1st International Roadside Safety Conference
Safer Roads, Saving Lives, Saving Money

June 12-15, 2017
Holiday Inn Golden Gateway, San Francisco, California

Organized by
Transportation Research Board

Sponsored by
TRB Standing Committee on Roadside Safety Design (AFB20)

Co-Sponsored by
Transportation Pooled Fund Program Project No. TPF-5(329), including US State Departments of Transportation for Kentucky, Minnesota, Nebraska, Ohio, Washington, and West Virginia
On behalf of the Conference Planning Team, it is our pleasure to welcome you to San Francisco, California and the Transportation Research Board’s (TRB) First International Roadside Safety Conference. Not only do we welcome you to the beautiful city of San Francisco, California and all it has to offer; we also thank you for attending the first event of what we hope is a continued series of conferences. There are going to be many excellent presentations and meetings during the four days of the conference; table-top exhibits featuring innovations in roadside safety from the private sector; and many opportunities to come together and hold informal discussions.

To provide some background as to how the conference concept began, in 2007, the TRB Standing Committee on Roadside Safety Design (AFB20) developed a Strategic Plan that identified and outlined different goals and strategies to make incremental improvements to solve current roadside safety problems. The 2007 plan was developed to: (1) help focus committee efforts pertaining to roadside safety design; (2) provide guidance to its future activities; (3) define its role within TRB as well as with other TRB standing committees; and (4) establish goals and measures for evaluating any progress toward achieving the committee’s vision.

U.S. and international safety experts on the committee understood that while advances in roadside safety design could continue to occur as a result of the AFB20’s annual meetings and workshops, it was agreed that significant improvements in roadside safety (i.e., reductions in road fatalities and injuries) would be best achieved by: (1) taking active measures to promote roadside safety design around the world through increased dissemination of information; (2) providing peer exchange opportunities to share best practices, proven technologies, and new methods; and (3) improving collaboration and participation within the international roadside safety community.

From 2009 to 2013, roadside safety researchers and experts explored the development of an ongoing International Roadside Safety Conference (IRSC) with the preparation of a White Paper, following by continued planning discussions. As a result, it was determined that the first IRSC event would be held within the U.S., while later events could be held at various locations around the world, approximately every four years, and could alternate between U.S. and International locations on a rotating basis. It was determined that an ongoing IRSC would help to reduce U.S. and global deaths and injuries associated with run-off-road crashes.

The primary goal of this conference is to effect changes that will reduce the frequency and severity of roadside crashes. The First IRSC provides a global forum to explore current roadside safety problems and practices and disseminate research results related to a full range of roadside safety issues, including: administration, planning, design, construction, operations, and maintenance. The theme is “Safer Roads, Saving Lives, Saving Money.” It is also the goal to highlight technological advancements and innovations involving new research as well as proven practices related to the theme.

Both abstracts and technical papers were accepted for presentations. All accepted technical papers were peer-reviewed by at least three internationally-recognized experts and have been published in a TRB Transportation Research E-Circular in advance of the conference. The top rated papers from each of the subthemes (see below) will be selected for publication in a special edition of the Transportation Research Record: Journal of the Transportation Research Board (TRR Journal) after the conference. All presentations will also be archived and made available on the web to participants following the event.

Subthemes:
- Innovations in Roadside Safety Hardware and Features
- Advancements in Roadway Safety Features
- Roadside Safety Design and Hazard Mitigation
- Simulation, Testing, and Evaluation Methods
- Vehicle Technologies and Safety Considerations
- Roadway Departure Data Collection and Analysis
- Safety Policy, Guidelines, Plans, Programs, and Strategies
A welcome session and keynote talk will start the conference on Monday morning, and the day will conclude with a reception and the opening of the exhibits in the exhibits ballroom. In addition to the keynote plenary and technical sessions scheduled on Tuesday and Wednesday, the exhibits will also be open during the breaks and lunches on those days as well. On Wednesday evening, there will be a subcommittee meeting of the International Research Activities subcommittee; on Thursday a full AFB20 committee will be held during the day.

As you can see, the conference has been organized to provide you with an opportunity to learn about many of the latest advancements in roadside safety design. We encourage you to take advantage of this opportunity to learn about and discuss the latest advancements with agency owners, engineers, researchers, practitioners, and industry representatives that are attending, presenting, and exhibiting at the conference. We believe, following the conference, you will be able to immediately apply this new knowledge to address problems and issues impacting roadside safety in your state, province, or country.

With best wishes for your future success in this regard,

Dr. Ronald Faller  
Midwest Roadside Safety Facility (MwRSF)  
University of Nebraska-Lincoln  
1st IRSC Chair and AFB20 Member

Dr. Roger Bligh  
Texas A&M Transportation Institute  
1st IRSC Co-Chair and AFB20 Chair

TRANSPORTATION RESEARCH BOARD

The Transportation Research Board is one of seven major programs of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to increase the benefits that transportation contributes to society by providing leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. The Board’s varied committees, task forces, and panels annually engage about 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.

www.TRB.org
Thank You Patrons

TRB sincerely appreciates the following organizations for their generous support of the 1st International Roadside Safety Conference

GOLD

SILVER

BRONZE
## AGENDA AT A GLANCE

### Sunday, June 11

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<tbody>
<tr>
<td>3:00 p.m. – 6:00 p.m.</td>
<td>Registration</td>
<td>Emerald Foyer</td>
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### Monday, June 12

