpose of this research is to increase understanding of the travel demand impacts of implementing bicycle corridors, like the one illustrated in Figure 1, as part of the UDOT *Inclusion of Active Transportation* policy.

Several analyses were conducted to determine if there were any relationships that existed between bicycle rates and average annual daily traffic (AADT), posted speed limit, number of lanes, or roadway classification; and if so, if the relationship was statistically significant. The results of the



Figure 1: Grant Avenue 2125 South, Ogden

AADT analysis revealed no statistical significance between bicycle rates and AADT, but the analysis did indicate a distinct trend toward a decrease in bicycle rates as AADT increased. The posted speed limit analysis revealed statistical significance and a distinct trend in bicycle rates decreasing as the posted speed limit increased as illustrated in Figure 2. Posted speed limits from 20 to 30 mph revealed the highest bicycle rates in the analysis. The results of the number of lanes analysis revealed no statistical significance as no specific lane configuration revealed a higher bicycle rate than another. For the roadway classification analysis, three different evaluations were conducted. The first two evaluations revealed no statistical significance in a relationship between bicycle rates and roadway classification; however, the third analysis did reveal a potential difference (not statistically significant) between the Major Collector and Minor Arterial classifications and the other classifications.

After the individual analyses were conducted, a mixed model analysis was also conducted to determine if roadways with bicycle infrastructure had higher bicycle rates than adjacent roadways without bicycle infrastructure. The results revealed a 40 to 66 percent increase in bicycle volumes on

roadways with bicycle infrastructure when compared to adjacent roadways that do not have bicycle infrastructure as part of the cross section. Roadways with bicycle infrastructure saw average bicycle rates twice that of roadways without bicycle infrastructure.

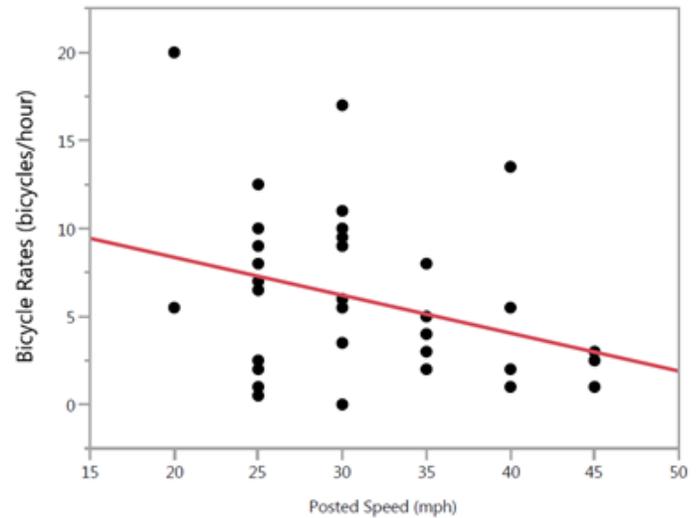


Figure 2: Bicycle Rate vs. Posted Speed

Finally, to gain a more historical perspective on bicycle data, three trails in Utah County were reviewed to determine if bicycle usage has increased over the past year. The three trails reviewed from 2013 to 2014 were the College Connector Trail, Provo River Trail, and the Murdock Canal Trail. All three of the trails saw an increase in bicycle usage ranging from 1.7 to 7.5 percent (600 to 7,000 cyclists).

This research acts as a baseline to build upon when evaluating the impact of bicycle corridors in Utah. As more bicycle infrastructure is implemented and corresponding data are collected, the baseline can be added upon to meet the needs of all users on the transportation corridors in Utah.

For more information, contact BYU's Grant Schultz ([gschultz@byu.edu](mailto:gschultz@byu.edu)) or Tom Hales ([tahales@utah.gov](mailto:tahales@utah.gov)) of the Research Division.

## Opportunities for Young Professionals on TRB Standing Committees

Employees of UDOT have multiple opportunities to participate in committees, projects, and other activities organized by the Transportation Research Board (TRB). Some of these opportunities include serving on TRB standing committees, serving on National Cooperative Highway Research Program (NCHRP) project and synthesis panels, submitting and prioritizing NCHRP research problem statements, and attending the TRB Annual Meeting. The focus of this article is to highlight opportunities for young professionals (age 35 and under) who are interested in getting involved with TRB standing committees.



