12th TRB
International Conference on
Low-Volume Roads

September 15 – 18, 2019
Hilton Garden Inn Kalispell, Montana

Sponsored by
Transportation Research Board

Co-Sponsored by
Forest Service, U.S. Department of Agriculture

Organized by
Standing Committee on Low-Volume Roads (AFB30)
Conference Subcommittee for the 12th International Conference on Low-Volume Roads (AFB30(1))

Local Host
Western Transportation Institute (WTI) at Montana State University (MSU)

The National Academies of
SCIENCES • ENGINEERING • MEDICINE
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Shawna Ballay, Pueblo of Isleta
Steve Blosor, Pennsylvania State University
Alex Campbell, Anyway Solutions
Andrew Ceifetz, WSP
Gary Danczyk, United States Department of Agriculture (USDA) Forest Service
Asif Faiz, Faiz and Associates, LLC
Laura Fay, Western Transportation Institute
Vanessa Goetz, Iowa Department of Transportation
Maureen Kestler, US Army Corps of Engineers (USACE)
Keith Knapp, Iowa State University
Bethany Kunz, U.S. Geological Survey
Glen Legere, FPinnovations
Ricky Mitchell, Ricky Mitchell
David Orr, Cornell Local Roads Program

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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
On behalf of the conference steering committee, it is my honor to welcome you to Kalispell, Montana for the TRB’s 12th International Conference on Low-Volume Roads. It is wonderful to be having the conference in a rural setting where the knowledge that is going to be shared is most needed. Kalispell, with Glacier National Park close by, is a beautiful area of the country and our local hosts have excelled in providing a great venue with plenty of opportunities for pre- and post-conference activities.

This conference continues the long tradition of low-volume roads conferences, held every four years since 1975 to provide a forum for the exchange of information and innovative ideas on all aspects of low-volume road planning, financing, design, construction, maintenance, operations, and safety. We have introduced a number of changes in the conference format, including more hands-on Sunday workshops from which attendees will be able to walk away with readily implementable knowledge; lightning poster sessions, which include a brief presentation by the author on the main take home message; facilitated panel sessions on hot topics; and mini workshops that demonstrate phone app and web-based tools.

We have six Sunday workshops, covering conversion of distressed paved roads to engineered unpaved roads, timber bridge inspection, climate resiliency, unstable slope management tools, the use of unmanned aerial vehicles in low volume road management, and low-cost safety improvements. The workshops are followed by the welcome session and opening of the exhibits. Monday morning sees the opening session with welcome messages from local administrators and three plenary speakers covering key issues facing agencies managing low volume road networks. This is followed by a packed program with 104 technical presentations, 62% of which will be in the form of lightning poster presentations combined with a 5-minute podium presentation by each author. We also have the 10 U.S. state departments of transportation as a pooled fund project hosting two panel sessions discussing low volume road bridge management, and we welcome the Community Access Program (ReCAP) who will be sharing their initiatives for providing sustainable infrastructure in developing countries. Tuesday afternoon is dedicated to a field trip that will highlight demonstrations of a variety of low volume road management tools including those that are being covered in the Sunday workshops. The field trip will conclude with a Montana-style barbeque in a superb ranch setting.

Registrations are indicating a diverse local and international audience with a broad knowledge base. I look forward to meeting each one of you, learning from all of you, and working with you to implement the knowledge that will be shared.

Finally, I would like to thank everybody who has contributed to making the conference a success, with special thanks to the organizing committee, TRB, Western Transportation Institute, the US Forest Service, the pooled fund states, and our conference patrons.

David Jones, University of California, Davis
Chair, TRB Standing Committee on Low-Volume Roads (AFB30) &
Chair, TRB Low Volume Roads Conference Planning Committee (AFB30(1))
# Agenda at a Glance

