

Bureau Research

Mac Rashid (Local Aid)

Giri Venkiteela

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Presentation on 2018 TRB Annual Meeting

By
Mac Rashid
Local Aid and Economic Development

Optimizing Work Zone Lighting (Session 384)

Poster Presentation

- Recognized by AASHTO Research Advisory Committee as high value research in safety and maintenance section
- The objective of this project is:
 - *to investigate the visual needs of workers and drivers in work zones, and the technical performance of new technologies and approaches for improving visual effectiveness while reducing glare and visual chaos*

Optimizing Work Zone Lighting (Session 384)

Mamun Rashid¹ and John D. Bullough²

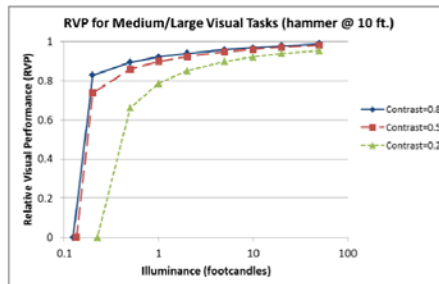
¹New Jersey Department of Transportation, Trenton, NJ; ²Lighting Research Center, Rensselaer Polytechnic Institute, Troy, NY



Introduction

Work zones are inherently complex and confusing visual environments, where the usual patterns of traffic flow are perturbed, and where lights used by workers for task visibility can create glare not only to workers but to nearby drivers. The use of delineation and signage, in addition to warning lights that may be flashing, can all contribute to "visual chaos."

The New Jersey Department of Transportation (NJDOT) commissioned the present study to address and begin to overcome these issues. The objective of the present study was to identify the needs of workers and drivers in different work zone environments, and to review existing knowledge about ways in which lighting practices and technologies can be deployed to provide workers with sufficient illumination while minimizing glare and confusion to all individuals in and near the work zone.



Visual performance values for one of the tasks performed by workers at work zones, as a function of light level (illuminance) and task contrast.



Balloon lights can provide adequate illumination for task visibility while substantially reducing glare for workers and drivers in and near the work zone.

October 2014 NJ-2014-004
New Jersey Department of Transportation
Bureau of Research
Technical Brief
Optimizing Work Zone Lighting

This project investigated the visual needs of workers and drivers in work zones, and the technical performance of new technologies and approaches for improving visual effectiveness, while reducing glare and visual chaos. This Technical Brief summarizes the work zone lighting and traffic control guidelines for several different scenarios, based on the findings from this study.

Long Term, Stationary Projects

Long term, stationary projects include road construction and reconstruction activities over a period of several weeks or longer.

Illustration Systems

- 110 foot spacing provides 5 footcandles of illumination within 100 feet of the work zone.
- Stationary 110 foot spacing requires 110 foot spacing and a lighting height of 110 feet.
- Stationary 110 foot spacing requires 110 foot spacing and a lighting height of 110 feet.

Emergency Incidents

Emergency incidents include motor vehicle accidents, fallen power lines, or other situations where time for planning is minimal.

Emergency Incidents

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Project findings were converted into preliminary guidelines for lighting and traffic control in different work zone situations, including long- and short-term operations.

Conclusions

Following a literature review of recently published information on lighting and traffic control in work zones, and a questionnaire of safety engineers, technical analyses of illumination systems, signage and delineation materials, and warning lights were undertaken. The results of the technical analyses led to the development of several preliminary guidelines for illumination system selection/layout, application of sign and delineation devices and materials, and the use and control of warning lights to provide workers and nearby drivers with visual information in work zones. Implementation of the preliminary guidance in the present report can assist NJDOT in improving visual conditions in several different types of work zones through lighting that maintains visual performance while reducing glare and distraction from excessively bright lights.