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<thead>
<tr>
<th>Time</th>
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<tr>
<td>7:00 a.m. – 5:30 p.m.</td>
<td>Registration</td>
<td>Emerald Foyer</td>
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<tr>
<td>8:00 a.m. – 9:30 a.m.</td>
<td>General Session 1</td>
<td>Emerald Ballroom</td>
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<tr>
<td>9:30 a.m. – 10:00 a.m.</td>
<td>Break</td>
<td>Lower Lobby Foyer</td>
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<tr>
<td>10:00 a.m. – 11:45 a.m.</td>
<td>Technical Sessions 1A, 1B, 1C, 1D</td>
<td>Redwood</td>
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<td></td>
<td>1A - Barrier Compatibility and Safety of Vulnerable Road Users</td>
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<td>1B - Real-World Evaluation of Roadside Safety Countermeasures</td>
<td>Emerald Ballroom</td>
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<td>1C - Safety Audits, Ratings, and Assessment</td>
<td>Oregon/Nevada</td>
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<td>1D - Vehicle Performance on Special Terrain and Other Roadside Safety Considerations</td>
<td>California/Washington</td>
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<tr>
<td>Noon – 1:30 p.m.</td>
<td>Lunch</td>
<td>Gold Rush Ballroom</td>
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<td>1:30 p.m. – 3:15 p.m.</td>
<td>Technical Sessions 2A, 2B, 2C, 2D</td>
<td>Emerald Ballroom</td>
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<td>2A - Safety Considerations for Narrow Hazards - Utility Poles and Sign Supports</td>
<td>Emerald Ballroom</td>
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<td>2B - Vulnerable Road User Safety</td>
<td>Redwood</td>
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<td>2C - Deformable Longitudinal Barriers - Performance, Challenges, and Innovations</td>
<td>Oregon/Nevada</td>
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<td>2D - Vehicle and Hardware Evaluation Criteria – Alternative Methods and Compatability</td>
<td>California/Washington</td>
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<td>3:15 p.m. – 3:45 p.m.</td>
<td>Break</td>
<td>Lower Lobby Foyer</td>
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<td>3:45 p.m. – 5:30 p.m.</td>
<td>Technical Sessions 3A, 3B, 3C, 3D</td>
<td>Emerald Ballroom</td>
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<td>3A - Bridge Railing Evaluation Through Analysis, FEA, or Physical Testing</td>
<td>Emerald Ballroom</td>
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<td>3B - Advancing Motorcyclist Safety Through Computer Simulation</td>
<td>Redwood</td>
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<td>3C - Roadway Departure Safety – Rumble Strips And Safety Edge</td>
<td>Oregon/Nevada</td>
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<td>3D - Roadside Safety Countermeasures To Reduce Incidents</td>
<td>California/Washington</td>
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<tr>
<td>5:30 p.m. – 7:00 p.m.</td>
<td>Reception with Exhibitors</td>
<td>Gold Rush Ballroom</td>
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<td>8:00 a.m. – 4:00 p.m.</td>
<td>Registration</td>
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<td>8:30 a.m. – 9:30 a.m.</td>
<td>General Session 2</td>
<td>Emerald Ballroom</td>
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<td>9:30 a.m. – 10:00 a.m.</td>
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<td>Gold Rush Ballroom</td>
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<tr>
<td>9:30 a.m. – 3:45 p.m.</td>
<td>Exhibits</td>
<td>Gold Rush Ballroom</td>
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<td>10:00 a.m. – 11:45 a.m.</td>
<td>Technical Sessions 4A, 4B, 4C</td>
<td>Emerald Ballroom, Redwood, Oregon/Nevada</td>
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<td>10:00 a.m. – 11:45 a.m.</td>
<td>Technical Sessions 4A</td>
<td>Emerald Ballroom</td>
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<td>10:00 a.m. – 11:45 a.m.</td>
<td>Technical Sessions 4B</td>
<td>Redwood</td>
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<td>10:00 a.m. – 11:45 a.m.</td>
<td>Technical Sessions 4C</td>
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<tr>
<td>Noon – 1:30 p.m.</td>
<td>Lunch</td>
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<td>1:30 p.m. – 3:15 p.m.</td>
<td>Technical Sessions 5A, 5B, 5C, 5D</td>
<td>Emerald Ballroom, Redwood, Oregon/Nevada, California/Washington</td>
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<td>1:30 p.m. – 3:15 p.m.</td>
<td>Technical Sessions 5A</td>
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<tr>
<td>1:30 p.m. – 3:15 p.m.</td>
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<td>1:30 p.m. – 3:15 p.m.</td>
<td>Technical Sessions 5C</td>
<td>Oregon/Nevada</td>
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<td>1:30 p.m. – 3:15 p.m.</td>
<td>Technical Sessions 5D</td>
<td>California/Washington</td>
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<tr>
<td>3:15 p.m. – 3:45 p.m.</td>
<td>Break</td>
<td>Gold Rush Ballroom</td>
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<td>3:45 p.m. – 5:30 p.m.</td>
<td>Technical Sessions 6A, 6B, 6C</td>
<td>Redwood, Oregon/Nevada</td>
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<td>3:45 p.m. – 5:30 p.m.</td>
<td>Technical Sessions 6A</td>
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<td>3:45 p.m. – 5:30 p.m.</td>
<td>Technical Sessions 6B</td>
<td>Oregon/Nevada</td>
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<td>3:45 p.m. – 5:30 p.m.</td>
<td>Technical Sessions 6C</td>
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<tr>
<td>3:45 p.m. – 5:30 p.m.</td>
<td>Technical Sessions 6D</td>
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<tr>
<td>6:30 p.m. – 8:30 p.m.</td>
<td>Technical Tour (organized by Golden Gate Bridge, Highway and Transportation District – space is limited)</td>
<td>Emerald Ballroom</td>
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### Wednesday, June 14

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<tr>
<td>8:00 a.m. – 4:00 a.m.</td>
<td>Registration</td>
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<tr>
<td>8:30 a.m. – 9:30 a.m.</td>
<td>General Session 3</td>
<td>Emerald Ballroom</td>
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<td>9:30 a.m. – 10:00 a.m.</td>
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<tr>
<td>9:30 a.m. – 3:45 p.m.</td>
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<td>10:00 a.m. – 11:45 a.m.</td>
<td><strong>Technical Sessions 7A, 7B, 7C</strong></td>
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<td>7A - High Performance, Innovative and Aesthetic Barriers</td>
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<td>7B - New Vehicle Safety Technologies and Heavy Vehicle Considerations</td>
<td>Redwood</td>
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<td>7C - Real-World Crash Data - Uses and Benefits</td>
<td>Oregon/Nevada</td>
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<tr>
<td>Noon – 1:30 p.m.</td>
<td>Lunch</td>
<td>Gold Rush Ballroom</td>
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<td>1:30 p.m. – 3:15 p.m.</td>
<td><strong>Technical Sessions 8A, 8B, 8C</strong></td>
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<td>8A - Innovations and Ongoing Research on Crash Cushions and Guardrail End Terminals</td>
<td>Emerald Ballroom</td>
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<td>8B - Post-Soil Performance for Guardrail Applications</td>
<td>Redwood</td>
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<td>8C - International Perspectives in Roadside Safety Research</td>
<td>Oregon/Nevada</td>
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<tr>
<td>3:15 p.m. – 3:45 p.m.</td>
<td>Break</td>
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<tr>
<td>3:45 p.m. – 5:30 p.m.</td>
<td><strong>Technical Sessions 9A, 9B, 9C</strong></td>
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<td>9A - New Technologies and Guidelines for Concrete Barriers</td>
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<td>9B - Hazard Identification, Risk Assessment, and Treatment Guidelines</td>
<td>Redwood</td>
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<td>9C - Occupant Risk Assessment - Crash Data, Modeling, and Testing</td>
<td>Oregon/Nevada</td>
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<tr>
<td>6:30 p.m. – 9:30 p.m.</td>
<td>Roadside Safety Design International Research Activities</td>
<td>Crystal</td>
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<td>Subcommittee AFB20(2) Meeting</td>
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### Thursday, June 15

