



*2012 International Conference on*

**Winter Maintenance  
and  
Surface Transportation  
Weather**

*Coralville Marriott Hotel and  
Conference Center*

*Coralville, Iowa  
April 30 - May 3, 2012*

*Sponsored by*

**Transportation Research Board  
of the National Academies**

*In cooperation with*

**Iowa Department of Transportation**

**American Association of State Highway and Transportation Officials**

**Federal Highway Administration  
U.S. Department of Transportation**

# ***PRELIMINARY PROGRAM***

*Transportation Research Board*

## **2012 International Conference on Winter Maintenance and Surface Transportation Weather**

*Coralville Marriott Hotel & Convention Center*

*Coralville, Iowa*

**April 30 - May 3, 2012**

**Monday, April 30, 2012**

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**11:00 a.m. – 5:00 p.m.**

**Registration and Information**

### **Session 1**

**1:00 p.m. – 2:30 p.m.**

#### **Welcome**

Max S. Perchanok, *Ontario Ministry of Transportation*, presiding

- TBD, Local or University Rep
- John F. Adam, Chief Engineer and Highway Division Director, *Iowa Department of Transportation*
- TBD, *Federal Highway Administration*

#### **Keynote Address:**

#### **Winter Maintenance and Meteorological Communities Collaboration and Synergy:**

**Accomplishments and Future Opportunities**, Leland D. Smithson, *American Association of State Highway and Transportation Officials*

#### **Charge to Conference Participants:**

Identification of gaps in knowledge, understanding and practices, and development of Research Needs Statements (RNS) to address these issues.

**2:30 p.m. – 3:00 p.m.**

**Break**

### **Session 2**

**3:00 p.m. – 5:00 p.m.**

#### **Environmental Stewardship and Sustainability**

Torgeir Vaa, *Norwegian Public Roads Administration*, presiding

**Impact of Climate Change on the Use of Anti- and De-icing Salt in Sweden** (WM-STW12-167), Anna K. Arvidsson, Göran Blomqvist and Gudrun Öberg, *Swedish National Road and Transport Research Institute (VTI)*

**Sustainable Winter Maintenance and a 22 inch Blizzard: A Case Study** (WM-STW12-139), Wilfrid Nixon, *University of Iowa*; R. Mark DeVries, *McHenry County Department of Transportation, Illinois*

**Identification of Salt Vulnerable Areas: A Critical Step in Road Salt Management** (WM-STW12-163A), Andrew Betts, Nandana Perera and Bahram Gharabaghi, *University of Guelph, Ontario*

**Measuring Sustainability in Winter Operations** (WM-STW12-155), Wilfrid A. Nixon, *University of Iowa*

**5:00 p.m. – 6:30 p.m.**

**Reception, Cash Bar**

**Tuesday, May 1, 2012**

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**7:30 a.m. – 5:00 p.m.                      Registration and Information**

**7:00 a.m. – 8:00 a.m.                      Continental Breakfast**

**Session 3A**

**8:00 a.m. – 10:00 a.m.                      Road Safety under Winter Conditions**

Tina M. Greenfield, *Iowa Department of Transportation*, presiding

**Application of Collision Prediction Models for Quantifying the Safety Benefit of Winter Road Maintenance** (WM-STW12-101), Taimur Usman and Liping Fu, *University of Waterloo, Ontario*; Luis F. Miranda-Moreno, *McGill University, Quebec*; Max S. Perchanok, *Ontario Ministry of Transportation*

**Registration of Road Vehicle Rescue Actions as a Basis for Traffic Safety Measures** (WM-STW12-111), Torgeir Vaa and Per Brandli, *Norwegian Public Roads Administration*

**Diagnosing Hazardous Road Surface Conditions Through Probe Vehicle as Mobile Sensing Platform** (WM-STW12-127), Jinhwan Jang and Namchul Baik, *Korea Institute of Construction Technology*

**Safety Impacts of Winter Weather on Iowa's Rural Primary Highways**,(WM-STW12-113A), Zachary Hans, Neal Hawkins, Inya Nlenanya and Steve Lavrenz, *Center for Transportation Research & Education, Iowa State University*

**Session 3B**

**8:00 a.m. – 10:00 a.m.                      Decision Support Systems: Present and Future**

Amy E. Burlarley-Hyland, *DBi Services LLC*, presiding

**Intelligent Transportation Solutions (ITS) and Support System for Winter Maintenance (SSWM) – for Road Maintenance** (WM-STW12-104), Jörgen Bogren and Torbjörn Gustavsson, *Göteborg University, Sweden*