Acknowledgments

The authors gratefully acknowledge support from the New Jersey Department of Transportation (NJDOT) and the Federal Highway Administration, and from the University Transportation Research Consortium (UTRC) of the City University of New York, for conducting this study. Robert Cassiello, Anthony Pellegrino, Robert Zydorski and Angelo Nucci from NJDOT provided very useful input throughout the project. Camille Kamga and Penny Eickemeyer from UTRC assisted in project management and administration. Mark Rea, Nicholas Skinner and Timothy Plummer from the Lighting Research Center also made important contributions to this study.

Long Term, Stationary Projects

Illumination Systems	
Portable Trailer-Mounted Light Towers	<ul style="list-style-type: none"> 110 foot spacing provides 5 footcandles of illumination within two traffic lanes
Balloon Lights	<ul style="list-style-type: none"> Distance (D, feet) at which luminance (E, footcandles) is produced by a balloon light with a light output (L, lumens) and a mounting height (H, feet) can be estimated by: $D = \sqrt{\frac{18L}{250E} - \frac{H^2}{2}}$
Semi-Permanent High Mast Lighting	<ul style="list-style-type: none"> Used for projects of several months duration Staggered arrangement spaced 320 feet apart per side provides 10 foot-candles along six traffic lanes
Signage and Delineation	
Sign Sheeting Materials	<ul style="list-style-type: none"> ASTM Type III sufficient in most conditions; Type IV or XI for very bright, complex visual environments Increased font size (>8 inches) for legibility at longer distances
Barricades and Barrels	<ul style="list-style-type: none"> ASTM Type I sufficient in most conditions; Type IV or XI for very bright, complex urban environments

Long Term, Stationary Projects contd..

Warning Lights	
All Flashing Lights	"High-low" flashing rather than "on-off" should be used
Vehicle-Mounted Beacons and Lights	<ul style="list-style-type: none">• Peak intensity at least 600 candelas (effective intensity 430 candelas) for daytime visibility• Peak intensity of 200 candelas (effective intensity of 140 candelas) for nighttime visibility• Green lights equipped with dimming for glare control
Barricade Lights	<ul style="list-style-type: none">• Type A for rural environments; Type B for urban locations• Sequential flashing for lane closure tapers

Slow-Moving Operations

Illumination Systems	
Vehicle-Mounted Light Towers	<ul style="list-style-type: none">• Not recommended; glare can be problematic and light levels excessive
Vehicle-Mounted Balloon Lights	<ul style="list-style-type: none">• For movement, provide 1 footcandle 15 feet ahead of slow moving equipment and 50 feet ahead of fast-moving equipment• Visual tasks such as inspection of pavement for defects require at least 5 footcandles
Signage and Delineation	
Barrel Wrap (if used)	<ul style="list-style-type: none">• ASTM Type I sufficient except in most brightly illuminated, complex urban environments
Warning Lights	
Vehicle-Mounted Beacons and Lights	<ul style="list-style-type: none">• Peak intensity at least 600 candelas for daytime visibility• Peak intensity of 200 candelas for nighttime visibility• “High-low” rather than “on-off” flashing should be used• Green lights equipped with dimming for glare control

Emergency Incidents

Illumination Systems	
Vehicle Headlights	<ul style="list-style-type: none">• Direct away from oncoming traffic
Signage and Delineation	
Traffic Cones	<ul style="list-style-type: none">• Use devices with ASTM Type IV or XI sheeting
Warning Lights	
Vehicle-Mounted Beacons	<ul style="list-style-type: none">• Consider dimming and switching off flashing lights if multiple vehicles are present• Use “high-low” rather than “on-off” flashing
Barricade Lights (if available)	<ul style="list-style-type: none">• Use Type B barricade lights• Use sequential flashing to indicate lane closure
Flares	<ul style="list-style-type: none">• Use flares or other warning devices initially