## Sunday, September 15, 2019

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00 a.m. – 5:30 p.m.</td>
<td>Registration</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>9:00 a.m. – 12:00 p.m.</td>
<td><strong>Session 1: Morning Workshops</strong>&lt;br&gt;Converting Distressed Paved Roads to Engineered Unpaved Roads&lt;br&gt;Timber Bridge Load Rating Using Load and Resistance Factor Rating (LRFR)&lt;br&gt;Steps for Making Low Volume Roads More Climate Resilient</td>
<td>Glacier IV, Glacier III, Glacier I &amp; II</td>
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<tr>
<td>12:00 p.m. – 1:00 p.m.</td>
<td>Lunch (on your own)</td>
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<tr>
<td>1:00 p.m. – 4:30 p.m.</td>
<td><strong>Session 2: Afternoon Workshops</strong>&lt;br&gt;Unstable Slope Management Program (USMP) for Low Volume Roads <em>(tickets required)</em>&lt;br&gt;Unmanned Aerial Vehicles (UAVs) in Low Volume Road Management&lt;br&gt;Low-Cost Safety Improvements for Low Volume Roads</td>
<td>Glacier III, Glacier IV, Glacier I &amp; II</td>
</tr>
<tr>
<td>5:30 p.m. – 7:00 p.m.</td>
<td>Exhibits Open and Welcome Reception</td>
<td>Glacier Ballroom Foyer &amp; Glacier IV</td>
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## Monday, September 16, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>7:00 a.m. – 8:00 a.m.</td>
<td>Continental Breakfast</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>7:00 a.m. – 5:00 p.m.</td>
<td>Registration</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>8:00 a.m. – 10:00 a.m.</td>
<td>Opening Plenary Session</td>
<td>Glacier IV</td>
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<tr>
<td>10:00 a.m. – 10:30 a.m.</td>
<td>Break</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>10:30 a.m. – 12:00 p.m.</td>
<td><strong>Session 4: Road Surfacings Part 1</strong>&lt;br&gt;<strong>Session 5: Rural Roadway Safety Plans, Technology and Research</strong>&lt;br&gt;<strong>Session 6: Tools for Geotechnology Applications</strong></td>
<td>Glacier I, Glacier II, Glacier III</td>
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<tr>
<td>12:00 p.m. – 1:30 p.m.</td>
<td>Lunch</td>
<td>Glacier IV</td>
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<tr>
<td>1:30 p.m. – 3:00 p.m.</td>
<td><strong>Session 7: Cold Regions &amp; Climate Change</strong>&lt;br&gt;<strong>Session 8: Pavement Management</strong>&lt;br&gt;<strong>Session 9: Road Surfacings Part 2</strong></td>
<td>Glacier I, Glacier II, Glacier III</td>
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<tr>
<td>3:00 p.m. – 3:30 p.m.</td>
<td>Break</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>3:30 p.m. – 5:00 p.m.</td>
<td><strong>Session 10: Planning and Economics</strong>&lt;br&gt;<strong>Session 11: Unpaved Road Management Part 1</strong>&lt;br&gt;<strong>Session 12: Geosynthetics in Low Volume Roads</strong></td>
<td>Glacier I, Glacier II, Glacier III</td>
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## Tuesday, September 17, 2019

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<tr>
<td>7:30 a.m. – 8:30 a.m.</td>
<td>Continental Breakfast</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>7:30 a.m. – 1:00 p.m.</td>
<td>Registration</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>Time</td>
<td>Session</td>
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<tr>
<td>8:30 a.m. – 10:00 a.m.</td>
<td>Concurrent Sessions: Session 13: Drainage &amp; Stream Crossings</td>
<td>Glacier I</td>
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<td>Session 14: International Perspectives on Climate Resiliency and Adaption for Low-Volume Roads</td>
<td>Glacier II</td>
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<td>Session 15: Education for Low Volume Road Engineers</td>
<td>Glacier III</td>
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<tr>
<td>10:00 a.m. – 10:30 a.m.</td>
<td>Break</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>10:30 a.m. – 12:00 p.m.</td>
<td>Concurrent Sessions: Session 16: Stabilization</td>
<td>Glacier I</td>
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<td>Session 17: Unpaved Road Management Part 2</td>
<td>Glacier II</td>
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<td></td>
<td>Session 18: Pooled Fund States Part 1: Local Bridge Programs in 10 States</td>
<td>Glacier III</td>
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<tr>
<td>12:00 p.m. – 1:00 p.m.</td>
<td>Lunch</td>
<td>Glacier IV</td>
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<tr>
<td>1:00 p.m. – 5:30 p.m.</td>
<td>Conference Field Trip</td>
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<tr>
<td>6:00 p.m. – 8:30 p.m.</td>
<td>Conference Banquet</td>
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**Wednesday, September 18, 2019**

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<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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<tr>
<td>7:30 a.m. – 8:30 a.m.</td>
<td>Continental Breakfast</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>7:30 a.m. – 3:30 p.m.</td>
<td>Registration</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>8:30 a.m.– 10:00 a.m.</td>
<td>Concurrent Sessions: Session 19: Safety</td>
<td>Glacier I</td>
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<td>Session 20: Developments in LVR Pavement Design and Management</td>
<td>Glacier II</td>
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<tr>
<td></td>
<td>Session 21: Pooled Fund States Part 2: Local Bridge Programs in 10 States</td>
<td>Glacier III</td>
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<tr>
<td>10:00 a.m. – 10:30 a.m.</td>
<td>Break</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>10:30 a.m. – 12:00 p.m.</td>
<td>Concurrent Sessions: Session 22: Pavement Evaluation</td>
<td>Glacier I</td>
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<td>Session 23: Autonomous Vehicles on Low Volume Roads</td>
<td>Glacier II</td>
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<td>Session 24: ReCAP: Research for Community Access Partnership</td>
<td>Glacier III</td>
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<tr>
<td>12:00 p.m. – 1:30 p.m.</td>
<td>Lunch</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>1:30 p.m. – 3:00 p.m.</td>
<td>Concurrent Workshops: Session 25: Mini Workshop – Unpaved Roads</td>
<td>Glacier I</td>
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<td>Session 26: Mini Workshop – Pavement Management</td>
<td>Glacier II</td>
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<td>Session 27: Mini Workshop - Safety</td>
<td>Glacier III</td>
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<tr>
<td>3:00 p.m. – 3:30 p.m.</td>
<td>Break</td>
<td>Glacier Ballroom Foyer</td>
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<tr>
<td>3:30 p.m. – 5:00 p.m.</td>
<td>Closing Plenary Session</td>
<td>Glacier IV</td>
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**Thursday, September 19, 2019**

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<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:30 a.m. – 10:00 a.m.</td>
<td>LVR 2019 Conference Planning Committee Meeting (MEMBERS ONLY)</td>
<td>Glacier I</td>
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Sunday, September 15