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<tr>
<td>8:30 a.m. – 5:00 p.m.</td>
<td>TRB AFB20 Committee Meeting</td>
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<td>Noon – 1:30 p.m.</td>
<td>Lunch</td>
<td>Emerald</td>
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<tr>
<td>3:00 p.m. – 3:30 p.m.</td>
<td>Break</td>
<td>Emerald Foyer</td>
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**CONFERENCE PLANNING TEAM**

**Ronald Faller**, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Chair

**Roger Bligh**, Texas A&M Transportation Institute, Co-Chair

**Richard Albin**, Federal Highway Administration

**Marco Anghileri**, Politecnico di Milano, Italy

**Keith Cota**, New Hampshire Department of Transportation

**John Donahue**, Washington Department of Transportation (Pooled Fund Sponsor)

**Mike Dreznes**, International Road Federation

**Michael Elle**, Minnesota Department of Transportation (Pooled Fund Sponsor)

**Don Fisher**, Ohio Department of Transportation (Pooled Fund Sponsor)

**Hampton Clay Gabler**, Virginia Tech University

**Douglas Gabauer**, Bucknell University

**Jodi Gibson**, Nebraska Department of Roads (Pooled Fund Sponsor and Project Lead)

**Raphael Grzebieta**, University of New South Wales, Australia

**Donna Hardy**, West Virginia Department of Highways (Pooled Fund Sponsor)

**Joseph G. Jones**, Leidos, Inc

**Malcolm Ray**, Roadsafe LLC

**Jason Siwula**, Kentucky Transportation Cabinet (Pooled Fund Sponsor)

**Phil TenHulzen**, Nebraska Department of Roads (Pooled Fund Sponsor)

**Francesca La Torre**, University of Florence, Italy

**Rod Troutbeck**, Troutbeck & Associates, Australia

**TRB Staff**

**Stephen F. Maher**, Associate Director - Design

**Angela Christian**, Associate Program Officer

**Brie Schwarz**, Web Specialist

**Bruce Millar**, Conference Manager

**Kate Debelack**, Meetings Assistant
Monday, June 12

7:00 a.m. - 5:30 p.m., Emerald Foyer
Registration

8:00 a.m. - 9:30 a.m., Emerald Ballroom
General Session 1
Moderators: Ronald Faller, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska; Stephen Maher, Transportation Research Board; Roger Bligh, Texas A&M Transportation Institute, College Station, Texas

Keynote Address: A Complete Simulation Ecosystem - LS-DYNA
• Jason Wang, Developer, Livermore Software Technology Corporation, Livermore, CA

9:30 a.m. - 10:00 a.m., Lower Lobby Foyer
Break

10:00 a.m. - 11:45 a.m.
Technical Sessions

Session 1A, Redwood
Barrier Compatibility and Safety of Vulnerable Users
Moderator: Richard Albin, Federal Highway Administration, Olympia, Washington

• Development of a MASH TL-2 Crashworthy Pedestrian Railing System
  Ronald Faller, Midwest Roadside Safety Facility, University of Nebraska-Lincoln

• Development of a Continuous Motorcycle Protection Barrier System using Computer Simulation and Full-Scale Crash Testing
  Ali Atahan, Istanbul Technical University, Istanbul, Turkey

• Vulnerable Road User Serious Injury Impacts Into W-Beam Barriers
  Mario Mongiardini, Transport and Road Safety Research Centre (TARS), University of New South Wales (UNSW), Sydney, Australia

• *Making Roadsides Safer for Vulnerable Road Users
  José A. Quintanilha, Escola Politécnica of Universidade de São Paulo, São Paulo, Brazil (* Invited Presentation)

Session 1B, Emerald Ballroom
Real-World Evaluation of Roadside Safety Countermeasures
Moderator: Don Fisher, Ohio Department of Transportation, Columbus, Ohio

• Challenges and Opportunities For Improving The Safeside Procedure for Cost-Benefit Assessment of Roadside Safety Intervention Alternatives
  Carlos Roque, Laboratório Nacional de Engenharia Civil, Departamento de Transportes, Lisbon, Portugal

• Road Safety Audit & Proposal For Corridor Extension Plan: Case Study Barapullah Corridor, New Delhi, India
  Namit Kumar, Rites Ltd, New Delhi, India

• Standardization of Roadside Safety ISPE Processes Using Data Dictionary for Pre- and Post-Crash Information
  Charles Stevens, Texas A&M Transportation Institute, College Station, Texas

• Roadside Safety Hardware Framework Concept For Enhanced In-Service Performance Evaluation and Asset Management Practices
  Charles Stevens, Texas A&M Transportation Institute, College Station, Texas
Session 1C, Oregon/Nevada
Safety Audits, Ratings, and Assessments
Moderator: Malcolm Ray, Roadsafe LLC, Canton, Maine

- A Study of Applying Mobile Mapping Result for Road Safety Audit on Rural Roads in Thailand
  Kawin Saiprasertkit, Department of Rural Roads, Bangkok, Thailand

- Safe System Assessments of Roadside Safety Projects
  Jamie Robertson, Safe System Solutions Pty Ltd, Victoria, Australia

- Relationship between Roadside Hazard Rating and Crash Occurrence
  Jonathan Wood, South Dakota State University, Brookings, South Dakota

- Meeting the Challenge of the Decade of Action
  Michael Dreznes, International Road Federation, Chicago, Illinois

Session 1D, California/Washington
Vehicle Performance on Special Terrain and Other Roadside Safety Considerations
Moderator: Roger Bligh, Texas A&M Transportation Institute, College Station, Texas

- An Initial Investigation into Traversability of Rock Ditch Liners
  Mojdeh Asadollahi Pajouh, Midwest Roadside Safety Facility- University of Nebraska-Lincoln, Nebraska

- Testing & Analyses of Terrain Effects on Vehicle Trajectories & Kinematic
  Dhafer Marzougui, Center for Collision Safety and Analysis, George Mason University, Fairfax, Virginia

- Taxonomy of Roadside Safety Hardware
  Malcolm Ray, Roadsafe LLC, Canton, Maine

