2016
INTERNATIONAL CONFERENCE & WORKSHOP ON
WINTER MAINTENANCE AND SURFACE TRANSPORTATION WEATHER

Fort Collins Marriott, Fort Collins, CO
April 25–27, 2016

Sponsored by
TRB Committees on:
Winter Maintenance (AHD65) and
Surface Transportation Weather (AH010)

The National Academies of
SCIENCES • ENGINEERING • MEDICINE
2016 INTERNATIONAL CONFERENCE & WORKSHOP ON WINTER MAINTENANCE AND SURFACE TRANSPORTATION WEATHER

TRB Committee on Winter Maintenance (AHD65)

Max Perchanok, Ontario Ministry of Transportation, Chair
Kathy Ahlenius, Wyoming Department of Transportation, Committee Research Coordinator
Christopher Albrecht, The Narwhal Group
David Bergner, Monte Vista Associates, LLC
Amy Burlarley-Hyland, DBI Services, Inc.
Mark Cornwell, Sustainable Salting Solutions, LLC
R. DeVries, Vaisala Inc.
Kimberly Engle, Cryotech Deicing Technology
Dan Eriksson, Swedish Transport Administration (TRAFLIKVERKET)
Laura Fay, Western Transportation Institute (WTI)
G. Fitch, Virginia Department of Transportation
Liping Fu, University of Waterloo
Tina Greenfield, Iowa Department of Transportation
Joseph Horton, California Department of Transportation (CALTRANS)
Benjamin Jordan, University of Wisconsin, Madison
Alex Klein-Paste, Norwegian University of Science and Technology (NTNU)
Robert Koefod, Cargill Deicing Technology

Michael Loftus, HNTB Corporation
Masaru Matsuzawa, Civil Engineering Research Institute for Cold Region
Richard Nelson, American Association of State Highway and Transportation Officials (AASHTO)
Thomas Peters, Minnesota Department of Transportation
Paul Pisano, Federal Highway Administration (FHWA)
Steven Potter, Alaska Department of Transportation and Public Facilities
Torgeir Vaa, Norwegian Public Roads Administration
Dukgeun Yun, Korea Institute of Construction Technology (KICT)
Michael Linton, C.F. Crozier & Associates Inc., Young member
Anne Nuijten, Norwegian University of Science and Technology (NTNU), Young member
Wilfrid Nixon, Salt Institute, Emeritus member
Leland Smithson, American Association of State Highway and Transportation Officials (AASHTO), Emeritus member

TRB Committee on Surface Transportation Weather (AH010)

Kathy Ahlenius, Wyoming Department of Transportation, Chair
Rhonda Young, Gonzaga University, Committee Research Coordinator
Wilfrid Nixon, Salt Institute, Committee Communications Coordinator
Roemer Alfelor, Federal Highway Administration (FHWA)
Anna Arvidsson, Swedish National Road and Transport Research Inst.
Paul Bridge, Vaisala
R. DeVries, Vaisala
Benjamin Dow, City of Fargo, City of Fargo
Dr. Nour-Eddin El Faouzi, IFSTTAR
Tina Greenfield, Iowa Department of Transportation
Arthur Handman, The H Group, Inc.
Peter Jin, Rutgers, The State University of New Jersey

Tae J. Kwon, University of Waterloo
Richard Nelson, American Association of State Highway and Transportation Officials (AASHTO)
Leon Osborne, University of North Dakota
Max Perchanok, Ontario Ministry of Transportation
Lin Qiu, Georgetown University
Adel Sadek, University at Buffalo
David Veneziano, Iowa State University
Rhonda Young, Gonzaga University
Shrikanth Mamidipalli, University of Alabama, Birmingham, Young member
Anburaj Muthumani, Western Transportation Institute (WTI), Young member
Eetu Pilli-Sihvola, Finnish Transport Safety Agency
Trafi, Young member
Joshua Seeherman, University of California, Berkeley, Young member

TRB Staff Members
James W. Bryant, Senior Program Officer - Maintenance and Preservation Engineer
Joanicie L. Johnson, Associate Program Officer
This is a Non-traditional conference in that presentations have been prepared in advanced and can be accessed by registered workshop participants (On Demand Presentations). Workshop participants are encouraged to watch the on demand presentations and access associated materials so that there is ample time to discuss the ideas at the interactive workshop.

The objectives of the International Conference on Winter Maintenance and Surface Transportation Weather are to provide a forum for the exchange of information on the state-of-the-art and state-of-the-practice in research and technology applications to improve snow removal and ice control operations with support of surface transportation weather information.

