Innovative Technologies and Methodologies
Utah Department of Transportation

PANEL ON TECHNOLOGY

COMMITTEE FOR A STUDY OF THE FUTURE INTERSTATE HIGHWAY SYSTEM

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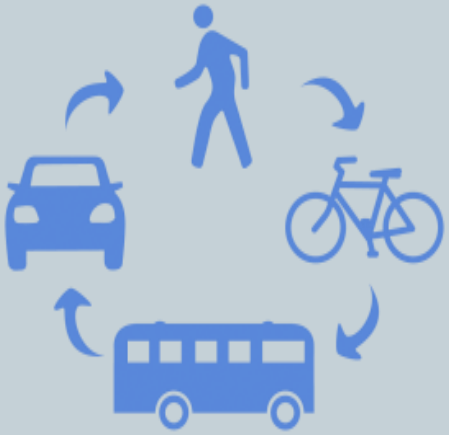
DECEMBER 19, 2016

Innovating transportation solutions that strengthen Utah's economy and enhance quality of life.

zero Crashes Injuries Fatalities

Zero Crashes, Injuries, Fatalities



Optimize Mobility

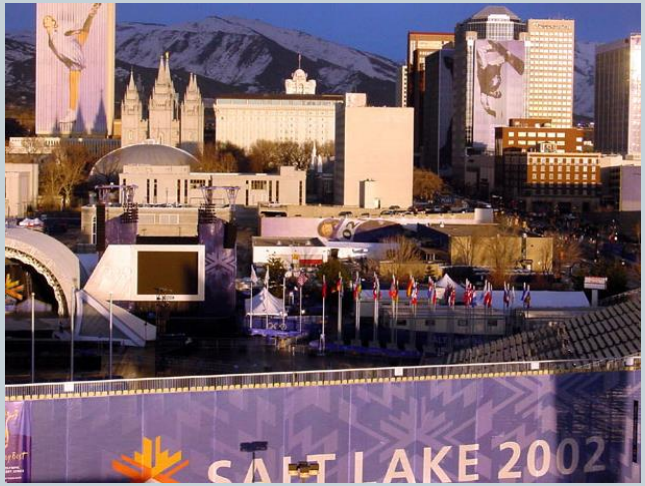
Preserve Infrastructure

UDOT Keeping Utah Moving

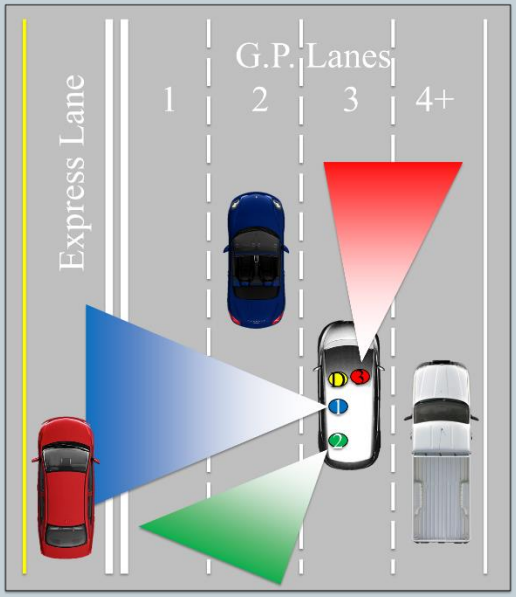
UDOT Assets

$30 billion
of inventory

I-15 Reconstruction



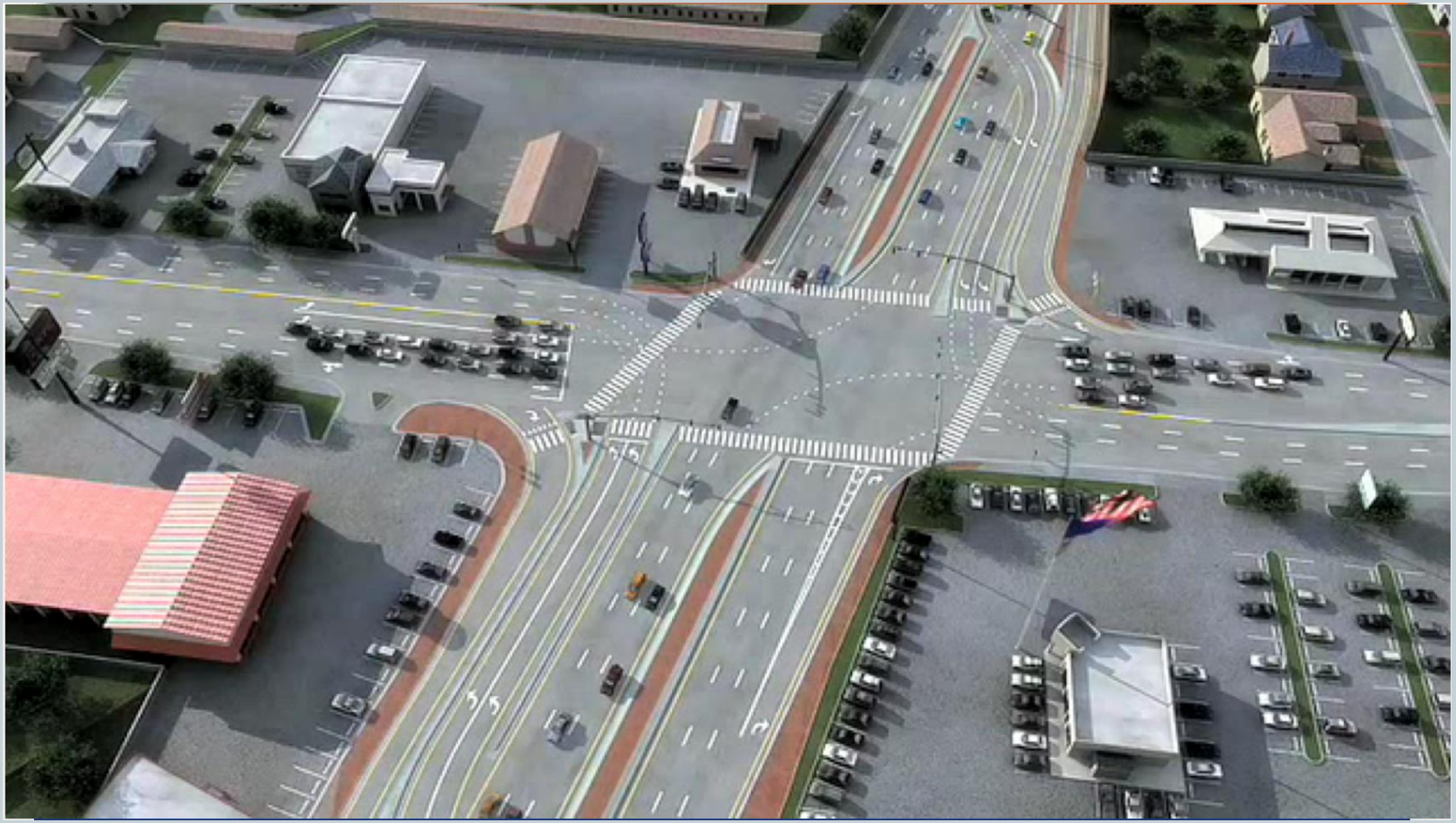
Congestion Pricing



Geofoam Embankments

Construction Manager-General Contracting

Continuous Flow Intersection



Diverging Diamond Interchange

ThrU-Turns

Accelerated Bridge Construction