- Safety Countermeasures for Roadway Departure Crashes: An Overview
  Mohammad Jalayer, Center for Advanced Infrastructure and Transportation, Rutgers University, Piscataway, New Jersey

Noon - 1:30 p.m., Gold Rush Ballroom
Lunch

1:30 p.m. - 3:15 p.m. 
Technical Sessions

Session 2A, Emerald Ballroom
Safety Considerations for Narrow Hazards - Utility Poles and Sign Supports
Moderator: Ronald Faller, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

- Development of Crashworthy Road Sign Post using Energy Absorbing Modules on the Sign Base Plate
  Dukgeun Yun, Korea Institute of Civil Engineering and Building Technology, Gyeonggi-do, Korea

- Development of Guidance for Minimum Sign Area for Slipbase Sign Supports
  Roger Bligh, Texas A&M Transportation Institute, College Station, Texas

- Consideration of Placement Criteria for Utility Poles to Minimize Crash Risk
  Christine Carrigan, RoadSafe LLC, Canton, Maine

- Utility Poles, Toleration or Confrontation
  Don Ivey, Scientific Inquiry Inc., Bryan, Texas
Session 2B, Redwood

**Vulnerable Road User Safety**

*Moderator: Rod Troutbeck, Troutbeck & Associates, Queensland, Australia*

"See Me Save Me - Improving The Safety of Cyclists"
Harpreet Singh Dhunna, Avoid Accidents, Mohali, India

Protecting the Most Vulnerable: Which Safety Measures Generate Public Support for Paratransit and Bus Transportation?
Isabella Guajardo, University of Pennsylvania, Perelman School of Medicine, Pennsylvania

Making Roads (more) Motorcycle Friendly in New Zealand
Julian Chisnall, New Zealand Transport Agency, Wellington, New Zealand

*Reducing Drink Driving in Cambodia: A Partnership Approach*
Kong Sovann, Road Safety Consultant, Phnom Penh, Cambodia (*Invited Presentation)

Session 2C, Oregon/Nevada

**Deformable Longitudinal Barriers - Performance, Challenges, and Innovations**

*Moderator: John Reid, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska*

MGS Dynamic Deflections and Working Widths at Lower Speeds
Mojdeh Asadollahi Pajouh, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Challenges in Developing Cost Effective MASH TL4 Semi-Flexible Barriers
Leigh Brown, Valmont Highway Technology, Sydney, Australia

New Zinc-Aluminum-Magnesium Metallic Coating for Guardrails
Richard Clausius, ArcelorMittal Global R&D, East Chicago, Indiana

New Thrie Beam Terminal End Shoe Connection
Akram Abu-Odeh, Texas A&M Transportation Institute, College Station, Texas

Session 2D, California/Washington

**Vehicle and Hardware Evaluation Criteria – Alternative Methods and Compatability**

*Moderator: Chiara Silvestri Dobrovolny, Texas A&M Transportation Institute, College Station, Texas*

Dean Alberson, Texas A&M Transportation Institute (Retired), College Station, Texas

Evaluating Safety Hardware Identification Methods Durability using Crash Testing Opportunities
Charles Stevens, Texas A&M Transportation Institute, College Station, Texas

Correlation between Roadside Safety Hardware and Vehicle Safety Standards Evaluation Criteria
Nathan Schulz, Texas A&M Transportation Institute, College Station, Texas

*Using Event Data Recorders in Motor Vehicles to Better Understand Run Off the Road Crashes*
Kenute Hare, Ministry of Transport and Mining, Kingston, Jamaica (*Invited Presentation)

3:15 p.m. - 3:45 p.m., Lower Lobby Foyer

Break
Technical Sessions

Session 3A, Emerald Ballroom

Bridge Railing Evaluation Through Analysis, FEA, or Physical Testing
Moderator: Marco Anghileri, Politecnico di Milano, Milan, Italy

Attachment of a Combination Bridge Rail to Concrete Parapet Utilizing Epoxy Adhesive Anchors
Robert Bielenberg, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Design and Evaluation of a Fascia Mounted Bridge Rail for Steel Bridges on Local Roadways
Chuck Plaxico, Roadsafe LLC, Canton, Maine

Design and Full-Scale Testing of New Retrofit Bridge Rail for 24.8-Mile Long Causeway Bridges Over Lake Pontchartrain, New Orleans, Louisiana
William Williams, Texas A&M Transportation Institute, College Station, Texas

MASH Equivalency of NCHRP 350-Approved Bridge Railings
William Williams, Texas A&M Transportation Institute, College Station, Texas

Session 3B, Redwood

Advancing Motorcyclist Safety Through Computer Simulation
Moderator: Jennifer Schmidt, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Development of a Motorcycle FE Model for Simulating Impacts into Roadside Safety Barriers
Mario Mongiardini, Transport and Road Safety Research Centre, University of New South Wales, Australia

Motorcycle Finite Element Computer Model to Assist with Roadside Safety Research Efforts
Nathan Schulz, Texas A&M Transportation Institute, College Station, Texas

Improvement of Hybrid III 50th percentile FE model for Sliding Configuration Motorcyclist Impact
Matteo Bernardini, Politecnico di Milano – Transportation Safety Lab – LaST, Milan, Italy

Upright Motorcycle Impacts against Roadside Safety Barrier: Rider Injury Risks and Countermeasure Investigation through FEA
Nathan Schulz, Texas A&M Transportation Institute, College Station, Texas

Session 3C, Oregon/Nevada

Roadway Departure Safety – Countermeasures, Rumble Strips, and Safety Edge
Moderator: John Donahue, Washington State Department of Transportation, Olympia, Washington

Safety Evaluation of Safety Edge Treatment in Iowa
Amrita Goswamy, Institute of Transportation, Iowa State University, Ames, Iowa

Investigating Effectiveness of Centerline Rumble Strips on Rural Two-Lane Roads in Louisiana with Empirical Bayes Method
M. Ashifur Rahman, University of Louisiana, Lafayette, Louisiana

Safety Impacts of the Safety Edge
Shauna Hallmark, Institute for Transportation at Iowa State University, Ames, Iowa

Safety Impacts of Centerline Rumble Strips in Georgia
Marisha S. Pena, Georgia Institute of Technology, Atlanta, Georgia
Session 3D, California/Washington
Roadside Safety Countermeasures to Reduce Incidents
Moderator: Michael Dreznes, International Road Federation, Chicago, Illinois