**Geospatial Weather Decision Support for Transportation Applications** (WM-STW12-112), Jeremy Duensing, *Telvent DTN*

**The Present and Future of Practical Road Weather Decision Support Research** (WM-STW12-164), Michael B. Chapman and Sheldon Drobot, *National Center for Atmospheric Research*

**Decision Support Technologies: Beyond Winter Operations** (WM-STW12-116A), Benjamin W. Hershey, Anthony K. McClellan and John J. Mewes, *Meridian Environmental Technology, Inc.*

**10:00 a.m. – 10:30 a.m.                      Break**

**Session 4A**

**10:30 a.m. – Noon                              Winter Surface Friction Improvement and Standards**

Jan Å Ölander, *Swedish Transport Administration*, presiding

**Side Friction as a Parameter in Optimizing Winter Road Operations** (WM-STW12-110), Torgeir Vaa and Ivar Hol, *Norwegian Public Roads Administration*

**Potential of Using Warm Wetted Sand for Skid Control on Walkways and Bike Paths** (WM-STW12-108), Anna Niska, *Swedish National Road and Transport Research Institute (VTI)*

**Trafficability of Heavy Vehicles on Inclines** (WM-STW12-109), Torgeir Vaa and Ivar Hol, *Norwegian Public Roads Administration*

**Friction and Side Friction – Comparing Measuring Equipment with Passenger Cars** (WM-STW12-146A), Dagfin Gryteselv, *SINTEF Road and Railway Engineering*; Terje Giæver and Torgeir Vaa, *Norwegian Public Roads Administration*

#### **Session 4B**

**10:30 a.m. – Noon**

#### **Blowing and Drifting Snow**

Chris Albrecht, *Institute for Transportation at Iowa State University*, presiding

**Revision of the Highway Snowstorm Countermeasure Manual - Focus on Snowbreak Woods** (WM-STW12-131), Manabu Kaneko, Takashi Watanabe and Masaru Matsuzawa, *Civil Engineering Research Institute for Cold Region, Japan*; Yasuhiko Ito, *Snow Avalanche and Landslide Research Center, Japan*

**A Snow-Transport and Mitigation Modelling System for Managing Snow Drifting Along Highways** (WM-STW12-120), Patrick Grover, Neil Hellas and Steven McArdle, *4DM, Inc.*

**Operational Blowing Snow Modeling: Benefits for the End User** (WM-STW12-114A), Leon F. Osborne, Jr., Benjamin W. Hershey and John J. Mewes, *Meridian Environmental Technology, Inc.*

**Noon – 1:00 p.m.**

**Lunch**

#### **Session 5A**

**1:00 p.m. – 3:00 p.m.**

#### **Measuring and Forecasting Pavement Surface and Subsurface Conditions**

Noriyuki Sato, *California State University, Chico*, presiding

**Model to Forecast Short- and Long-Term Prediction of Road Surface Temperature in South Korea** (WM-STW12-102), ChoongHeon Yang, Duk-Geun Yun and Jung Gon Sung, *Korea Institute of Construction Technology*

**Measuring and Predicting Soil Temperature and Moisture Content Beneath Nova Scotia's Highways: One Year of Observations and Forecasts** (WM-STW-122), Benoit Pouliot, Paul Delannoy, Phil Woodhams, and Shawn Allan, *AMEC Earth & Environmental*; Olga Kidson, *Nova Scotia Transportation and Infrastructure Renewal*

**An Evaluation of a Simulation of Sub-Pavement Conditions as They Affect the Implementation and Removal of Seasonal Load Restrictions** (WM-STW12-136), Robert D. Hart, Leon F. Osborne, Jr., and John J. Mewes, *Meridian Environmental Technology, Inc.*; Mark A. Askelson and Jennifer L. Hershey, *University of North Dakota*

#### **Session 5B**

**1:00 p.m. – 3:00 p.m.**

#### **Innovations in Winter Maintenance Equipment**

Kathy M. Ahlenius, *Wyoming Department of Transportation*, presiding

**Potential Impacts of a Multi-Purpose Snow Removal Instrument on Snow Removal** (WM-STW12-103), Woo Hoon Jeon, Choong Heon Yang and In Su Kim, *Korea Institute of Construction Technology*; Jun-Seok Oh, *Western Michigan University*