8:00 a.m. – 5:30 p.m.
REGISTRATION
Glacier Ballroom Foyer

9:00 a.m. – 12:00 p.m., Concurrent Workshops
SESSION 1: MORNING WORKSHOPS

Converting Distressed Paved Roads to Engineered Unpaved Roads
*Glacier IV*
Laura Fay, Western Transportation Institute; and David Jones, University of California Davis

Timber Bridge Load Rating Using Load and Resistance Factor Rating (LRFR)
*Glacier III*
J. Scott Groenier, United States Department of Agriculture (USDA) Forest Service

Steps for Making Low Volume Roads More Climate Resilient
*Glacier I & II*
Gordon Keller, Genesee Geotechnical; Asif Faiz, Faiz and Associates; Glen Legere, FPInnovations; Mark Partington, FP Innovations; and Alex Campbell, AnyWay Solutions

12:00 p.m. – 1:00 p.m.
LUNCH (On You Own)

1:00 p.m. – 4:30 p.m., Concurrent Workshops
SESSION 2: AFTERNOON WORKSHOPS

Unstable Slope Management Program (USMP) for Low Volume Roads
*Glacier III*
Tickets Required
Eric Bilderback, National Park Service; and Douglas Anderson, Federal Highway Administration (FHWA)

Unmanned Aerial Vehicles (UAVs) in Low Volume Road Management
*Glacier IV*
Colin Brooks, Michigan Technological University; Richard Dobson, Michigan Technological University; and Joe Campbell, Federal Highway Administration (FHWA)

Low-Cost Safety Improvements for Low Volume Roads
*Glacier I & II*
Keith Knapp, Iowa State University; Rosemarie Anderson, Federal Highway Administration (FHWA); and Nicole Oneyear, Iowa State University

5:30 p.m. – 7:00 p.m.
EXHIBITS OPEN
Glacier Ballroom Foyer

WELCOME RECEPTION
Glacier IV
Monday, September 16

7:00 a.m. – 8:00 a.m.
CONTINENTAL BREAKFAST
Glacier Ballroom Foyer

7:00 a.m. – 5:00 p.m.
REGISTRATION
Glacier Ballroom Foyer

8:00 a.m. – 10:00 a.m.
OPENING PLENARY SESSION
Glacier IV
David Jones, University of California Davis

Welcome from Conference Chair
David Jones, University of California Davis

Welcome from Glacier National Park
Jeff Mow, Glacier National Park

Welcome from Flathead County, Montana
Mike Pence, Flathead County Montana

Yoder Award Presentation
Nancy Whiting, Transportation Research Board (TRB)

Towards Shared Stewardship of Rural Low Volume Road Systems – Federal, State & Local Partnerships
Gary Danczyk, United States Department of Agriculture (USDA) Forest Service

LTAP: Helping the Low Volume Road Community
David Orr, Cornell Local Roads Program; and Matthew Ulberg, Montana State University

Low Volume Roads Role in Disaster Recovery and Network Resilience: A Case Study
Philip Barutha, University of Nebraska Lincoln

10:00 a.m. – 10:30 a.m.
BREAK
Glacier Ballroom Foyer
SESSION 4: ROAD SURFACINGS PART 1

Glacier I

David Orr, Cornell Local Roads Program, moderator

The Performance Evaluation of Emulsified Asphalt Residue
Zhanping You, Michigan Technological University

Design, Construction, and Preliminary Investigations of Otta Seal in Iowa
Sharif Gushgari, Iowa State University

Full Scale Field Implementation of Otta Seal in Iowa
Brian Moore, Iowa County Engineers Association Service Bureau

Performance of Chip Seal Treatments in Two Different Climatic Regions
Adriana Vargas-Nordcbeck, National Center for Asphalt Technology

Chloride Stabilized Roads versus Thin Bituminous Surface: A Comparative Analysis
Alondra Chamorro, Pontificia Universidad Catolica De Chile

Assessing Bio-Based Fog Seal for Asphalt Pavement Preservation
Bo Yang, Iowa State University

Role of Preventive Treatments in Low-Volume Road Maintenance Program: A Full-Scale Case Study
Farhang Jalali, National Center for Asphalt Technology (NCAT)

Effect of Preservation Treatments on the Structural Performance of Pavements: A Study from NCAT’s Low-Volume Preservation Sections
Md Rahman, Graduate Student, National Center for Asphalt Technology (NCAT)

SESSION 5: RURAL ROADWAY SAFETY PLANS, TECHNOLOGY, AND RESEARCH

Glacier II

Mike Fitch, Ohio Department of Transportation (ODOT), moderator

Rural Research Roadmap: Safety Ideas
Jamie Sullivan, Western Transportation Institute

Local Road Safety Plan Implementation Peer Exchange: Addressing Low Volume Roads
Rosemarie Anderson, Federal Highway Administration (FHWA)

Rural Intelligent Transportation Systems Toolkit: Operations and Safety
Natalie Villwock-Witte, Western Transportation Institute

Driving FoRRwD to Reducing Rural Roadway Departures
Dick Albin, Federal Highway Administration (FHWA)
SESSION 6: TOOLS FOR GEOTECHNOLOGY APPLICATIONS