Initial Developments Supporting a Roadside Tree Removal Marketing Campaign
Karla Lechtenberg, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Retrospective Look at 1998 Strategies to Improve Roadside Safety: Mission 2 – Build & Maintain Information Resources and Analysis Procedures
Kenneth Opiela, Center for Collision Safety and Analysis, George Mason University, Fairfax, Virginia

Traffic Stopped Ahead – Everything you Wanted to know about Work Zone Queue Warning Systems
Joseph Jeffrey, Road-Tech Safety Services, Inc., Shingle Springs, California

Reducing the Incidence of Impaired Driving Through Globally Effective Countermeasures
Danielle Comeau, Alcohol Countermeasure Systems Corp, Ontario, Canada

5:30 p.m. - 7:00 p.m., Gold Rush Ballroom
Reception with Exhibitors

Tuesday, June 13

8:00 a.m. - 4:00 p.m., Emerald Foyer
Registration

8:30 a.m. - 9:30 a.m., Emerald Ballroom
General Session 2
Moderator: Stephen Maher, Transportation Research Board

Keynote Address:
• Malcolm Dougherty, Director, California Department of Transportation, Sacramento, CA and Chair, TRB Executive Committee

9:30 a.m. - 10:00 a.m., Gold Rush Ballroom
Break

9:30 a.m. - 3:45 p.m., Gold Rush Ballroom
Exhibits

10:00 a.m. - 11:45 a.m.
Technical Sessions

Session 4A, Emerald Ballroom
Guidelines, Advances, and Ongoing Research into Wire-Rope Cable Barriers
Moderator: Don Fisher, Ohio Department of Transportation, Columbus, Ohio

High Tension Cable Barrier in the Median of a Freeway in Alberta, Canada: A Case Study of Two Successful Projects
Masood Hassan, Tetra Tech Canada Inc., Edmonton, Canada

Investigation and Mitigation of Post Penetration into Floorplan of 1100C Small Cars
Ronald Faller, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Recommended Updates to MASH for Testing of Cable Barrier Systems
Scott Rosenbaugh, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska
Safety Procedures for Emergency Responders when High Tension Wire Rope Systems are Involved with Run-Off Road Accidents
Dean Alberson, Texas A&M Transportation Institute (Retired), College Station, Texas

Session 4B, Redwood
Roadway and Roadside Safety Involving Unique Hazards and Needs
Moderator: Roger Bligh, Texas A&M Transportation Institute, College Station, Texas

Design and Analysis of High Energy Absorbing Rock Fence
Iraj Mamaghani, University of North Dakota, Grand Forks, North Dakota

Design of Reinforced Expanded Polystyrene Styrofoam Covering Rock-Sheds Under Impact of Falling Rock
Iraj Mamaghani, University of North Dakota, Grand Forks, North Dakota

Driving Speeds and Speed Tables: Slovenian Research
Marko Rencelj, University of Maribor, Faculty of Civil Engineering, Transportation Engineering and Architecture, Maribor, Slovenia

Development of Crash Modification Functions For The Safety Performance of Treatments on Rural Two-Lane Roads
Jiguang Zhao, CH2M HILL, Chicago, Illinois

Session 4C, Oregon/Nevada
Occupant Behavior and Injuries in Crash Events
Moderator: Michael Elle, Minnesota Department of Transportation, Saint Paul, Minnesota

Feasibility of Predicting Light Vehicle Occupant Injury Disutility from Impacts with Road Safety Barriers
Andrew Burbridge, Department of Transport and Main Roads, Queensland University of Technology, Queensland, Australia

Comparison of Human Occupant Kinematics in Laboratory Impact and Run-Off-Road Crash Configurations
Rudolf Reichert, George Mason University, Center for Collision Safety and Analysis, Fairfax, Virginia

Investigation of Potential Mitigation of Driver Injury in Heavy Truck Frontal and Rollover Crashes
Nathan Schulz, Texas A&M Transportation Institute, College Park Station, Texas

Experience with Inclusion of Instrumented Anthropomorphic Test Devices in Roadside Safety Barrier Testing with Heavy Trucks
Chiara Silvestri Dobrovolny, Texas A&M Transportation Institute, College Park Station, Texas

Noon - 1:30 p.m., Gold Rush Ballroom
Lunch

1:30 p.m. - 3:15 p.m.
Technical Sessions

Session 5A, Emerald Ballroom
Safety of W-Beam Guardrail Systems for Standard and Special Applications
Moderator: Marco Anghileri, Politecnico di Milano, Milan, Italy

Ponderosa Pine Round Posts as Alternative to Rectangular SYP Posts in Retrofit G4(2W) Guardrail Systems
Karla Lechtenberg, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Modeling & Simulation of Vehicle Crashes on Curved, Banked Roadway Sections
Dhafer Marzougui, Center for Collision Safety and Analysis, George Mason University, Fairfax, Virginia
A Synthesis of MASH-Tested 31-in. Tall, Non-Proprietary, W-beam Guardrail Systems
Scott Rosenbaugh, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Evaluation of a 31-inch W-Beam Guardrail for Placement on a 3H:1V Sloped Terrain through FEA
Nathan Schulz, Texas A&M Transportation Institute, College Park Station, Texas

Session 5B, Redwood
Investigation and Evaluation of Roadway Departure Crashes and Characteristics
Moderator: John Donahue, Washington State Department of Transportation, Olympia, Washington

Combating Roadway Departures
Richard Albin, Federal Highway Administration, Olympia, Washington

An Analytical Framework of Systematic Screening of Roadway Departure Crashes on Rural Highways in Montana
Md Shafiul Azam, AgileAssets Inc., Austin, Texas

Evaluation of Roadway Departure Characteristics using SHRP 2 Naturalistic Driving Study and Road Information Database Data – Preliminary Results
Shauna Hallmark, Institute for Transportation at Iowa State University, Ames, Iowa

An Exploratory Analysis on Fatalities of Roadway Departure Crashes
Mouyid Islam, CH2M HILL, Chicago, Illinois

Session 5C, Oregon/Nevada
Roadside Safety Policies, Strategies, and Guidelines
Moderator: Francesca La Torre, University of Florence, Florence, Italy

Consideration of Roadside Features in the Highway Safety Manual
Christine Carrigan, RoadSafe LLC, Canton, Maine

Selection and Placement Guidelines for Test Level 2 through Test Level 5 Median Barriers
Christine Carrigan, RoadSafe LLC, Canton, Maine

A New Method To Evaluate Roadside Safety For Rural Two-Lane Roads Based On Reliability Analysis
Mohammad Jalayer, Center for Advanced Infrastructure and Transportation, Rutgers University, New Jersey, Piscataway, New Jersey