**Factors for Consideration in Selecting Snow Plow Cutting Edges** (WM-STW12-143), Wilfrid A. Nixon, *University of Iowa*

**Synthesis and Best Practices for Performance Evaluation of Snow and Ice Plows** (WM-STW12-156A), Souhail Elhouar and Enad Mahmoud, *Bradley University-Peoria, Illinois*

**Benefits of Implementing AVL Technologies in Wisconsin for Winter Maintenance Operations** (WM-STW12-157), Kelvin R. Santiago-Chaparro, Madhav Chitturi, Todd Szymkowski and David A. Noyce, *University of Wisconsin-Madison*

**3:00 p.m. – 3:30 p.m.            Break**

**Session 6**

**3:30 p.m. – 5:00 p.m.            [Climate Trends and Large-Volume Snow Control](#)**

John P. Burkhardt, *Indiana Department of Transportation (Retired)*,  
presiding

**Measures Against Avalanches in Which the Phenomena of Snow Sliding Through Supporting Surfaces of Snow Bridges Occurs** (WM-STW12-130), Hiroki Matsushita, Masaru Matsuzawa, Osamu Sakase and Hiroshi Nakamura, *Civil Engineering Research Institute for Cold Region, Japan*  
**Implementing Winter Climate Studies for Transportation Projects in Ontario, Canada** (WM-STW12-121), Steven McArdle, Patrick Grover and Neil Hellas, *4DM, Inc.*

**Recent Trends in the Changes in Snowfall and Snow Depth in Japan, and Their Impact on Snow Control Measures** (WM-STW12-107), Masaru Matsuzawa, Yusuke Harada, Masayo Ueda and Hiroki Matsushita, *Civil Engineering Research Institute for Cold Region, Japan*; Yasuhiko Ito, *Snow Avalanche and Landslide Research Center, Japan*

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**Wednesday, May 2, 2012**

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**7:30 a.m. – 5:00 p.m.            Registration and Information**

**7:00 a.m. – 8:00 a.m.            Continental Breakfast**

**Session 7A**

**8:00 a.m. – 10:00 a.m.            [Winter Maintenance Policy and Management](#)**

Masaru Matsuzawa, *Civil Engineering Research Institute for Cold Region*, presiding

**Weather or Not? State Liability and Road Weather Information Systems (RWIS)** (WM-STW12-151), Jaime Rall, *National Conference of State Legislatures*

**Implementing PennDOT's Winter Services Strategic Plan** (WM-STW12-158), Charles C. Goodhart and Bonnie J. Fields, *Pennsylvania Department of Transportation*; Robert J. Vance and Michael S. Renz, *Vance & Renz, LLC*; Mary W. Treisbach, *Consultant*; Barbara T. Harder, *B. T. Harder, Inc.*

**Winter Storm Responses: Adverse Conditions Communication/Coordination Plan 2008** (WM-STW12-150A), Paul Keltner, *Wisconsin Department of Transportation*

**Importance of a Comprehensive Winter Operations Plan and Manual** (WM-STW12-141), David L. Bergner, *International Municipal Signal Association*

**Session 7B**

**8:00 a.m. – 10:00 a.m.            [Data Networks and Quality](#)**

Roemer M. Alfelor, *Federal Highway Administration*, presiding

**New Methods to Quality Check Road and Weather Observations for Vehicle Data** (WM-STW12-117), Daniel Koller, Benjamin W. Hershey, John J. Mewes and Anthony K. McClellan, *Meridian Environmental Technology, Inc.*



**A National Mobile Environmental Observation Network: *Increasing Insight to Road Weather and Surface Conditions*** (WM-STW12-124), Brian Bell and Paul Heppner, *Global Science & Technology, Inc.*

**Multi-State, Multi-Sensor, and Predictive Road Condition Information** (WM-STW12-119A), John J. Mewes, Gregory M. Ostermeier and Julie L. Theisen, *Meridian Environmental Technology, Inc.*

**Assessment and Evaluation of MDSS Recommendations** (WM-STW12-115), Anthony K. McClellan, Benjamin W. Hershey, Robert D. Hart and John J. Mewes, *Meridian Environmental Technology, Inc.*