Multimodal Projects and Partnerships

Airport TRAX

University TRAX / 400 South

3500 South/MAX Bus Rapid Transit

I-15 CORE/FrontRunner South

UTAH COUNTY CORE 15 CORRIDOR EXPANSION

Inter-Regional Corridor Alternatives Analysis

Inter-Regional Corridor Alternatives Analysis

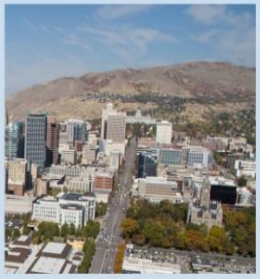
Mountain View Corridor

MOUNTAIN VIEW CORRIDOR

Utah Collaborative Active Transportation Study

UCATS

I-15 State Street/North-South TRAX



Technical Teams Working Together

Innovation Working Group

- Statewide Transportation Innovation Council (FHWA)
- Research UTRAC Forum
- Communications Division
- TRB Attendees
- Grant Writing
- EDC
- Subject Matter Experts at UDOT
- SharePoint Team
- Solicitation and Communication of Innovations Statewide
- National Committee Members
- Learning Management
- SHRP 2
- Annual Conference Awards
- Technical/Division Team Meetings
- Quarterly Leadership Book Discussions

Innovation Report Timeline

UDOT Keeping Utah Moving

INNOVATION AND EFFICIENCIES REPORT

1) REGIONS AND GROUPS
SUBMIT FACT SHEETS
- Efficiencies
- Innovations
- TRB idea implementation
- SUCCESS Framework initiatives

2) RESEARCH
COMPILES SUBMITTED FACT SHEETS INTO COMPREHENSIVE EFFICIENCIES LIST

3) LEADERSHIP
REVIEWS EFFICIENCIES LIST AND SELECTS TOPICS TO BE HIGHLIGHTED IN INNOVATION AND EFFICIENCY REPORT

4) REGIONS AND GROUPS
PREPARE WRITE-UPS ON SELECTED TOPICS

5) RESEARCH
COMPILES REPORT

You can find past reports at this link:
udot.utah.gov/go/innovation

6) COMMUNICATIONS OFFICE
COORDINATES SHARING OF REPORT WITH:
- THE PUBLIC
- KEY STAKEHOLDERS
- EMPLOYEES
- INDUSTRY PARTNERS

HOW YOU CAN SHARE UDOT'S STORY
- UDOT's blog
- Social media
- Fact sheets
- Staff meetings
- Share with consultants and contractors
- Mention in meetings with local government/businesses
- Presentations

SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY-AUGUST

Hydrodemolition Bridge Rehabilitation

Flashing Yellow Arrow for Left Turns

Portable Weather Station

Variable Speed Limit

Tow Plows

Wildlife and Vehicle Safety

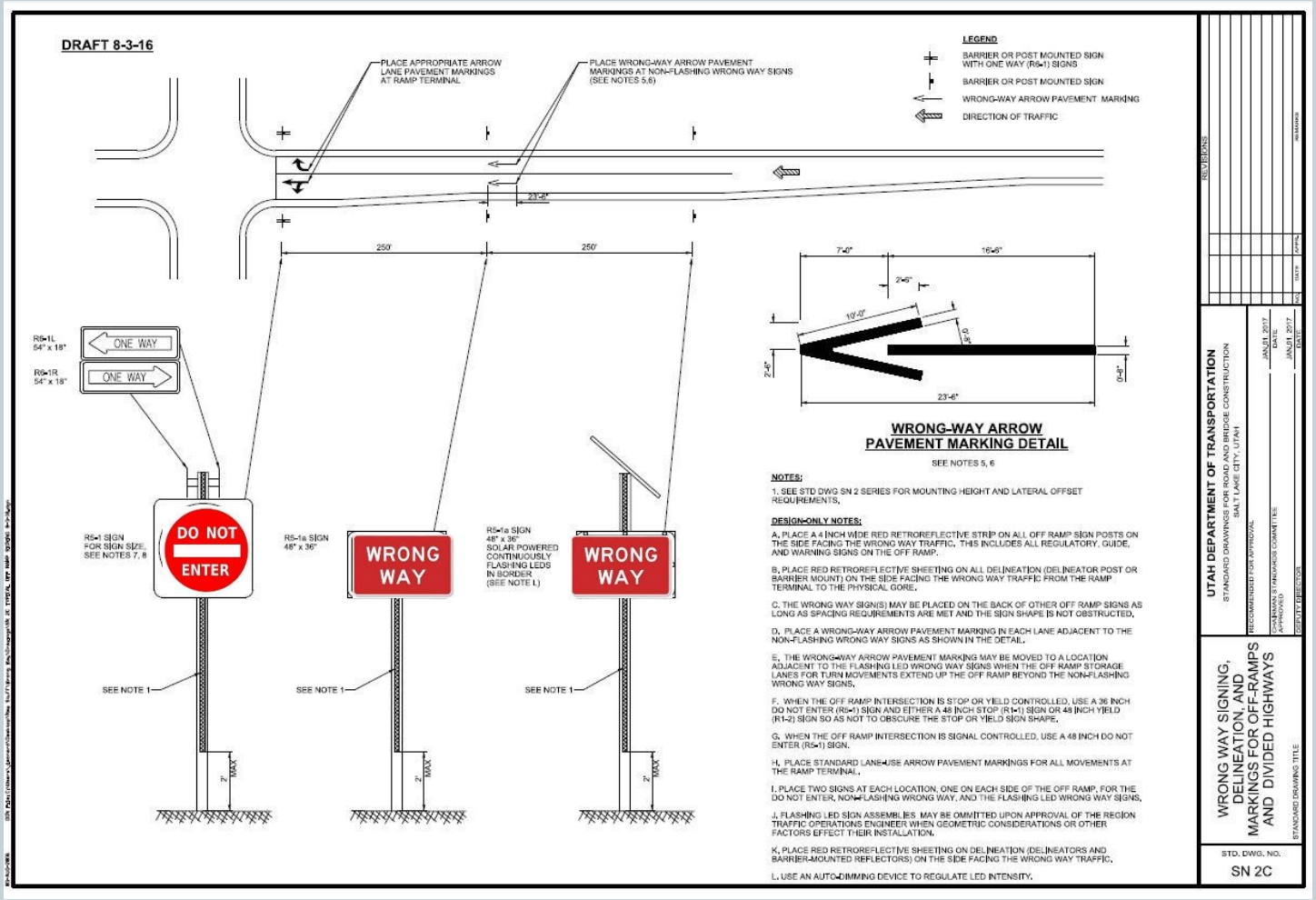
3D Design and Automated Machine Guidance

Precast Concrete Pavement Panels

Innovation & Efficiencies Report

- Grate Lifter
- Region Four Water Truck
- Truck and Trailer Electrical Test Box
- Three-Year Maintenance Planning Tool
- Storm Management Dashboard
- Intelligent Design and Construction
- Real-Time Pavement Smoothness
- Unmanned Aircraft Systems
- Moab Adaptive Signal Control
- Wind Mitigation for Signal Mast Arms
- P+T+Quality Bidding
- Electronic Signature Routing
- Statewide Utility License Agreements
- Statewide Access Management Program
- Transportation and Land Use Connection
- Bicycle & Pedestrian Counts Guidebook