*Star Ratings And Safer Roads Investment Plan For Cambodia
Kong Sovann, Road Safety Consultant, Phnom Penh, Cambodia (*Invited Presentation)

Session 5D, California/Washington
Roadside Safety Barrier Accreditation, Equipment Evaluation, and Technologies for Maintenance and Work-Zone Operations
Moderator: Michael Dreznes, International Road Federation, Chicago, Illinois

Establishing a National Accreditation Scheme for Road Safety Barrier Industry
Evan Coulson, Road Authority – VicRoads, Melbourne, Australia

Progress Towards A National Harmonisation for Road Side Safety Barrier Training And Accreditations Schemes For Installation And Maintenance In Australia And New Zealand
Paul Hansen, Working Party for National Training and Accreditation in the Roadside Safety Barrier Industry in Australia and New Zealand, Sydney, Australia

Evaluation of Radar Speed Sign for Mobile Maintenance Operations
Ali Jafarnejad, School of Civil and Construction Engineering, Oregon State University, Corvallis, Oregon

*Role of Technology and Autonomous Vehicles in Work Zones
Fred Bergstresser, Royal Truck & Equipment, Inc., Coopersburg, PA (*Invited Presentation)
3:15 p.m. - 3:45 p.m., Gold Rush Ballroom

Break

3:45 p.m. - 5:30 p.m.

Technical Sessions

Session 6A, Redwood

High-Friction Surface Treatments (HFSTS) and Maintenance Practices
Moderator: Ken Kochevar, Federal Highway Administration, California Division, Sacramento, California

- Advances in Winter Maintenance Practices to Improve Roadside Safety
  Dave Bergner, Monte Vista Associates, LLC, Phoenix, Arizona

- High Friction Surfacing Treatment: How a 45 Year Old Process has been Reengineered into the Leading National Safety System used by Highway Agencies to Reduce Fatalities and Serious Injuries
  Richard Baker, DBI Services, LLC, Hazleton, Pennsylvania

- Improving Pavement Friction to Advance Roadway Safety on Horizontal Curves
  Joseph Cheung, FHWA- Office of Safety, Washington, District of Columbia

- Safety Impact of High Friction Surface Treatment Installations in the state of Pennsylvania
  Seri Park, Villanova University, Villanova, Pennsylvania

Session 6B, Oregon/Nevada

Real-World Crash Data
Moderator: Malcolm Ray, Roadsafe LLC, Canton, Maine

- Integrating Crash Severity in Roadside Safety Quantitative Analysis: Assessing Partial Proportional Odds Models
  Carlos Roque, Laboratório Nacional de Engenharia Civil, Departamento de Transportes, Lisbon, Portugal

- Estimate of Occupant Ejection and Occupant Head-Slap Prevalence In Real-World Longitudinal Barrier Crashes
  Douglas Gabauer, Bucknell University, Lewisburg, Pennsylvania

- Comprehensive Analysis of Bridge-Related Crashes in New Jersey
  Mohammad Jalayer, Center for Advanced Infrastructure and Transportation, Rutgers University, Piscataway, New Jersey

- Comprehensive Analysis of Run-off-road Crashes in New Jersey
  Mohammad Jalayer, Center for Advanced Infrastructure and Transportation (CAIT), Rutgers, The State University of New Jersey

Session 6C, Emerald Ballroom

Barrier Evaluation with FEA and Crash Testing Needs for High-Speed Roadways
Moderator: Michael Elle, Minnesota Department of Transportation, Saint Paul, Minnesota

- Comparison of Verification and Validation of Crash Test & Simulation Results for Common Barriers
  Dhafer Marzougui, Center for Collision Safety and Analysis, George Mason University, Fairfax, Virginia

- Applying Finite Element Analysis to Assess the Crash Performance of Modified R350 TL4 Bridge Rail Design in Accordance with the Federal-Aid Reimbursement Eligibility Process
  Chuck Plaxico, Roadsafe LLC, Canton, Maine

- Evaluating the Relevancy of Current Crash Test Guidelines for Roadside Safety Barriers on High Speed Roads
  Chiara Silvestri Dobrovolny, Texas A&M University - Department of Civil Engineering, College Station, Texas
Design Impact Conditions for Testing and Evaluation of Longitudinal Safety Barriers for Use on High Speed Roadways
Roger Bligh, Texas A&M Transportation Institute, College Station, Texas

6:30 p.m. - 8:30 p.m.
Technical Tour (organized by Golden Gate Bridge, Highway and Transportation District – space is limited)

Wednesday, June 14

8:00 a.m. - 4:00 p.m., Emerald Foyer
Registration

8:30 a.m. - 9:30 a.m., Emerald Ballroom
General Session 3
Moderator: Ronald Faller, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Keynote Address: Automotive Safety - Past, Present and Future
• Priya Prasad, Ford Motor Company (Retired), Dearborn, MI
Global Automotive Safety, Autonomous Automobiles, and the Future of the Industry

9:30 a.m. - 10:00 a.m., Gold Rush Ballroom
Break

9:30 a.m. - 3:45 p.m., Gold Rush Ballroom
Exhibits

10:00 a.m. - 11:45 a.m.
Technical Sessions

Session 7A, Emerald Ballroom
High Performance, Innovative, and Aesthetic Barriers
Moderator: Michael Dreznes, International Road Federation, Chicago, Illinois

Compliance Crash Testing of the CA ST-70 Side Mounted Bridge Rail
Vue Her, California Department of Transportation, Sacramento, California

Development of MASH TL-5 Steel Median Safety Barrier
Richard Clausius, ArcelorMittal Global R&D, East Chicago, Indiana

Development of a MASH TL-4 Roller Barrier
Frederick Mauer, Gregory Industries, Canton, Ohio

*Implementing MASH High-Tension, Three-Cable Guide Rail (HT3CGR) System in Ontario
Mark Ayton, Ontario Ministry of Transportation, Ontario, Canada (*Invited Presentation)

Session 7B, Redwood
New Vehicle Safety Technologies and Heavy Vehicle Considerations
Moderator: John Donahue, Washington State Department of Transportation, Olympia, Washington

Roadside Safety Implications of Future Vehicle Designs
Dhafer Marzougui, Center for Collision Safety and Analysis, George Mason University, Fairfax, Virginia

Heavy Vehicle Encroachment Trajectories
Malcolm Ray, RoadSafe LLC, Canton, Maine
Commercial Motor Vehicle Safety Measures
John Durkos, Road Systems, Inc., Cleveland, Ohio