**10:00 a.m. – 10:30 a.m.      Break**

### **Session 8A**

**10:30 a.m. – Noon**

#### **Delivery Approaches and Performance Measures**

Max S. Perchanok, *Ontario Ministry of Transportation*, presiding

**Evaluation of Three Methods for Delivery of Winter Operations Contracting** (WM-STW12-153), Amy Burlarley-Hyland, *DBi Services, LLC*

**Research Programs for Winter Road Maintenance in the Third Medium-Term Plan of the Public Works Research Institute of Japan** (WM-STW12-129), Motoki Asano, Masayoshi Watanabe, Masaru Matsuzawa, Masayuki Kumagai and Yuyi Yanagisawa, *Civil Engineering Research Institute for Cold Region, Japan*

**Performance Measures and Prediction Models Applied to Management of Henan Provincial Highways** (WM-STW12-160), Li Ningyuan, *Changsha University of Science and Technology, China*; Wei Wang, *Henan Vocational and Technical College of Communications, China*

### **Session 8B**

**10:30 a.m. – Noon**

#### **Optimizing Winter Maintenance Materials**

Joseph Brett Althouse, *Occidental Chemical Company*, presiding

**Combined Use of Chemicals for De-icing and Dust-Binding of Paved Roads – Possibilities and Problems** (WM-STW12-137), Mats Gustafsson and Göran Blomqvist, *Swedish National Road and Transport Research Institute (VTI)*; Wolfgang Hafner, *Magistrat der Landeshauptstadt Klagenfurt am Wörthersee, Austria*

**Alternative Approaches to Measuring Deicer Ice Melting Capacity – Optimization of Test Accuracy and Precision** (WM-STW12-145), Scott Koefod and Jessica Adkins, *Cargill Salt*; Michelle R. Akin, *Western Transportation Institute, Montana State University-Bozeman*

**Residual Salt and Road Surface Wetness – Comparison of Field Techniques** (WM-STW12-140), Göran Blomqvist and Mats Gustafsson, *Swedish National Road and Transport Research Institute (VTI)*

**Noon – 1:00 p.m.      Lunch**

### **Session 9A**

**1:00 p.m. – 3:00 p.m.**

#### **Winter Mobility and Maintenance Performance**

Richard J. Nelson, *Nevada Department of Transportation*, presiding

**Quantifying the Mobility Effects of Winter Snow Events and the Benefits of Winter Road Maintenance** (WM-STW12-165), Garrett Donaher, Liping Fu and Taimur Usman, *University of Waterloo, Ontario*; Max S. Perchanok, *Ontario Ministry of Transportation*

**Winter Performance Measurement Using Traffic Speed Modeling** (WM-STW12-161), Tina Greenfield and Matt Haubrich, *Iowa Department of Transportation*; Mark Kaiser, Zhengyuan Zhu, Daniel Fortin and Jing Li, *Iowa State University*

**Weather and Friction Data Collection for Winter Road Performance Evaluation** (WM-STW12-128), Roberto A. Tokunaga, Makoto Kiriishi, Tetsuya Takada and Naoto Takahashi, *Civil Engineering Research Institute for Cold Region, Japan*; Tatsuya Yamazaki, *Hokkaido Regional Development Bureau, Japan*

**Simulating Winter Maintenance for Performance Measurement** (WM-STW12-118), John J. Mewes, Jeffrey Kuntz and Benjamin W. Hershey, *Meridian Environmental Technology, Inc.*

### **Session 9B**

**1:00 p.m. – 3:00 p.m.**

#### **Road Weather Data Management**

Leland D. Smithson, *American Association of State Highway and Transportation Officials*, presiding

**Using Clarus Data for Disseminating Winter and Other Weather-Related Alerts** (WM-STW12-152), Roemer M. Alfelore and Paul A. Pisano, *Federal Highway Administration*; Doug Galarus, *Western Transportation Institute, Montana State University*; David Yohanan, *Telvent USA Corporation*

**Clarus System** (WM-STW12-168A), Brenda Boyce, *Mixon/Hill, Inc.*

**Clarus Multi-State Regional Demonstrations: Summary of Evaluation Results and Lessons Learned** (WM-STW12-123), Deepak Gopalakrishna and Chris Cluett, *Battelle*; Kevin Balke, *Texas Transportation Institute*; Paul A. Pisano, *Federal Highway Administration*