TRB maintains more than 200 standing committees and task forces representing almost all modes of transportation. The committees provide transportation researchers and practitioners with opportunities to join together in a variety of research and technology transfer activities. A list of standing committees by topic is available at the following link: <http://www.trb.org/AboutTRB/StandingCommitteesMT.aspx>.

TRB has a Young Members Council (YMC) that encourages young professional participation in the TRB community. According to Dr. Alison Conway, current Chair of the YMC and Assistant Professor at the City College of New York, both the YMC and TRB are eager to involve Young Members – particularly those representing the public sector – in relevant TRB committees and activities. The YMC website contains a number of documents that TRB has put together to help new and young members get involved. These are available under the “Resources for New Members” and “Resources for Young Members” tabs at the following link: <https://sites.google.com/site/youngmemberscouncil/home>.

Information on TRB standing committee member responsibilities is available at the following link: <http://onlinepubs.trb.org/onlinepubs/dva/membersguide.pdf>. Dr. Conway recently stated that Young Members are expected to contribute in the same ways that any member would. This includes participating in program development, developing research needs statements, assisting with committee

communications, etc. Members should generally be willing to actively participate in committee meetings and conference calls, and to actively contribute to at least one ongoing or ad hoc committee activity per year for the three-year term of appointment. Committees usually meet in person twice per year, in January and in the summer. Remote access is usually provided to call in to the summer meetings, given travel restrictions.

Young professionals can express interest in any of the many TRB standing committees. Once the chairperson of that committee hears of an interest, then the interested person submits a résumé and answers several questions. Up to four Young Members may be appointed to each committee. The first year of membership is similar to a probationary period, after which the Young Member may be appointed for a three-year period. There is also the opportunity to be a Friend of a committee if you are not appointed a member. This way, you are not an official participant, but you still get all the information that the committee gets. Both young and seasoned professionals can visit [MyTRB.org](http://MyTRB.org) to create or log into their MyTRB account and add themselves to the Friends list for the committees in which they are most interested. Within MyTRB, one can also search for committee chairs and members, including those at UDOT.

Benefits of TRB committee membership include professional development, networking, and more. Megan Leonard of UDOT serves as a Young Member on the TRB Standing Committee on Application of Emerging Technologies to Design and Construction (AFH30). She recently shared the following perspective on her experience: “As a Young Member of a TRB committee, I have the opportunity to receive information on new technologies, learn about excellent and innovative construction projects, peer review graduate students’ papers from all over the country, and offer opinions and endorsements for research projects. Peer review papers are assigned based on background and expertise, and I was able to use my design background for that.”

For more information on getting involved with TRB committees, see the links above or contact David Stevens ([davidstevens@utah.gov](mailto:davidstevens@utah.gov)) or Cameron Kergaye ([ckergaye@utah.gov](mailto:ckergaye@utah.gov)) of the Research Division, or Megan Leonard ([mleonard@utah.gov](mailto:mleonard@utah.gov)) of UDOT Region Two.

## Bicycle & Pedestrian Safety at Intersections: Phase 3

### Different Modes = Different Experiences

Cyclists and pedestrians face a greater risk of injury or death when involved in a crash as compared to drivers/passengers of motor vehicles. As the number of non-motorized roadway users has increased in recent years, there is a greater need to understand how engineering and design impact safety.

### Urban vs. Rural

Building upon Phases 1 and 2 of this research, this study sought to understand how non-motorized safety differs in areas outside the urban core of the Wasatch Front. By examining characteristics of the built-environment, roadways, and traffic signal programming, the factors creating the biggest impact on safety and crash rates in more rural communities were identified. This phase of data collection examined intersections in Cache, Tooele, and Washington Counties, and Moab City.



Cache County: High-Risk Intersections

### Collecting the Data

Using data from the Utah Office of Highway Safety and UDOT, crashes involving at least one pedestrian or cyclist were highlighted within each study area. Intersections with the highest numbers of incidents were then evaluated on 80 distinct criteria. Intersections with low crash rates were also evaluated and included in the analysis for comparison.