A Collection of Roundabout Topics: Safety, Design, and Operations

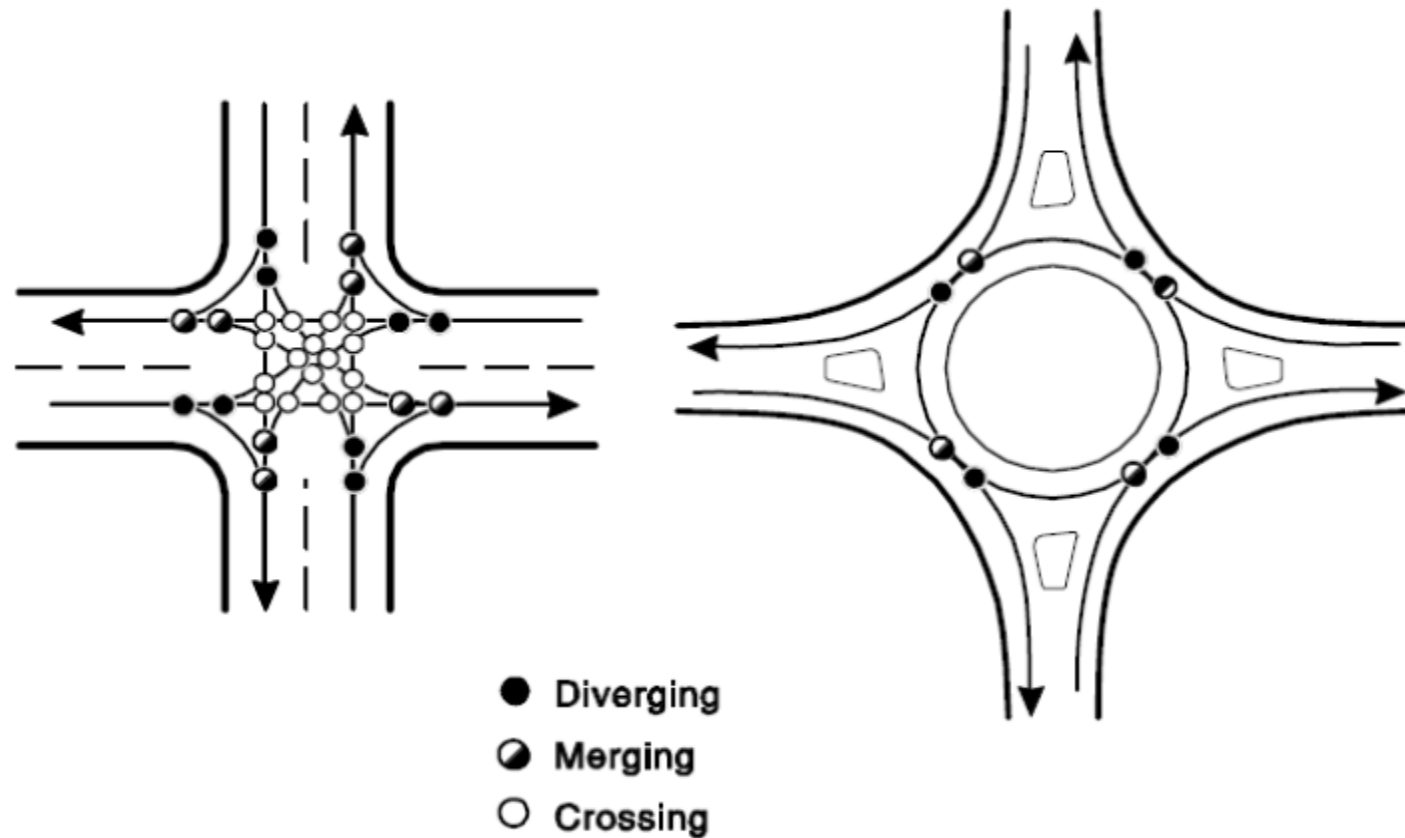


Safety of Roundabout: The Details Matter

By University of Louisiana, Lafayette

- Louisiana currently has 30 roundabouts in operation and hundreds of roundabouts in the planning and designing stage.
- This study investigates 19 roundabouts performance
- Significant reduction in injury crashes because of lower operating speed, reduced right-angle collisions, and elimination of head-on and left-turn crashes.

- Based on the changes in the number of conflicting points and traffic control method, roundabout is the biggest and most consistent safety improvement



How Do Roundabout Entry Design Parameters Influence Safety?