Wrong-Way Driving Detection

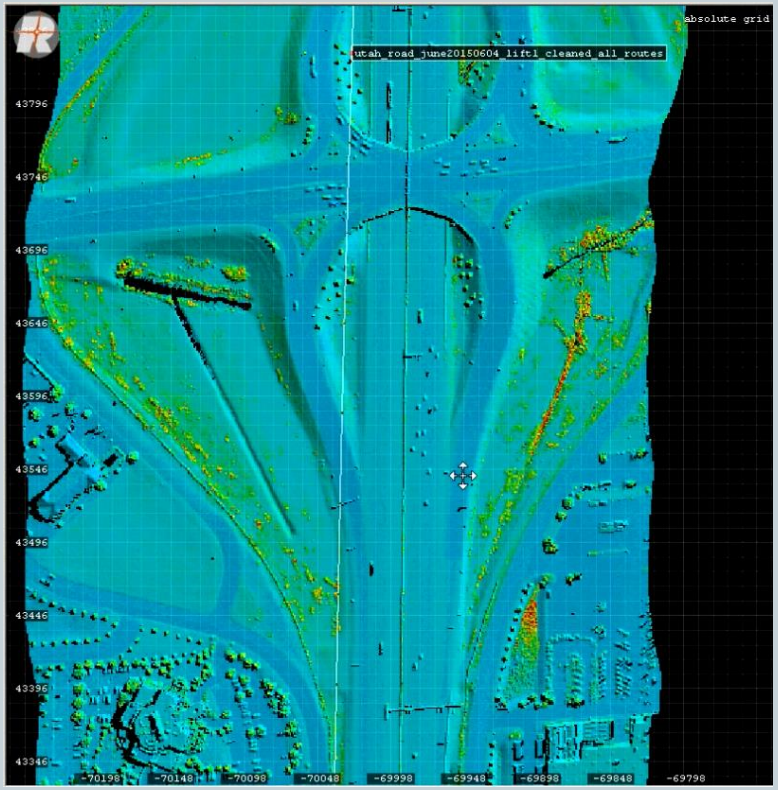


Wet Weather, Nighttime, Plowable Markings

- Identified state-of-practice and emerging technologies
- Recessed LED markers
  - Promising technology for high-risk areas
  - Being tested in Washington and United Kingdom
- Areas identified to update UDOT's Pavement Marking Decision Matrix

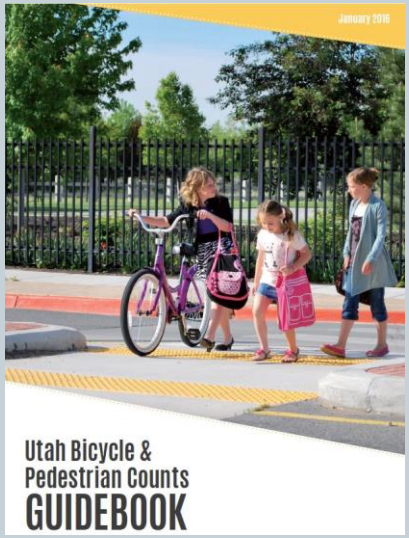
Aerial LiDAR to Update Highway Inventory

- Aerial LiDAR acquired to evaluate for asset mgmt use
  - I-84, I-15 and US-191
- Compared to Mandli data
- Pros:
  - Capture features not detected by mobile (e.g., drainage)
  - Less expensive, quicker
- Cons:
  - Lower resolution (miss smaller objects)



Sample Implementation Projects

- Guidebook for local governments
- Working with Active Transportation in Planning to promote it



- Developing a low-shrinkage, high-creep concrete for infrastructure repair
- Grassy Mountain Rest Area Westbound

Measuring Innovation Benefits

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{\text{Number x Value x Percentage}}{\text{Contract + TAC + PM costs}}$$