Over 30 technical presentations have been recorded, posted online, and available to on demand access to registered conference participants. The titles of the 8 on demand sessions are included below:

- SESSION 1: COST BENEFIT OF WINTER MAINTENANCE ACTIVITIES
- SESSION 2: LARGE VOLUME SNOW CONTROL
- SESSION 3: BEST PRACTICES TO REDUCE THE ENVIRONMENTAL IMPACTS OF WINTER MAINTENANCE
- SESSION 4: THE APPLICATION OF INNOVATIVE TECHNOLOGIES IN DECISION SUPPORT FOR WINTER OPERATIONS.
- SESSION 5: DECISION SUPPORT IN WINTER OPERATIONS
- SESSION 6: ASSESSING ROAD SURFACE AND ROAD WEATHER CONDITIONS
- SESSION 7: INNOVATIVE SOLUTIONS AND EQUIPMENT FOR SNOW AND ICE CONTROL
- SESSION 8: POLICY AND MANAGEMENT FOR WINTER MAINTENANCE AND WEATHER SERVICES

The in-person workshop will draw from themes developed in the presentations to identify key advances since the 2012 conference, technologies that are on the horizon for near-term implementation, and key ongoing research needs.
# Agenda at a Glance

*As of March 15, 2016 (subject to change)*

## Monday, April 25, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:30 p.m. – 7:00 p.m.</td>
<td>Opening Reception</td>
</tr>
</tbody>
</table>

## Tuesday, April 26, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. – 9:30 a.m.</td>
<td>Plenary Session</td>
</tr>
<tr>
<td>9:30 a.m. – 10:00 a.m.</td>
<td>Break</td>
</tr>
<tr>
<td>10:00 a.m. – Noon</td>
<td><strong>Concurrent Workshop Breakout Sessions</strong></td>
</tr>
<tr>
<td></td>
<td>Decision Support Part 1: Tools to aid travel planning</td>
</tr>
<tr>
<td></td>
<td>Best Management Practices Part 1: Focus on Sustainability</td>
</tr>
<tr>
<td></td>
<td>Big Data &amp; Winter Maintenance: Turning data into useful information</td>
</tr>
<tr>
<td>Noon – 1:00 p.m.</td>
<td>Lunch</td>
</tr>
<tr>
<td>1:00 p.m. – 3:00 p.m.</td>
<td><strong>Concurrent Workshop Breakout Sessions</strong></td>
</tr>
<tr>
<td></td>
<td>Equipment &amp; Materials</td>
</tr>
<tr>
<td></td>
<td>Resilience &amp; Climate Change</td>
</tr>
<tr>
<td>3:00 p.m. – 3:30 p.m.</td>
<td>Break</td>
</tr>
<tr>
<td>3:30 p.m. – 5:30 p.m.</td>
<td><strong>Concurrent Workshop Breakout Sessions</strong></td>
</tr>
<tr>
<td></td>
<td>Decision Support Part 2: Maintenance Operations</td>
</tr>
<tr>
<td></td>
<td>Best Management Practices Part 2: Administration &amp; Human Resources</td>
</tr>
</tbody>
</table>

## Wednesday, April 27, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. – 9:15 a.m.</td>
<td><em>Focus on Emerging Issues: Industry, Academic, Public Sector</em></td>
</tr>
<tr>
<td>9:15 a.m. – 9:30 a.m.</td>
<td>Break</td>
</tr>
<tr>
<td>9:30 a.m. – 11:30 a.m.</td>
<td>Breakout Session Reports and Discussion of Cross Cutting Issues</td>
</tr>
<tr>
<td>11:30 a.m. - Noon</td>
<td>Closing Remarks</td>
</tr>
<tr>
<td>Noon – 1:00 PM</td>
<td>Lunch</td>
</tr>
</tbody>
</table>
CONFERENCE AGENDA

MONDAY, APRIL 25, 2016

5:30 p.m. – 7:00 p.m. OPENING RECEPTION

TUESDAY, APRIL 26, 2016

7:00 a.m. – 8:00 a.m. Breakfast

8:00 a.m. – 9:30 a.m. WELCOME AND INTRODUCTIONS
James Bryant, TRB, Senior Program Officer - Maintenance and Preservation Engineer
Colorado State Department of Transportation Invited
Fort Collins Invited