Transport Research Centre (CDV), Czech Republic

- Most Czech roundabout crashes were found to occur on entries.
- This study comprised three analyses: crash-based safety performance functions, speed analysis, and finally safety performance functions which incorporated speed.
- All three analyses proved that entry design parameters have a statistically significant influence on safety, in terms of crash frequency, severity and speeds

Investigating Driver Yielding Behavior at Roundabout Approaches

University of Wisconsin, Madison

- In order to investigate the effects of pavement markings on yielding, a survey was conducted.
- The word “YIELD” provided the largest variance in yielding locations.
- When a pedestrian crosswalk was present, participants chose to yield at the pedestrian crosswalk between 38% and 50% of the time regardless of pedestrians' presence.


- When “shark teeth” pavement marking were present participants yielded approximately five (5) feet further upstream than scenarios without.
- The results suggest drivers yield in different locations depending on different pavement marking configurations at roundabout approaches, which may influence the number of rear-end collisions.



Safety Performance Analysis of Roundabout Interchanges in Missouri

University of Missouri, Columbia

- This presentation describes a safety performance study of roundabout terminals
- A significant data undertaking involved the review of 1,681 individual crash reports for 13 roundabout terminals.
- The study showed single-lane roundabouts replacing stop-controlled ramp terminals reduced crashes by 32.8%, 23.1%, and 24.4% for Fatal and Injury (FI), Property Damage Only (PDO), and Total (TOT) crashes, respectively.

- 
- The results were not as high as the safety benefits of roundabout intersections.
 - Dual-lane roundabout ramp terminals, as an aggregate, showed an increase in crashes of 28.8% in FI, 33.6% in PDO, and 33.3% in TOT crashes
 - In a separate presentation by the City of Hilliard, Ohio showed crash rate has been increased by implementing dual-lane roundabouts

- The reason behind the crash rate increase in dual lane roundabout is driver's lack of knowledge about markings and exiting the roundabouts



Bicycle and Pedestrians Committee

- Attended two committee meetings
 - Bicycle Committee
 - Pedestrians Committee
- The purpose was to get an idea what new technologies/ methods are available to reduce bicycle and pedestrian crashes
- The committee members presented brief presentations for each of the sessions/ workshops they were presenting at TRB 2018

Takeaways for NJDOT

- The poster presentation was a good representation of NJDOT to the nation
- Learned more about roundabouts and its implementation
- 2X2 lanes roundabouts seems difficult for the drivers to maneuver
- As a result of that, crash rates are higher than the signalized intersection
- If designed properly, 1X1 and 2X1 lanes roundabouts are the safest intersection design
- Attending Committee meetings allowed me to learn more about different successful practices

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

Giri Venkiteela, PhD
Bureau of Research

TRB Committee Member-2

Polymer Concretes, Adhesives, and Sealers Committee AHD40

Corrosion Committee AHD45

Presentations attended-28

Lectern Session 271

Impact of Connected and Automated Vehicles on Transportation Forecasting and Planning

1. Starting Points for CVAV Planning: What Is Known and What Is Unknown
2. Modifying the Planning Process for Colorado DOT and Connected and Automated Vehicles
3. **Investigative Efforts to Address the Impact of CAV on Transportation Forecasting and Planning in Florida**
4. Connected Vehicles Versus Automated Vehicles: Changes That Need to Occur in the Planning Process to Help Manage the Changes Ahead
5. City-Level Efforts to Prepare for Connected and Automated Vehicles
6. Austin to China and India: Illustrating the Spectrum of Mobility Paths Off Oil and Carbon

Lectern Session 406

Planning for a Future with Autonomous and Connected Vehicles

1. **How Autonomous Driving May Affect the Value of Travel Time Savings for Commuting**
2. Shared Mobility Versus Private Car Ownership: A Multivariate Analysis of Public Interest in Autonomous Vehicles
3. The Impact of Private Autonomous Vehicles on Vehicle Ownership and Unoccupied VMT Generation
4. Impact of Ridesharing on Operational Efficiency of Shared Autonomous Electric Vehicle Fleet
5. A Model of Ridesourcing Demand Generation and Distribution