Intelligent Transportation System Technology Application for Notification of Vehicles with Right-of Way
Chiara Silvestri Dobrovolny, Texas A&M Transportation Institute, College Station, Texas

**Session 7C, Oregon/Nevada**

**Real-World Crash Data - Uses and Benefits**
*Moderator: Lance Bullard, Texas A&M Transportation Institute, College Station, Texas*

- **Roadside Barrier Issues: Lessons Learned from National Transportation Safety Board (NTSB) Accident Investigations**
  Donald Karol, National Transportation Safety Board, Washington, District of Columbia

- **The SHRP 2 Roadway Information Database: A Template for Data Collection**
  Omar Smadi; Iowa State University, Ames, Iowa

- **The Use of Corporate Crash Data to Assist Companies Improve Road Infrastructure for Workplace Safety**
  Jeffrey Simmons; Transport and Road Safety (TARS) Research Centre, University of New South Wales, Australia

- **Comparing Objective and Subjective Roadway Data Collection Methods Using Cost-Benefit Analysis for the Proposed Safety Countermeasures**
  Niloo Parvin; Iowa State University, Ames, Iowa

**Noon - 1:30 p.m., Gold Rush Ballroom**

**Lunch**

**1:30 p.m. - 3:15 p.m.**

**Technical Sessions**

**Session 8A, Emerald Ballroom**

**Innovations and Ongoing Research on Crash Cushions and Guardrail End Terminals**
*Moderator: John Donahue, Washington State Department of Transportation, Olympia, Washington*

- **New Methodology for Analysis of Sand Barrel Arrays**
  Robert Bielenberg, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

- **Evaluation of Energy-Absorbing End Terminals Adjacent to Curbs**
  Jennifer Schmidt, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

- **A MASH TL-3 Compliant Short Radius System**
  Akram Abu-Odeh, Texas A&M Transportation Institute, College Station, Texas

- **Development of a New MASH Guardrail Terminal**
  John Durkos, Road Systems, Inc., Cleveland, Ohio

**Session 8B, Redwood**

**Post-Soil Performance for Guardrail Applications**
*Moderator: Richard Albin, Federal Highway Administration, Olympia, Washington*

- **Performance Characteristics of Posts Embedded in Soil for Use in Computer Simulation**
  Karla Lechtenberg; Midwest Roadside Safety Facility, University of Nebraska-Lincoln

- **Impact Resistance of Guardrail Posts on Sloped Ground**
  Chung Song, University of Nebraska Lincoln – Lincoln, Nebraska

- **Behavior and Performance of Wood and Composite Block-outs Raised on Posts during Component Pendulum Impact Testing**
  Chiara Silvestri Dobrovolny, Texas A&M Transportation Institute, College Station, Texas
Evaluation Of Soil Conditions And Post Embedment Depth On Guardrail Post Performance  
Ali Atahan, Istanbul Technical University, Istanbul, Turkey

Session 8C, Oregon/Nevada  
International Perspectives in Roadside Safety Research  
Moderator: Ronald Faller, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Worksite Safety Screens (Anti-Gawk/Anti-Debris)  
Evan Coulson, Road Agency (VicRoads), Melbourne, Australia

Study of An Innovative Type of Junction for Elements of Road Safety Barriers  
Sergio Marco Bassi, Politecnico di Milano - Transport Safety Lab – LaST, Milan, Italy

Development of the Australian and New Zealand Standard for Safety Barriers and Associated Devices  
Rod Troutbeck, Troutbeck & Associates, Queensland, Australia

Monitoring and Predicting Traffic Safety in Slovenia  
Peter Lipar, University of Ljubljana, Faculty of Civil and Geodetic Engineering, Ljubljana, Slovenia

3:15 p.m. - 3:45 p.m., Gold Rush Ballroom  
Break

3:45 p.m. - 5:30 p.m.  
Technical Sessions

Session 9A, Emerald Ballroom  
New Technologies and Guidelines for Concrete Barriers  
Moderator: Michael Elle, Minnesota Department of Transportation, Saint Paul, Minnesota

Length of Need for Free-Standing, F-Shape, Portable Concrete Barrier  
Robert Bielenberg, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

A MASH Compliant Sign Mounting Designs for Placement on Concrete Median Barrier  
Akram Abu-Odeh, Texas A&M Transportation Institute, College Station, Texas

Evaluation of a MASH Test Level 4 Sound Wall Barrier Using Simulation  
Nauman Sheikh, Texas A&M Transportation Institute, College Station, Texas

Development of a Precast Slim Temporary Concrete Safety Barrier STCSB 50 for Work Zone Applications  
Ali Atahan, Istanbul Technical University, Istanbul, Turkey

Session 9B, Redwood  
Hazard Identification, Risk Assessment, and Treatment Guidelines  
Moderator: Francesca La Torre, University of Florence, Florence, Italy

Identifying Roadway Risk Factors in Pennsylvania’s Delaware Valley Region  
Seri Park, Villanova University, Villanova, Pennsylvania

Guidelines for Shielding Bridge Piers  
Malcolm Ray, RoadSafe LLC, Canton, Maine

Handling an Instant Hazard  
Eric Hemphill, North Texas Tollway Authority, Plano, Texas

Benchmarking the Risks of Roadside Hazards  
Christine Carrigan, RoadSafe LLC, Canton, Maine
Session 9C, Oregon/Nevada
Occupant Risk Assessment - Crash, Data, Modeling, and Testing
Moderator: Jennifer Schmidt, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, Nebraska

Flail-Space Model – A Review of the Lateral Impact Velocity for Thoracic Injuries
Tana Tan; Transport and Road Safety (TARS) Research – UNSW, Sydney, Australia

Evaluation of Head and Brain Injury Using Empirical and Analytical Predictors in Human Body Model
Davide Benetton, Politecnico di Milano - Transport Safety Lab – LaST, Milan, Italy

Integrated Interior & Restraint Modeling for Occupant Risk Analysis
Rudolf Reichert, Center for Collision Safety and Analysis, George Mason University, Fairfax, Virginia

Comparison of Hybrid III and Human Body Model in Head Injury Encountered in Pendulum Impact and Inverted Drop Tests
Benedetta Arosio, Politecnico di Milano - Transport Safety Lab – LaST, Milan, Italy

6:30 p.m. - 9:30 p.m., Crystal
Roadside Safety Design International Research Activities Subcommittee AFB20(2)

Thursday, June 15

8:00 a.m. - Noon, Emerald Foyer
Registration

8:30 a.m. - 5:00 p.m., Crystal
TRB AFB20 Committing Meeting

8:30 a.m. - Noon
Welcome and Introductions
IRSC Debrief and Feedback
Session I: Motorcycle Safety
Breakout Sessions I
• Motorcycle Safety
• 2nd International Roadside Safety Conference