### What Makes an Intersection Dangerous?

The analysis found that high-risk intersections in less urbanized areas have significantly more travel lanes. The presence of bike lanes and left-turn lanes were significantly correlated to higher crash rates, particularly for pedestrians. Additionally, an analysis of demographics found that high-risk intersections were more likely to be located in areas with a large number of children and near neighborhoods with lower incomes.



Signage to Improve Visibility of Non-Motorized Travelers

### Recommendations

A majority of high-risk intersections were located along the main thoroughfare through the communities in the study areas. Because of this clustering of risk, improvements can be targeted to specific corridors. Recommendations include:

- ◆ Promote bicycle routes located on parallel facilities
- ◆ Provide signage promoting visibility of non-motorized users
- ◆ Incorporate treatments to reduce the impact of the large number of lanes (e.g. provide a pedestrian refuge, increase ped crossing times, etc.)
- ◆ Provide signage which educates pedestrians and cyclists regarding their responsibilities when crossing the roadway (e.g. educational ped-head call buttons, "caution" signage, etc.)

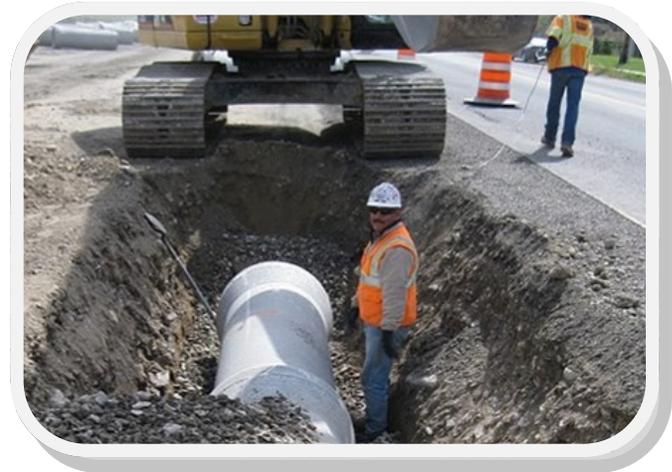
For more information, contact Jason Richins of UDOT's Research Division ([jtrichins@utah.gov](mailto:jtrichins@utah.gov)) or Shaunna Burbidge ([burbidge@walkbikeplan.com](mailto:burbidge@walkbikeplan.com)) of Active Planning.

## Update: Implementation of Ideas from the 2015 TRB Annual Meeting

In January 2015 a group of thirteen UDOT leaders and engineers attended the 2015 Transportation Research Board (TRB) Annual Meeting in Washington, D.C. to learn about the results of key transportation research and to network with others on best practices. Each UDOT attendee to the Annual Meeting brought back innovative, cost-saving ideas to implement at UDOT. In November 2015 this group attended the UDOT Leadership Team meeting to provide an update on implementation progress. Following are summaries of a few of the great ideas being implemented at UDOT from 2015:

**Wrong-way driver detection technology and response (Glenn Blackwelder)** – This supports UDOT’s existing initiative. The Traffic Operation Center (TOC) now posts messages on variable message signs reading “WRONG WAY DRIVER REPORTED – USE CAUTION” for 10 miles in each direction when we receive a wrong-way driver report. The TOC responded to 54 wrong-way driver incidents from Feb. through Oct. 2015. In addition, the TOC has started working on technology to better identify wrong-way drivers using our vehicle detection, both on the freeway mainline and at the off-ramp signals. We are also participating with UDOT Traffic and Safety and the Department of Public Safety on a wrong-way driving research project.

**3D modeling of utilities and mitigating underground risk (Lisa Wilson)** – The plan is for subsurface utility engineering (SUE) reports to include risk information and subsurface/pavement data together with 3D surveyed utility locations. A 3D utility database is being developed for UDOT. We are working with contractors on implementing our 3D initiatives.



*Opportunity to collect and use 3D utility locations*

**Safety and behavior-based safety (Rick Torgerson)** – The plan is to work with Operations on additional implementation ideas related to the ROADS program that UDOT is implementing. By implementing the ROADS program, we have seen a reduction of serious Workers Compensation claims year to date. The overall number of accidents is relatively unchanged, but the cost is going down. UDOT is seeking to lower the number of accidents and employee-related injuries by implementing additional ROADS safety ideas.