Lectern Session 479

Proven Performance of Concrete Overlays: Part 1 (Part 2, Session 541)

1. Performance of Concrete Overlays on Illinois Interstates: 1967 Through 2016
2. A Tale of Two Pavements: Forensic Investigation of an Unbonded Concrete Overlay and a Concrete Pavement Reconstruction on I-40 near Flagstaff, Arizona
3. **A Long-Term Performance Evaluation of an Experimental Concrete Overlay**
4. Comparing the BCOA-Me Design Procedure and the Short Jointed Plain Concrete Pavement Module in the Pavement Me Design Procedure

Lectern Session 549

Corrosion Determination and Prevention for Infrastructure Preservation

1. Duplex Zinc Coatings for Corrosion Protection of Steel Structures
2. Corrosion Resistances of Steel Pipes Coated with Two Types of Enamel in Electrostatic and Wet Spraying Processes
3. Influence of Bridge Deck Cracking on Corrosion Initiation of Corrosion-Resistant Reinforcement
4. Simulation of Corrosion of Galvanized Steel Under Accelerated Conditions

Lectern Session 605

Sustainability and the Use of Recycled Materials

1. Sustainability of Using Recycled Concrete Aggregates in Concrete Pavements
2. Use of Reclaimed Asphalt Pavement Aggregates in Portland Cement Concrete for Pavement Application: A Critical Overview
3. Evaluation of Selected Durability Properties of Portland Cement Concretes Containing Ground Glass Fiber as a Pozzolan
4. Investigation of Engineered Cementitious Composite for Culvert Repair

Lectern Session 841

Machine Learning Methods for Crash Prediction and Safety Analysis

1. Beyond Grand Theft Auto V for Training, Testing, and Enhancing Deep Learning in Self-Driving Cars
2. Classification of Distracted Driving Based on Visual Features and Behavior Data Using a Random Forest Method
3. An Improved Deep Belief Network Model for Road Safety Analyses
4. Mobile Sensing and Machine Learning for Identifying Driving Safety Profiles
5. Adaptable Advanced Driver Assistance Systems (ADASs)

Presentation given

Corrosion Committee AHD45

Wednesday, 8:00 AM - 12:00 PM, MM Scarlet Oak (Mezz)

NJDOT Research Project Presentation -Giri Venkiteela

Evaluation of different paints systems for Over-coating exiting Structural Steel



Cyclic Weathering Test-Chamber used for Accelerated Testing



20 Millimeter Pull Off Dolly: After Pull Off Test



20 Millimeter Pull Off Dolly: Over Coat Paint Removed After Pull Test

The project was well received by the FHWA and other States.

Currently in conversation with FHWA office of infrastructure research and development for collaboration.

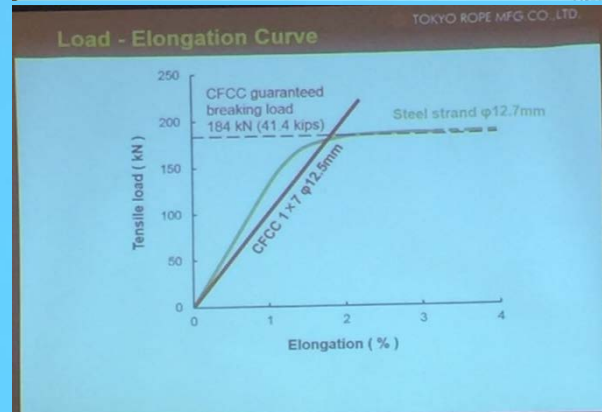
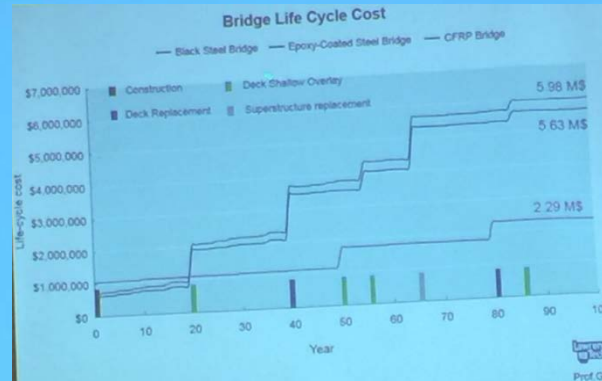
1. Concrete Structures (Post-tensioning)