**Evaluating the Quality and Value of Road Weather Information** (WM-STW12-142), Roemer M. Alfelore and Paul A. Pisano, *Federal Highway Administration*; Leon F. Osborne, Jr. and Robert D. Hart, *Meridian Environmental Technology, Inc.*

**3:00 p.m. – 3:30 p.m.**

**Break**

### **Session 10**

**3:30 p.m. – 5:00 p.m.**

#### **Future Opportunities for Transportation and Meteorological Collaboration**

Wilfrid A. Nixon, *University of Iowa*, presiding

#### **Panel Discussion:**

Jan Å Ölander, *Swedish Transport Administration*

Leland D. Smithson, *American Association of State Highway and Transportation Officials*

Max S. Perchanok, *Ontario Ministry of Transportation*

Leon F. Osborne, Jr., *Meridian Environmental Technology, Inc.*

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## **Thursday, May 3, 2012**

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**7:30 a.m. – 11:00 a.m.**

**Registration and Information**

**7:00 a.m. – 8:00 a.m.**

**Continental Breakfast**

### **Session 11**

**8:00 a.m. – 10:00 a.m.**

#### **Weather Information to Improve Driver Decisions**

Leon F. Osborne, Jr., *Meridian Environmental Technology, Inc.*, presiding

**Subjective and Objective Assessment of Winter Driving Environment** (WM-STW12-126), Naoto Takahashi, Tetsuya Takada, Makoto Kiriishi and Roberto A. Tokunaga, *Civil Engineering Research*

*Institute for Cold Region, Japan; Shigeru Kamiyama, Hokkaido Regional Development Bureau, Japan*

**CARS-CAP Automated Weather Reporting (WM-STW12-125)**, Peter Davies, Kristin Virshbo and Dane Unruh, *Castle Rock Associates*

**A Study on Provision of Winter Road Snowstorm Information to Road Users (WM-STW12-132)**, Hirotaka Takechi, Masaru Matsuzawa, Toshiro Kawanaka, Hiroshi Nakamura and Manabu Kaneko, *Civil Engineering Research Institute for Cold Region, Japan*

**Tomorrow's Forecast: Informed Drivers (WM-STW12-105)**, Sheldon Drobot, Michael B. Chapman, Amanda Anderson and Brice Lambi, *National Center for Atmospheric Research*; Paul A. Pisano and Gabriel Guevara, *Federal Highway Administration*

**10:00 a.m. – 10:30 a.m.      Break**

### **Session 12**

**10:30 a.m. – 11:30 a.m.      [Conference Summary](#)**

Max S. Perchanok, *Ontario Ministry of Transportation*, and Wilfrid A. Nixon, *University of Iowa*, presiding

## **Acknowledgements**

### **TRB Committee AHD65 on Winter Maintenance**

Max Samuel Perchanok, Chair, Joseph Brett Althouse, Roya Amjadi, Lisa Ballard, Dennis W. Belter, David L. Bergner, John P. Burkhardt, Madhav V. Chitturi, Peter F. Costello, Tim J. Croze, Rand Decker, Charles C. Goodhart, Srikanth Kidambi, Robert Scott Koefod, David A. Kuemmel, Chanyoung Lee, Michael J. Loftus, Masaru Matsuzawa, L. David Minsk, Tony A. Myhra, Richard J. Nelson, Jan Å Ölander, Raqib Omer, Paul A. Pisano, Morton Satin, Noriyuki Sato, Xianming Shi, Leland D. Smithson, Torgeir Vaa, Yetkin Yildirim, Jamie Yount, Dukgeun Yun

### **TRB Committee on Surface Transportation Weather**

Wilfrid A. Nixon, Chair, Kathy M. Ahlenius, Roemer M. Alfelor, Christopher Cluett, Nour-Eddin El Faouzi, Tina M. Greenfield, Arthur L. Handman, Gao Jianping, Richard J. Nelson, James M. O'Sullivan, Jan Å Ölander, Leon F. Osborne, Jr., Curt V. Pape, Max Samuel Perchanok, Lin W. Qiu, Adel W. Sadek, Joshua Lawrence Seeherman, Leland D. Smithson, Zhirui Ye, Robert A. Younie

### **Conference Program Committee**

Max Samuel Perchanok and Wilfrid A. Nixon, Co-Chairs, Roemer M. Alfelor, Arthur L. Handman, Masaru Matsuzawa, Jan Å Ölander, Leon F. Osborne, Jr., Leland D. Smithson