TRB Sponsoring Committee intros: scope, objectives
TRB Winter Maintenance Committee
Tina Greenfield, Iowa Department of Transportation, Incoming Chair Committee

TRB Surface Transportation Weather Committee
Kathy Ahlenius, Wyoming Department of Transportation

TRB Equipment Maintenance Committee
Lisa Kunzman, California Department of Transportation, Outgoing Chair

Attendee Introductions
James Bryant, TRB Staff

Accomplishments from 2012 Conference
Wilfrid Nixon, Salt Institute

2016 Conference Objectives and Challenge to Attendees
Workshop Organization and Logistics, introduce workshop leaders
Max Perchanok, Ontario Ministry of Transportation

9:30 a.m. – 10:00 a.m. BREAK
10:00 a.m. – Noon  CONCURRENT WORKSHOP BREAKOUT SESSIONS

Decision Support Part 1: Tools to aid travel planning  
Moderator: Dr. Roemer Alfelor, Federal Highway Administration

Decision support systems are so much more than simply saying when to plow and how much chemical to apply. Speed and travel time are also of critical concern to road users. This session contains presentations that explore novel uses of decision support systems and investigate how these uses can benefit winter operations.

Best Management Practices Part 1 - (Sustainability)  
Moderators: Wilfred Nixon, Salt Institute, and Richard Nelson, AASHTO

Administrative and management policies for winter maintenance vary across agencies as well as the types and providers of services. Research and analysis are needed to evaluate the effectiveness of these policies and identify potential improvements. This breakout session will focus on management practices that support sustainability in use of materials, and other resources.

Big Data & Winter Maintenance: Turning data into useful information  
Moderator: Tina Greenfield, Iowa Department of Transportation

The fields of automated and connected vehicle technologies will have a strong impact on winter maintenance operations in coming years. The emergence of remote sensing and mobile data collection technologies will also impact the amount of data that is collected to support winter maintenance operations. This breakout sessions focusing on tools and techniques to turn data into useful information for decision making.

Noon – 1:00 p.m.    LUNCH

1:00 p.m.-3:00 p.m.  CONCURRENT WORKSHOP BREAKOUT SESSIONS

Equipment & Materials  
Moderators: Lisa Kunzman, California Department of Transportation

Effective snow and ice control is a critical aspect of highway winter maintenance. Snow removal equipment, especially, is a key element that is affected by harsh conditions. This session is relevant for fleet management and maintenance and operations personnel who have winter maintenance responsibility.

Resilience & Climate Change  
Moderator: Kathy Ahlenius, Wyoming Department of Transportation

People are fond of saying "if you don't like the weather, wait a day, it will change". Climate does change and how it changes can affect the way transportation agencies maintain the roads especially in winter. What are some of issues your agency is dealing with in regards to climate change, extreme weather events and resiliency to future events? This session will focus on how agencies are facing changes and building in resilience to winter weather.
3:00 p.m. – 3:30 p.m.  
**BREAK**

3:30 p.m. – 5:30 p.m.  
**CONCURRENT WORKSHOP BREAKOUT SESSIONS**

**Decision Support Part 2: Maintenance Operations**  
**Moderator:** Max Perchanok, Ontario Ministry of Transportation

Roadway condition determinations remain a critical component of winter maintenance, and many decisions are based upon data received from static and mobile sensors. This session explores the techniques to assess sensor accuracy, placement, and equipment and will discuss issues and opportunities revolving around data confidence in decision making.

**Best Management Practices Part 2: Administration and Human Resources**  
**Moderator:** Richard Nelson, AASHTO

Having well trained, well equipment personnel is one of the keys for successful winter maintenance operations. This session explores the training and other program that are used in support of preparing operations and administrators for winter maintenance operations.

5:30 p.m.  
Day adjourned

---

**WEDNESDAY, APRIL 27, 2016**

7:00 a.m. – 8:00 a.m.  
**Breakfast**

8:00 a.m. – 9:15 a.m.  
**Focus on Emerging Issues: Industry, Academic, Public Sector**  
*Presiding: Wilfred Nixon, Salt Institute,*

9:15 a.m. – 9:30 a.m.  
**BREAK**

9:45 a.m. – 11:45 a.m.  
**WORKSHOP BREAKOUT SESSION REPORTS**  
Presiding: Max Perchanok, Ontario Ministry of Transportation

11:45 a.m. - Noon  
**CLOSING REMARKS**

Noon – 1:00 p.m.  
**Lunch**

Meeting Adjourned