Bridge Street Bridge

May. 2001 in Southfield, Michigan

Funded by FHWA and MDOT

United States's first bridge constructed using CFRP



Carbon Fiber Composite Cable
More strength and no corrosion

key takeaways.....

1. Autonomous vehicle transportation planning and effects needs to be studied for NJ
2. Autonomous vehicle updates and knowledge should research out to local level for complete readiness of the technology and public interest needs to be evaluated
3. Regular reports regarding our infrastructure condition and materials can help to prevent failures
4. Advanced coatings (zinc) can help infrastructure from corrosion which can save maintenance costs
5. Usage of the recycled materials in roadway construction can be a potential alternative. NJDOT need more exposure regarding these type of materials
6. Advanced safety models needed for accurate crash prediction on our roadways. This will eventually help us to systematic improvements of our roadways

Finally.....

7. Not only in the history but even today NJDOT focused on many new technologies and materials development. But we need to promote more aggressively our own research to national level. And TRB annual meeting is the excellent platform for this purpose

Thank you for your attention

TRB Overview

Pragna Shah

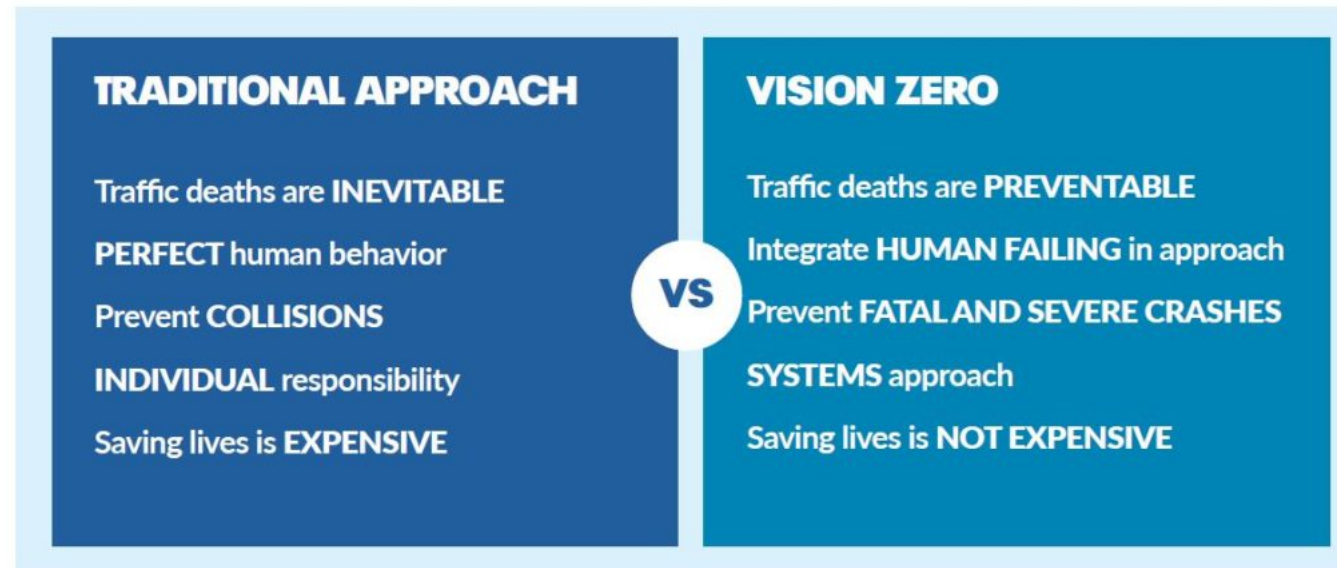
February 26, 2018

Sessions Attended

- Creating a Culture of Innovation
- Vision Zero at a Crossroads: Identifying Challenges and Developing Partnerships to Eliminate Traffic Deaths in the United States
- Diets, Diamonds, and Daring New Ideas for Intersections
- Zero Traffic Deaths: How Close Can We Get? What Will It Cost?
- Corrosion Committee
- Lessons Learned from Roundabout Implementation