Glacier III

Gordon Keller, Genesee Geotechnical, moderator

USFS, Region 1, GIS Semi-Automated Landslide Inventory Tool
Teresa Morales, United States Department of Agriculture (USDA) Forest Service, Region 1

A Photogrammetric Method for Obtaining Soil Density
Ernest Berney, US Army Corps of Engineers (USACE)

Using UAS Technology/Orthoimagery to Assess Pre- and Post-Construction Conditions
Teresa Morales, United States Department of Agriculture (USDA) Forest Service, Region 1

A UAS Photogrammetric Method for Determining Volume Changes in Man-Made Stockpiles
Bryan Ward, US Army Corps of Engineers (USACE)

12:00 p.m. – 1:30 p.m.
LUNCH

Glacier IV

1:30 p.m. – 3:00 p.m., Concurrent Sessions

SESSION 7: COLD REGIONS & CLIMATE CHANGE

Glacier I

Bethany Kunz, US Geological Survey, moderator

Development and Pilot Installation of a Scalable Environmental Sensor Monitoring System for Freeze-Thaw Monitoring Under Granular-Surfaced Roadways
Derya Genc, Ph.D. Candidate and Graduate Research Assistant

Comparison of Three Degree-Day Models for Application of Spring Load Restrictions on Low Volume Roads
Chud Lundgreen, United States Department of Agriculture (USDA) Forest Service

Accuracy Assessment of Satellite-Based Freeze-Thaw Retrievals (SMAP) at Low Volume Roads in the United States
Simon Kraatz, University of New Hampshire

When Should Agencies Post Weight Limits on Local Highways in New York State?
David Orr, Cornell Local Roads Program

Construction of Chemically and Mechanically Stabilized Test Sections to Reduce Freeze-Thaw Damage of Granular Roads
Jeramy Ashlock, Iowa State University

Climate Change Risk Assessment and Risk Management for Transportation Infrastructure in United States National Forests
Leslie J. Boak, United States Department of Agriculture (USDA) Forest Service
Impact of CO₂ Emissions on Low Volume Road Maintenance Policy – Case Study of Serbia
Goran Mladenovic, University of Belgrade

Making Rural Access Roads More Resilient
Raquel Damiao Langa Abubacar, ANE

Lessons Learned and Recommendations from Embedding Climate Change Adaptation into the Roads Sector - From Policy to Practice
Alize le Roux, CSIR, South Africa

SESSION 8: PAVEMENT MANAGEMENT
Glacier II
Asif Faiz, Faiz and Associates, moderator

Accuracy of Statewide Pavement Surface Evaluations and Ratings Performed by Local Agencies
Sharlan Montgomery Dunn, NCE

Using Summer Interns to Develop Pavement Management Plans for Local Highway Agencies in New York State
Geoff Scott, Cornell Local Roads Program – NY LTAP

A Framework for Monitoring of Road Agency Performance in Rural Road Asset Management
Charles Bopoto, ReCAP & AfCAP

Impact of Improved Fords Construction on Sediment Yield
Karelle Gilbert, Université Laval

SESSION 9: ROAD SURFACINGS PART 2
Glacier III
Vanessa Goetz, Iowa Department of Transportation (IowaDOT), moderator

Nuggets from Minnesota’s Research, Implementation and Deployment of Pervious Concrete in Low Volume Roads
Bernard Izevbekhai, Minnesota Department of Transportation (MnDOT)

Concrete Pavement Options for Resilient Low Volume Roads in Pacific Island Countries
Sam Johnson, World Bank

Recycled Building Materials for Asphalt Pavement in Low Volume Agriculture Roads
Hesham Mahgoub, Engineering and Research International, Inc. (ERI)

Rural Track Paths on Low Volume Roads in Austria
Wolfgang Haslehner, University of Natural Resources and Life Sciences; State Government of Burgenland, Eisenstadt, Austria
3:00 p.m. – 3:30 p.m.  
**BREAK**  
Glacier Ballroom Foyer

3:30 p.m. – 5:00 p.m., Concurrent Sessions  
**SESSION 10: PLANNING AND ECONOMICS**  
Glacier I  
*Chris “Chud” Lundgreen, United States Department of Agriculture (USDA) Forest Service*

- **Options for Aging and Deficient Low-Volume Road Bridges**  
  *Gordon Keller, Genesee Geotechnical*

- **Topological Connectivity Criteria for Low-Volume Road Network Design and Improvement**  
  *Wubeshet Woldemariam, Purdue University Northwest*

- **Connectivity, Accessibility, and Mobility Relationships in the Context of Low-Volume Road Networks**  
  *Samuel Labi, Purdue University*

- **Using Travel Demand Model to Estimate Traffic Volumes on Low-Volume Roads in Wyoming**  
  *Khaled Ksaibati, University of Wyoming*

- **Estimating AADT for Low Volume Roadways: A Case Study in Louisiana**  
  *Xiaoduan Sun, University of Louisiana at Lafayette*

- **Evidence-Based Investment Planning for Unsealed Roads**  
  *Julie Muir, Central Otago District Council and Director of IDS (Infrastructure Decision Support)*

- **A Novel Performance-Based Economic Analysis Approach: Case Study of Iowa Low Volume Roads**  
  *Sajjad Satvati, Iowa State University*