**Different perspective on managing pavement assets and their performance (Stan Burns)** – We reviewed the Washington State DOT strategy for possible implementation. From that we improved our process with the following: 1) Simple schedule with ties to the process; 2) Monthly working group collaboration; and 3) The working group forwards recommendations to a steering committee. Cost savings to UDOT is projected to be \$25,000 from improving our process.

**Evaluation of driver behavior and capacity in work zones to set work times on projects (Rob Wight)** – We are establishing better guidelines to set allowed work times on projects while optimizing costs and risks and maintaining mobility. We have used performance-based specifications to allow maximum flexibility to the team after bid. UDOT has developed a draft process to use construction

## Update: Implementation of Ideas from the 2015 TRB Annual Meeting (cont.)

costs in the evaluation of closure windows for construction.

[Geomembrane below the pavement section at MSE walls to provide corrosion protection for the majority of metal reinforcement \(Darin Sjoblom\)](#) – Due to concerns of causing pavement distress due to trapped water in the pavement section, the protective geomembrane had been eliminated above the metal reinforcement zone in our mechanically stabilized earth (MSE) wall designs. We contacted the Region Materials Engineers, and feedback was provided to help implement the geomembrane back into Special Provision 02831S. The membrane would be placed 2 feet below the granular borrow base of the pavement section. Cost savings to UDOT is projected to be 3 to 5 percent of MSE wall costs.

[Strategic location of satellite salt facilities for efficient snow and ice control \(Lloyd Neeley\)](#) – By reducing snow plow deadhead time with optimally placed satellite salt facilities, and in combination with optimally designed plow routes, UDOT can potentially save an additional 3 to 5 percent (about \$1 million) in its snow plowing operation, beyond the savings to be realized by implementing optimized plow routes only. If we elect to move forward with a statewide plow route optimization analysis, we can include a task in the current study to identify potential sites for satellite salt locations. The study is being refined with the consultant and District Engineers.

[Bicycling perspective on roadway design and operations \(David Adamson\)](#) – The plan is for designers and project teams to have a design "toolbox" with standards and preferred design options for bicycle facilities on state roads. We are working through the UDOT Active Transportation Committee to develop these standards and options. We will use many different standards available for bicycle facilities (NACTO, AASHTO, etc.) to develop our standards. The UDOT Active Transportation Committee decided to request funding to hire a consultant to help define the UDOT Active Transportation standards.

[Testing of the newest, state-of-the-art pavement friction testing equipment \(DF-Tester and CT-Meter\) \(Tom Hales\)](#) – This equipment was promoted and made avail-

able for loan by FHWA to states wishing to test it out. It incorporates the latest technologies in pavement friction testing and evaluation. The DF-Tester tests the friction of a pavement in a circular motion at a wide range of speeds. The CT-Meter checks the pavement texture using laser technology. We were able to incorporate the use of this equipment into the second stage of an existing friction-testing research project which will provide additional insight into the correlation of laboratory and field friction measurements for asphalt pavements. A UDOT research report summarizing this study will be available within the next few months. Estimated value of \$100,000 was attributed to the training and usage of the equipment that was provided through FHWA at no cost to UDOT.



*DF-Tester underside, showing rubber slider pads*

We look forward to learning about additional implementation successes at UDOT from those who attended the TRB Annual Meeting in the recent past as well as those who will attend in January 2016. For more information, contact the individuals named above or David Stevens ([davidstevens@utah.gov](mailto:davidstevens@utah.gov)) of the Research Division.

## Book Discussion: Review of *Leadership and Self-Deception*

The final book discussion of 2015 was on the The Arbinger Institute's *Leadership and Self-Deception*. Again, a number of UDOT employees took the opportunity to read the book, and several were on hand for the discussion with UDOT Deputy Director Shane Marshall on December 3rd.



Participants at book discussion

This book was written in a storytelling style — with fictional characters and organizations representing experiences compiled by the Arbinger Institute in

their years of work with actual organizations — to illustrate the concept of **Self-Deception**, and how to overcome it.

The central concept of the book is the “Box.” The term is used to refer to a state of self-deception that we insert ourselves into with an act of “self-betrayal” and where our perception of reality with regards to others becomes warped. When we are in the box, we see others as objects, rather than people.