Vision Zero at a Crossroads: Identifying Challenges and Developing Partnerships to Eliminate Traffic Deaths in the United States

What is Vision Zero?



Equity and Vision Zero: Portland Bureau of Transportation

Speed impacts the severity of a crash. A person walking struck by a person driving 40mph is eight times more likely to die than one struck by a person driving at 20 mph.



DEATH DUE TO SPEED

U.S. DEPARTMENT OF TRANSPORTATION, LITERATURE REVIEWED ON VEHICLE TRAVEL SPEEDS AND PEDESTRIAN INJURIES, MARCH 2000.
[HTTP://WWW.NHTSA.GOV/ABOUT.NHTSA/TRAFFIC+TECHS/CURRENT/LITERATURE+REVIEWED+ON+VEHICLE+TRAVEL+SPEEDS+AND+PEDESTRIAN+INJURIES](http://www.nhtsa.gov/about/nhtsa/traffic+techs/current/literature+reviewed+on+vehicle+travel+speeds+and+pedestrian+injuries)

In a city where people walking make up a disproportionate number of traffic deaths, slowing speeds is critical. Getting there will take a suite of policy, infrastructure, education, and enforcement actions.



- A 25 member Vision Zero Task Force: Strong Commitment to advancing equity
- Enforcement (Tightly focused tools)
 - No increased enforcement by officers
 - Focus on existing resources on most dangerous behaviors
 - Prioritize street design instead
- Community Engagement
 - Contracting with community groups
 - In language education

Road to Zero

Vision: Keep people safe on the road every day

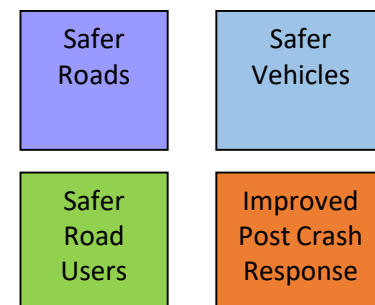
Mission: To reduce injury and death due to motor vehicle crashes and promote safe travel

How We Get to Zero:

- Double down on what works
- Accelerate Technology
- Change the Culture



**Road to Zero
Safe System Approach:**



Key Takeaways:

- With consistent implementation, we can make an impact on the number of lives lost
- Need to pay attention to equity and prioritize equity
- Important to involve stakeholders and the community
- Critical role for data
- Role for Researchers in evaluation and monitoring

TRB 97th Annual Meeting

Jan 7-11, 2018

Presentations, Meetings, and Workshops Attended

Carol Paszamant – NJDOT Research Library

Reminder from last year:
Why are librarians at TRB?



- Learning, for . . .
- Improving access to research
- Presenting and *coordinating*

What did I attend?

Meetings!



- ∞ Library & Information Science for Transportation (LIST) Committee
- ∞ TRB Information Services Committee
- ∞ Transportation Research Thesaurus (TRT) Subcommittee

Sessions –

- “Competing Visions of Transportation’s Future” / Rachael Nealer, USDOT; Lewis Fulton, UC-Davis; Joan Walker, UC-Berkeley; Ken Laberteaux, Toyota Research.

This session explored varying perspectives of where transportation is heading with an emphasis on energy consumption:

Disrupting trends/the 3 Revolutions: automation, shared mobility, and electrification - won’t solve congestion or necessarily change human behavior.

Bottom line: need changes in policy and more systems thinking.