**SESSION 11: UNPAVED ROAD MANAGEMENT PART 1**  
Glacier II  
*Edward Hoppe, Virginia Transportation Research Council, moderator*

- **Guide Specification for Gravel Road Surfacing**  
  *Stephen Monlux, LVR Consultants, LLC*

- **Benefits and Limitations of Installing Driving Surface Aggregate at Two Federal Lands Sites**  
  *Bethany Kunz, U.S. Geological Survey*

- **Clay Content Optimization for Gravel Road Surfacing**  
  *Stephen Monlux, LVR Consultants LLC*

- **Use of Gravel Loss Prediction Models in the Design and Management of Unsealed Road Pavements**  
  *Adriaan (Ian) Van Wijk, Aurecon*
Long-Term Study on the Cost-Effectiveness of Dust Control and Untreated Aggregate-Surfaced Resource Roads
Glen Legere, FPInnovations

SESSION 12: GEOSYNTHETICS IN LOW VOLUME ROADS
Stefan Louw, University of California Davis, moderator

Fiberglass Ace Mat as a Temporary, Rapid Alternative to Unpaved Road Surfaces
Daniel Harder, U.S. Army Engineer Research and Development Center

Monitoring the Performance of Unreinforced and Geosynthetic Reinforced Pavements on Forest Roads
Justin Long, Washington Department of Natural Resources

Mechanistic Analyses of Geosynthetic Reinforced Aggregate Road Test Sections
Jeb Tingle, US Army Corps of Engineers (USACE)

Experimental Studies on Coir Geotextile Reinforced Low Volume Rural Roads
Sunitha V, National Institute of Technology Tiruchirappalli

Enhancing Pavement Performance for Low Volume Roads Using Tire-Derived Geo-Cylinders
PV Vijay, West Virginia University

Tuesday, September 17

7:30 a.m. – 8:30 a.m.
CONTINENTAL BREAKFAST

7:30 a.m. – 1:00 p.m.
REGISTRATION

8:30 a.m. – 10:00 a.m., Concurrent Sessions
SESSION 13: DRAINAGE & STREAM CROSSINGS
Lyan Garcia, US Army Corps of Engineers (ERDC), moderator

Superficial Drainage Control: Facts That Affected the Construction of Loboguerrero Divided Highway Project
Maria Fernanda, Serrano Guzman, Pontificia Universidad Javeriana - Cali

Understanding Ditch Maintenance Decisions of Local Highway Agencies for Improved Water Resources across New York State
David Orr, Cornell Local Roads Program
Retrofitting the Rural Roadside Ditch Network to Treat Nitrogen from Agricultural Runoff Using Woodchip Bioreactors
Eric Chase, Center for Dirt and Gravel Road Studies - Penn State University

Optimization of LVR Design of Flooding and Debris Control Activities in Selected Caribbean Areas Including Dominica, Considering Local Climate and Development Changes
Jacob Greenstein, USAID

Improving Road Stream Crossings for Storm Resiliency and Aquatic Organism Passage: Pennsylvania Case Study
Steve Bloser, Penn State University

Proposed AASHTO-Ready Specifications for Load Rating and Redundancy Evaluation of Railroad Flatcars Used as Highway Bridges on Low-Volume Roads
Robert Connor, Purdue University

Flexible Buried Bridges for Low Volume Road Crossings
Joel Hahm, Big R Bridge

SESSION 14: INTERNATIONAL PERSPECTIVES ON CLIMATE RESILIENCY AND ADAPTION FOR LOW-VOLUME ROADS
Glen Legere, FPInnovations, moderator

North America
Mark Partington, FP Innovations

South East Asia
Ashok Kumor, World Bank

South America
Gordon Keller, Genesee Geotechnical

Southern Africa
Alize LeRoux, Council for Scientific & Industrial Research

SESSION 15: EDUCATION FOR LOW VOLUME ROAD ENGINEERS
Ron Eck, West Virginia University, moderator

Training and Education for Forest Roads: Use of Experiential Learning with Forestry Students within Coursework at a Land Grant University
Mike Aust, Virginia Polytechnic Institute and State University
Panel Discussion
Ben Worel, Minnesota Department of Transportation (MnDOT); Dale Heglund, North Dakota State University; Steve Bloser, PSU Dirt and Gravel Roads Center; Leslie Boak, US Forest Park; and Mike Aust, Virginia Polytechnic Institute and State University

10:00 a.m. – 10:30 a.m.

BREAK

10:30 a.m. – 12:00 p.m., Concurrent Sessions

SESSION 16: STABILIZATION
Alex Visser, University of Pretoria, moderator

Stabilizing Sand Roads Using Pulp and Paper Mill Boiler Ash
Mark Russell, US Army Corps of Engineers (USACE)

Use of Recycled Concrete Aggregates in Mechanical Stabilization for Low Volume Roads
Dr. Jaya R Shinganmakki, Rasta Center for Road Technology India; and Nabeel Muhamed, Rasta Center for Road Technology

Rapid Rehabilitation of Highly Distressed Low Volume Roads in Papua New Guinea Using In-Situ Soil Recycling with Hydraulic Soil Stabilization
Alex Campbell, Anyway Solutions,

Cement Stabilized Flyash for Application in Structural Layers of Low Volume Road Pavements
Umesh Chandra Sahoo, Indian Institute Of Technology, Bhubaneswar, India