10:00 a.m. - 10:30 a.m., Emerald Foyer
Break

Noon - 1:00 p.m., Emerald
Lunch

1:00 p.m. - 5:00 p.m., Crystal
Session II: MASH Implementation Updates
Breakout Sessions II
• Research Needs
• MASH Implementation Needs and Issues
Breakout Session Summaries
Other Business
Adjourn

3:30 p.m. - 4:00 p.m., Emerald Foyer
Break
Advancing Roadway Safety

Since 1969, members of the American Traffic Safety Services Association (ATSSA) have been the industry leaders in Advancing Roadway Safety. ATSSA members do this by manufacturing and installing innovative roadway safety devices that road users trust every time they take to America’s roadways. These include bright, reflective signs and pavement markings, guardrail, cable median barriers, crash cushions, rumble strips, intelligent transportation systems, temporary traffic control products, and roadway worker safety apparel.

ATSSA is also the industry’s recognized leader in work zone worker training. In 2016, ATSSA trained 35,000 students in the classroom, and an additional 11,000 students under the Federal Highway Administration’s Work Zone Safety Grant. ATSSA continues to expand its training portfolio by adding new courses regularly, including guardrail inspection, high friction surface treatment installation and inspection, and online courses – such as ATSSA’s new truck mounted attenuator course. For the most innovative roadway safety products, worker protection, and worker training, no one does it better – or safer – than ATSSA.

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Scott Chapman
Global Marketing Communications Manager
scott.chapman@averydennison.com
Horizon Signal Technologies, Inc. is a privately held Pennsylvania-based company specializing in meeting the needs of the road construction industry through the manufacture of portable traffic signal systems. Since our inception in 1988, we have dedicated ourselves to manufacturing the high quality, dependable traffic signal systems that provide superior reliability and versatility. Whether your project requires daily, long term, or emergency traffic control, we have the Portable Traffic Signal System to meet your needs. Our systems have been engineered to be component-based systems, meaning that our many add-on features allow our systems fit most any need.

Scott Heydt
Horizon Signal Technologies
office: 717-405-3733
mobile: 610-226-7600
Introducing T-LOK Positive Lock Connection system for Portable Concrete Traffic Barrier.

T-LOK was developed in the mid 1990's, and was NCHRP 350 TL # 3 approved. In 08' we re-tested to the FHWA's (MASH08) TL # 3. The MASH08 test is verified by the FHWA approval letter B-42B. In Virginia Rockingham Precast has been casting T-LOK connections into their Concrete Barriers since its inception. There are miles of concrete T-LOK concrete barriers all over Virginia, Maryland and Washington DC. T-LOK franchises are located in Australia as well as Canada, we are currently looking for parties interested in Franchising. T-LOK is currently approved by 15 State DOT’s.

Rod Morgan
T-LOK
P.O. Box 1347, Harrisonburg VA 22803
Office: 540-271-0172
Mobile: 540-263-5780
rod.morgan@conmatgroup.com; www.t-lok.com
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Transportation Research Board

Professional Development Hours Credit Statement for Registrant Records

Many licensure and certification agencies require the demonstration of continuing professional competency. Your attendance at this workshop and meetings entitles you to earn Professional Development Hour (PDH) units. This form is for your use in maintaining a record of the PDH units you have earned. Complete this form and retain it. Please do not return it to TRB. We recommend that you save the entire Workshop Program for your records should the licensure or certification agency request information from you. Reporting is done on an honor basis, and members are responsible for maintaining their own records.

The table below shows the professional development hours (PDH) that can be earned for the continuing education activities included in the Transportation Research Board’s International Roadside Safety Conference, San Francisco, CA, June 12-15, 2017.

Ann M. Brach
Director, Technical Activities

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<td>10:00 – 11:45</td>
<td>Technical Session 7A: High Performance, Innovative, and Aesthetic Barriers</td>
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<td>Technical Session 7B: New Vehicle Safety Technologies and Heavy Vehicle Considerations</td>
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<td>Technical Session 7C: Real-World Crash Data - Uses And Benefits</td>
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<td>1:30 – 3:15</td>
<td>Technical Session 8A: Innovations and Ongoing Research on Crash Cushions and Guardrail End Terminals</td>
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<td>Technical Session 8B: Post-Soil Performance for Guardrail Applications</td>
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<td>Technical Session 8C: International Perspectives In Roadside Safety Research</td>
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<td>3:45– 5:30</td>
<td>Technical Session 9A: New Technologies and Guidelines for Concrete Barriers</td>
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<td>Technical Session 9B: Hazard Identification, Risk Assessment, And Treatment Guidelines</td>
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<td>Technical Session 9C: Occupant Risk Assessment - Crash Data, Modeling, And Testing</td>
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Total PDH Units:

Name ________________________________________________________________   Date ______________

Signature______________________________________________________________
The Transportation Research Board (TRB) 97th Annual Meeting will be held January 7–11, 2018, at the Walter E. Washington Convention Center, in Washington, D.C. The information-packed program is expected to attract more than 12,000 transportation professionals from around the world.

The meeting program will cover all transportation modes, with more than 5,000 presentations in nearly 750 sessions and workshops, addressing topics of interest to policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions. A number of sessions and workshops will focus on the spotlight theme for the 2018 meeting: Transportation: Moving the Economy of the Future

The full 2018 program will be posted to this website in November, 2017.

Be a TRB Annual Meeting presenter! Some TRB committees provide calls for papers in specific subject areas to help potential authors identify topics for their papers. However, it is not necessary to respond to any specific call for papers. Papers addressing any relevant aspect of transportation research will be considered. To submit a paper, please visit the MyTRB Annual Meeting Paper Submission - https://annualmeeting.mytrb.org/CallForPapers/index.

2018 Exhibit and Marketing Opportunities are available and on sale now. Exhibit space and advertising opportunities are limited - http://events.jspargo.com/trb18/public/enter.aspx

Registration and housing will open in September, 2017. TRB has negotiated hotel rooms throughout the city at the government per diem rate, but you must be registered for the meeting in order to book rooms in the TRB hotel block.
HOTEL FLOOR PLAN

TRB Registration

Emerald Ballroom

Crystal

Internet Lounge

Media Library

ROH Restaurant

Holiday Inn

Gold Rush Ballroom

Monterey/Carmel

Oregon

Nevada

Washington

California

Redwood

Lower Lobby Level