Sessions (continued) –

- “The Future of Transportation and Reliance on Knowledge Sharing Among Transportation Organizations” / Jack Polczywa, SAE International; Eric Rensel, Gannett Fleming ; Thomas Kern, AASHTO.

Session focused on structural challenges in the sharing of knowledge essential for advancing the safety, mobility, and environmental goals of the transportation industry.

Bottom line: Collaboration is essential; methods include development of resource centers and standards, streamlining of metadata, interactive and innovative peer exchanges, and creative knowledge capture methods.

KM needs champions.

More sessions -

- “Humanizing Highway landscape Design” / Zhonghua Wei, Beijing University of Technology; Yuntian Fu, Tongji University; Karen Van Citters, Van Citters Historic Preservation, LLC.

Session looked at human perception characteristics of the highway roadside environment.

Bottom line: Monotonous landscape can cause fatigue and drowsiness. Van Citter's *A Brief History of Trees* was most engaging.

(one more . . .)

Last session -

- “Tools for the Zombie Apocalypse: Avoiding the Brain Drain in Transportation Organizations” / Leni Oman, Washington State DOT; Dr. Donna Cuomo, Mitre Corp; Frances Harrison, SpyPond Partners; Benjamin Pecheux, AEM Corporation.

Results of research:

NCHRP Project 20-104 > NCHRP Report 867:

Keeping What You Paid For—Retaining Essential Consultant-Developed Knowledge Within DOTs

NCHRP 20-103 > NCHRP Research Report 865:

Guidance for Development and Management of Sustainable Enterprise Information Portals

The Coordinating:

Presentation of Poster:

Attention: AASHTO Committee Members:

AASHTO Digital Publications - Before you download . . . (Don't!!)



For AASHTO Committee members notified of new digital publications with download/"purchase" instructions -

Abstract

Given all the confusion since AASHTO started providing their publications to state DOTs in digital format, and given the complexities of the download process, the limit of one free download per institution, and the need for DRM account login and password to open such documents, the credentials for which, once used, cannot be transferred to another account, it would therefore be helpful for state DOT libraries to inform their organizations of the best practice of letting their department library download these publications so that access can be predictable and consistent for all such publications.

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And Handout:

AASHTO Digital Publications LibGuide

<http://guides.libraryconnectivity.org/aashtoepubs>

Basic Information – From AASHTO's Publications Department

AASHTO Digital Publications: Basic Information

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Search

This LibGuide shares information in one place on suggestions for how state DOTs can manage the AASHTO E-Publications process. Prepared by a member of the Midwest Transportation Knowledge Network in consultation with AASHTO's Publication Department.



Basic Information

State DOT Best Practices

Latest News

01-03-2018	Updated historical transmittal spreadsheet AASHTO announced availability for purchase of print or single user PDF copies of subject compilations for 2017 Materials Book. This is outside the complimentary publications program for state DOT members.
11-30-2017	Updated historical transmittal spreadsheet
11-20-2017	Uploaded revised Access Instructions for Missouri DOT (staff can now install FileOpen software using MoDOT's Software Center; does not require administrative access to a PC)
10-24-2017	Uploaded IDOT Library Intranet page, LA DOTD LTRC Shared Drive Instructions, and MnDOT Deputy Commissioner email to staff
October 2017	Updated Registration information to include issues encountered when another staff member registers for a publication before the library (or designee) does

FAQs

- [FAQ - Complimentary Copies Distributed to AASHTO Members \(July 2017\)](#)
Prepared by AASHTO Publications Department
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-  [AASHTO Digital Publication Releases 2016 to Date - updated 1-3-18](#)
Lists in release date order all titles published since 2016. The list can be filtered to show which titles must be registered for by member agencies before the 12-month registration period expires.

Pending Registration Expirations for the Rest of 2018

Guide Specifications for Wind Loads on Bridges During Construction, 1st Edition (GSWLB-1-UL)	Expires 2/1/2018
Construction Handbook for Bridge Temporary Works, 2nd Edition (CHBTW-2-UL)	Expires 2/21/2018

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