Assessment of the Potential for Salt Damage to Asphalt Surfacings When Chloride-Treated Unpaved Roads Are Upgraded to a Sealed Standard
David Jones, University of California, Davis

Improving Low-Volume Asphalt Roads with Lignosulfonate-Based Additives
Magne Matuz-Thingnaes, Borregaard

Stabilization of Pavement Foundation Material Using Polymeric Additive: Characterization and Performance
Romel Georgees, Kirkuk University, Kirkuk, Iraq

SESSION 17: UNPAVED ROAD MANAGEMENT PART 2
Omar Albatayneh, University of Wyoming, moderator

Inventory-Based Rating System™, A Stable and Implementable Method of Condition Assessment for Unpaved Roads
Tim Colling, Michigan Technological University
Development and Application of a Sustainable Management System for Unpaved Rural Road Networks
Alondra Chamorro, Pontificia Universidad Catolica de Chile

A Pragmatic Approach for Dust Monitoring on Unsealed Roads
Theunis Henning, University of Auckland

SESSION 18: POOLED FUND STATES 1: LOCAL BRIDGE PROGRAMS IN 10 STATES
Eric Cowles, Iowa Department of Transportation (IowaDOT), moderator

Michigan
Mark Harrison, Michigan Department of Transportation, (MDOT)

Virginia
Edward Hoppe, Virginia Department of Transportation (VDOT)

Utah
Jason Simmons, Utah Department of Transportation (UDOT)

Alaska
Darryl Lester, Alaska Department of Transportation and Public Facilities

Louisiana
David North, Louisiana Department of Transportation & Development (DOTD)

12:00 p.m. – 1:00 p.m.
LUNCH

1:00 p.m. – 5:30 p.m.
CONFERENCE FIELD TRIP

Field Tour Stops
Unstable Slope Management Program (USMP) for Low Volume Roads
Doug Anderson, Federal Highway Administration (FHWA); and Eric Bilderback, National Park Service

Aquatic Organism Passage (AOP) for Low Volume Roads
Craig Kendall, United States Department of Agriculture (USDA); Scott Spaulding, United States Department of Agriculture (USDA); and Cliff Lewis, United States Department of Agriculture (USDA)

Dust Abatement Tactics and Lessons Learned for Low Volume Roads
Dave Prunty, Flathead County, MT

RoadRoid - Smartphone App to Assess Road Condition
Lars Forslof, Roadroid AB
**Unmanned Aerial Vehicle (UAV) Field Demonstration**

*Colin Brooks, Michigan Technological University; and Richard “Rick” Dobson. Michigan Technological University*

6:00 p.m. – 8:30 p.m.

**CONFERENCE BANQUET**

Diamond B. Wedding Barns
2909 Danford Ln
Kalispell, MT 59901

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**Wednesday, September 18**

7:30 a.m. – 8:30 a.m.

**CONTINENTAL BREAKFAST**  
*Glacier Ballroom Foyer*

7:30 a.m. – 3:30 p.m.

**REGISTRATION**  
*Glacier Ballroom Foyer*

8:30 a.m. – 10:00 a.m., Concurrent Sessions

**SESSION 19: SAFETY**  
*Glacier I*

**Ricky Mitchell, Mobile County, Alabama, moderator**

- Development of a New Daytime Process for the Evaluation of Sign Retroreflectivity  
  *Dale Heglund, NDSU/UGPTI/NDLTAP*

- Initial Analysis of Ohio’s Township Sign Grant Program  
  *Alejandro Chock, Mott MacDonald*

- Identifying Candidate Locations for Safety Improvements on Low-Volume Rural Roads: The Oregon Experience  
  *Ahmed Al-Kaisy, Montana State University*

- Pedestrian Safety Assessment around Schools in Small Cities – Case Study  
  *Hesham Mahgoub, Engineering and Research International, Inc. (ERI)*

- Safety Performance Functions of Low-Volume Roadways  
  *Subasish Das, Texas A&M Transportation Institution*

- Reliability Based Prediction of Number of Crashes on Low Volume Roads in Montana Using the Equivalent Property Damage Only Crash Indicator  
  *Sudip Bhattacharjee, Alabama A&M University*
Modeling Severities of Motorcycle Crashes at Low-Volume Roadways  
*Khaled Ksaibati, University of Wyoming*

A Tool for Improving the Geo-Coordinates of Crashes for Local Roads – CLIP  
*Mario Romero, Purdue University*

**SESSION 20: DEVELOPMENTS IN LVR PAVEMENT DESIGN AND MANAGEMENT**

*Glacier II*

*Alex Campbell, Anyway Solutions, moderator*

Applying Pavement Preservation Principles in Unpaved Road Management with Specific Reference to Fines Preservation and Dust Control  
*David Jones, University of California Davis*

Application of New Technologies in Mining Industry to Low-Volume Roads  
*Alex Visser, University of Pretoria*

Optimization of Low Volume Road Maintenance Strategies  
*Gerrie Van Zyl, Mycube Asset Management Systems*

Comparative Analysis of the DCP-DN Design Approach Against Other Methods Used for Upgrading of Low Volume Roads: Case of Uganda And Zambia  
*Joseph Chibwe, Road Development Agency*