### Self-Betrayal Points from the Book:

1. An act contrary to what I feel I should do for another is called an act of “self-betrayal.”
2. When I betray myself, I begin to see the world in a way that justifies my self-betrayal.
3. When I see a self-justifying world, my view of reality becomes distorted.
4. So—when I betray myself, I enter the box.
5. Over time, certain boxes become characteristic of me, and I carry them with me.
6. By being in the box, I provoke others to be in the box.
7. In the box, we invite mutual mistreatment and obtain mutual justification. We collude in giving each other reason to stay in the box.

When we are in the box, we think that others have the problem that is causing the friction in our relationships, when in fact the problem is ours, in our perception. These boxes undermine trust and working relationships, affect our bottom line as an organization, and cause unneeded anxiety and stress in our daily lives. Obviously, we need to find our way out of our boxes.

The book stresses what doesn't work in the box, in trying to get out of it:

- \* Trying to change others
- \* Doing my best to “cope” with others
- \* Leaving
- \* Communicating
- \* Implementing new skills or techniques
- \* Changing my behavior



Fortunately, as we become aware of our self-betrayal and question our own “virtue,” that allows us to see others as people again. “All of a sudden (the book states)...our box is

penetrated by the humanity of others. We know in that moment what we need to do—we need to honor them as people. And in that moment—the moment I see another as a person, with needs, hopes, and worries as legitimate as my own—I'm out of the box.”

Getting out and staying out of the box in all our various relationships takes ongoing and concerted effort, but pays huge dividends, both in productivity and personal happiness.

The next book in the discussion series with Shane Marshall will be *The Happiness Advantage: The Seven Principles of Positive Psychology That Fuel Success and Performance at Work*, by Shawn Achor. The first discussion, covering through Principle #3, The Tetris Effect (page 104), is scheduled for April 18 at 11:00 am at the UDOT Complex. Videoconferencing to the regions is available by advance request. Copies of both books can be checked out from Joni DeMille ([jdemille@utah.gov](mailto:jdemille@utah.gov)) in the UDOT Library. Audio copies of *The Happiness Advantage* are also available.



## Calendar of Events

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



NCHRP Synthesis of Practice Topics, DUE on February 15, 2016

NCHRP Highway IDEA Proposals, DUE on March 1, 2016

UDOT Research Problem Statements, DUE on March 14, 2016



### WEBINARS (click to see webinar details)

Title	Day/Date	Time
Promising Practices for Construction, Repair and Rehabilitation of Continuously Reinforced Concrete Pavement (CRCP) [TRB]	Thursday, Jan 28	12:00 PM -1:30 PM
Incorporating Transportation Security Awareness by Providing Interactive Training for All-Hazards Emergency Planning (TRB)	Wednesday, Feb 3	12:00 PM – 1:30 PM
Understanding Transportation Safety Risks on Tribal Lands: Learning from a Collaborative Research Project with American Indian Communities in Minnesota (TRB)	Thursday, Feb 4	12:00 PM – 1:30 PM
Implementing Energy Efficient Technologies for Cost-Savings at Airports (TRB)	Thursday, Feb 11	12:00 PM – 1:30 PM
Improved Test Methods for Specific Gravity and Absorption of Coarse and Fine Aggregate (TRB)	Thursday, Feb 18	12:00 PM – 1:30 PM
Tools for Optimizing Performance of Airport Operations and Maintenance (TRB)	Monday, Feb 22	12:00 PM – 1:30 PM
EPA’s Revised Ozone Standard (TRB)	Thursday, Feb 25	12:00 PM – 1:30 PM
A Sampling of Winter Maintenance Best Practices in Europe (TRB)	Monday, Feb 29	12:00 PM – 1:30 PM
Cities Beyond Driving (TRB)	Monday, March 7	11:00 AM – 12:30 PM
<b>NON-ENGINEERING WEBINARS</b>		
Leadership Self-Awareness: Getting Started with Knowing Yourself Better	On Demand	On Demand
Project Management for Everyone: A Non-Technical Approach	On Demand	On Demand
Growth Spurt! Three Ways to Become a Great Manager	On Demand	On Demand