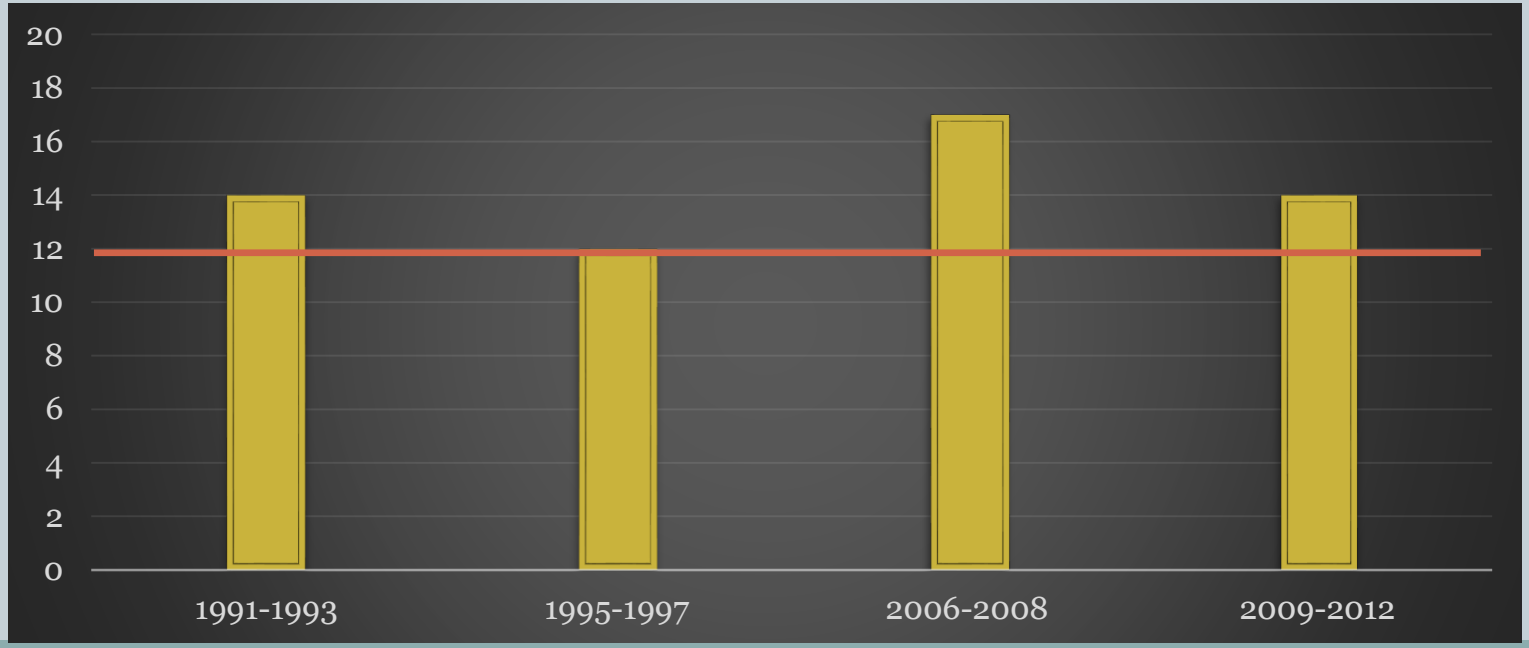
Note: Total program B/C includes projects where benefits could not be identified.

Qualitative Benefits

- Pavement & bridge life extension
- Improved rehab & maintenance methods
- Highway design advancements
- Traffic control enhancements
- More efficient & trained staff
- Reduced materials costs
- More efficient equipment
- Better utilize existing equipment
- Improved management
- Congestion mitigation for commuters
- Crash avoidance
- Crash severity reduction
- Construction zone enhancements
- Noise reduction
- Avoid inefficient highway expenditures
- Modify standards to eliminate poor designs
- Replace specs that are unsuccessful
- Reassign staff where not productive
- Find alternatives to inferior technologies
- Informed staff & stakeholders
- Understanding industry advancements
- Knowledge of future trends & challenges

Innovation Benefits Results

- 2016 –B/C ≈ 14 on 66 projects worth $68.2 million
- 2010 – B/C ≈ 17 on 41 projects
- 2000 – B/C ≈ 12 on 22 projects
- 1995 – B/C ≈ 14 on 18 projects



STIC Projects

- $100,000 Award with a 20% State Match
  - 2014 Development of a 3D Utility Database
  - 2015 3D Engineered Models as legal Documents in Construction
  - 2016 Developing a Progressive Design Build RFP
  - 2017 Submitted to Purchase a GIS Indexing Software

Accelerated Innovation Deployments

- 2014 Variable Speed Reduction in Active Work Zones - $775K
- 2015 E-Construction to Improve Business Practices - $626K

EDC – 4 Innovations

- Summit held in Sacramento - Dec. 1-2, 2016
  - UDOT pursuing 10 of the 11 Innovations
    - Automated Traffic Signal Performance Measures*
    - Collaborative Hydraulics
    - Community Connections
    - Data-Driven Safety Analysis
    - e-Construction & Partnering*
    - Pavement Preservation
    - Road Weather Management*
    - Safe Transportation for Every Pedestrian (STEP)
    - Ultra-High Performance Concrete Connections for PBES
    - Using Data to Improve Traffic Incident Management

Transportation Research