**SESSION 21: POOLED FUND STATES PART 2: LOCAL BRIDGE PROGRAMS IN 10 STATES**

*Glacier III*

*Edward Hoppe, Virginia Department of Transportation (VDOT), moderator*

**Illinois**  
*Stephanie Seck-Birhame, Illinois Department of Transportation (IDOT)*

**Iowa**  
*Eric Cowles, Iowa Department of Transportation (IowaDOT)*

**Kansas**  
*Tod Salfrank, Kansas Department of Transportation (KDOT)*

**Ohio**  
*Steve Luebbe, Fayette County Engineers Office*

**Wisconsin**  
*David Stertz, Wisconsin Department of Transportation (WisDOT)*
10:00 a.m. – 10:30 a.m.
BREAK

10:30 a.m. – 12:00 p.m., Concurrent Sessions

SESSION 22: PAVEMENT EVALUATION
Felipe Halles, Gerente General Grupo ALTA/VIA, Chile, moderator

Integrating Unmanned Aerial System Based Road Corridor Canopy Mapping with Real-Time Dust Monitoring
Eric Chase, Center for Dirt and Gravel Road Studies - Penn State University

Use of Cell Phone Apps to Evaluate Low Volume Roads in Illinois
Mohammad Hossain, Bradley University

Utilizing Smartphones and Image Processing Analysis for Evaluating Dust on Gravel Roads
Khaled Ksaibati, University of Wyoming

Do-It-Yourself Street View - Using 360° Camera Technology for Managing Low-Volume Roads
John Coburn, Olsson

Evaluation and Performance of Low Volume Roads
Richard A. Reid, South Dakota State University

Correlating Visual/Windshield Inspection Pavement Condition to Distresses from Automated Surveys Using Classification Trees
Georges Bou Saab, Arcadis U.S., Inc.

SESSION 23: AUTONOMOUS VEHICLES ON LOW VOLUME ROADS
Laura Fay, Western Transportation Institute, moderator

Overview and National Level Perspective of Autonomous Vehicles on Low Volume Rural Roads
Chris Albrecht, The Narwhal Group

Perspectives on Autonomous Vehicles in National Parks and Other Public Lands
Steve Suder, National Park Service

Getting Into the Specific Challenges of Autonomous Vehicles on Low Volume Rural Roads
Chris Albrecht, The Narwhal Group

Autonomous Truck Platooning on Forest Roads
Glen Legere, FPInnovations
SESSION 24: ReCAP: RESEARCH FOR COMMUNITY ACCESS PARTNERSHIP

Samuel Ampadu, Kumasi National University, Ghana, moderator

Introduction
Nkululeko Leta, Cardno UK /ReCAP

Transport Sector Leadership Development Programme (TSLDP) – Establishment of Centre for Sub-Saharan Transport Leadership
Nkululeko Leta, Cardno UK /ReCAP

Establishment and Growth of a Road and Transport Research Centre in Uganda
Mark Henry Rubarenzya, Uganda National Roads Authority

Establishment of a Road and Transport Research Center in Mozambique
Irene Simoes, The Road Fund

Research Capacity Building Intervention in Rural Road Sector in Myanmar
Soe Htun Naing, Chief Engineer (Director of RDU)

Outcome of Research Capacity Building in Tanzania
Fikiri Magafu, Researcher and Administrator

12:00 p.m. – 1:30 p.m.
LUNCH

1:30 p.m. – 3:00 p.m., Concurrent Mini Workshops

SESSION 25: MINI WORKSHOP – UNPAVED ROADS
Ben Worel, Minnesota Department of Transportation (MnDOT), moderator

Unpaving material design
Stefan Louw, University of California Davis

Chemical treatment selection
David Jones, University of California Davis

Mobile Dynamic Cone Penetrometer Analysis Program
Ernest Berney, US Army Corps of Engineers (ERDC)

SESSION 26: MINI WORKSHOP – PAVEMENT MANAGEMENT
Ricky Mitchell, Mobile County, Alabama

Determining Dust Levels on Gravel Roads Using Image Processing
Omar Albatayneh, University of Wyoming
Optimization Tool for Selecting Gravel Roads Maintenance Strategies
Omar Albatayneh, University of Wyoming

Roadresource.Org Recycling and Preservation Guidance
Stefan Louw, University of California Davis

SESSION 27: MINI WORKSHOP – SAFETY
Jamie Sullivan, Western Transportation Institute

Crash Tree Program
Dick Albin, Federal Highway Administration

Work Zone Pocket Guide
Mark J. Eicher, Muskingum County, Ohio

Traffic Sign Installation Guide
Geoffrey Scott, Cornell Local Roads Program

3:00 p.m. – 3:30 p.m.
BREAK

3:30 p.m. – 5:00 p.m.
CLOSING PLENARY SESSION

A Look to the Future of Low Volume Roads: Wrapping Up a Career
Ken Skorseth, South Dakota, (retired)

A Look to the Future of Low Volume Roads: Just Starting a Career
Alize Le Roux, Council for Scientific & Industrial Research

Resolutions and Closing Remarks
David Jones, University of California Davis

Thursday, September 19

8:30 a.m. – 10:00 a.m.
LVR 2019 CONFERENCE PLANNING COMMITTEE MEETING (members only)
TRANSPORTATION RESEARCH CIRCULAR E-C248: 12TH INTERNATIONAL CONFERENCE ON LOW-VOLUME ROADS

TRB’s Technical Activities Division has released Transportation Research Circular E-C248: 12th International Conference on Low-Volume Roads, highlighting topics including road surfaces, geotechnology, cold regions and climate change, pavement management, planning and economics, unpaved roads management, geosynthetics in low-volume roads, drainage and stream crossings, climate change resiliency, stabilization, and safety. [http://www.trb.org/main/blurbs/179567.aspx](http://www.trb.org/main/blurbs/179567.aspx)

NOW AVAILABLE

For limited time, TRB is hosting the LVR papers in a special SAGE collection that is open to conference attendees. To enjoy free access to the collection, download the papers at: [https://journals.sagepub.com/topic/collections-trr/trr-1-2019_low_volume_road_conference/trr](https://journals.sagepub.com/topic/collections-trr/trr-1-2019_low_volume_road_conference/trr)

Hurry, as free access to the collection will expire in January 2020.
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 Conference 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 12th TRB International Conference on Low Volume Roads, Kalispell, MT, September 15-18, 2019.

<table>
<thead>
<tr>
<th>DAY</th>
<th>TIME</th>
<th>TITLE</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>SUNDAY</td>
<td>9:00 a.m. – 12:00 p.m.</td>
<td>SESSION 1: MORNING WORKSHOPS</td>
<td>3.00</td>
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<tr>
<td></td>
<td>1:00 p.m. -4:30 p.m.</td>
<td>SESSION 2: AFTERNOON WORKSHOPS</td>
<td>3.50</td>
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<tr>
<td>MONDAY</td>
<td>8:00 a.m. – 10:00 a.m.</td>
<td>OPEN PLENARY SESSION</td>
<td>2.00</td>
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<td>10:30 a.m. -12:00 p.m.</td>
<td>SESSION 4, 5 OR 6</td>
<td>1.50</td>
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<td>1:30 p.m. – 3:00 p.m.</td>
<td>SESSION 7, 8 OR 9</td>
<td>1.50</td>
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<td>3:30 p.m. – 5:00 p.m.</td>
<td>SESSION 10, 11, OR 12</td>
<td>1.50</td>
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<td>TUESDAY</td>
<td>8:30 a.m. – 10:00 a.m.</td>
<td>SESSION 13, 14 OR 15</td>
<td>1.50</td>
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<td>10:30 a.m. – 12:00 p.m.</td>
<td>SESSION 16, 17 OR 18</td>
<td>1.50</td>
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<td>1:00 p.m. – 5:30 p.m.</td>
<td>CONFERENCE FIELD TOUR</td>
<td>4.50</td>
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<tr>
<td>WEDNESDAY</td>
<td>8:30 a.m. -10:00 a.m.</td>
<td>SESSION 19, 20, OR 21</td>
<td>1.50</td>
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<td>10:30 a.m. – 12:00 p.m.</td>
<td>SESSION 22, 23, OR 24</td>
<td>1.50</td>
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<td>1:30 p.m. – 3:00 p.m.</td>
<td>SESSION 26, 26, OR 27</td>
<td>1.50</td>
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<td>3:30 p.m. – 5:00 p.m.</td>
<td>CLOSING PLENARY SESSION</td>
<td>1.50</td>
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Total PDH Units:

Name ___________________________________________________________ ________   Date ___________________

Signature ________________________________________________________________________________________
Shuttle Bus Schedule

*Departs Red Lion Convention Lobby entrance on the hour & half hour.*

*Departs the Hilton Garden Inn at 15 & 45 minutes past the hour.*

Sunday, September 15, 8:00am – 8:00pm

Monday, September 16, 7:00am – 6:00pm

Tuesday, September 17, 7:30am – 2:00pm

**Afternoon tour:** buses will return attendees to both hotels.

**Evening banquet:** buses depart from both hotels at approximately 5:30pm. Buses will return guests to both hotels.

Wednesday, September 18 7:30am – 6:00pm
2020 TRB Annual Meeting

The Transportation Research Board (TRB) 99th Annual Meeting will be held January 12–16, 2020, at the Walter E. Washington Convention Center, in Washington, D.C. The information-packed program is expected to attract more than 13,000 transportation professionals from around the world.

The meeting program will cover all transportation modes, with more than 5,000 presentations in nearly 800 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 2020 meeting: *A Century of Progress: Foundation for the Future.*

TRB Calendar of Upcoming Events

Visit the TRB Calendar website at [http://www.trb.org/Calendar/Calendar.aspx](http://www.trb.org/Calendar/Calendar.aspx) (Conferences cosponsored by TRB are denoted with an asterisk.)

- 9th International Visualization in Transportation Symposium: Visualization in Action; November 5-6, 2019; Washington, DC
- Transportation Resilience 2019: 2nd International Conference on Transportation System Resilience to Natural Hazards and Extreme Weather; November 13-15, 2019; Washington, DC
- First International Conference on 3D Printing and Transportation; November 20-21, 2019; Washington, DC
- Conference on Health and Active Transportation; December 11-12, 2019; Washington, DC
Thank You!

The entire TRB community sincerely appreciates and thanks the following organizations for their generous patronage of the 12th TRB International Conference on Low Volume Roads

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- Envirotech Services, Inc.

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