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<tr>
<td>Graphics Collection</td>
<td>Photographs</td>
<td>Thousands of photos</td>
<td>All audiences</td>
<td>Basic</td>
<td>Gallery of photos from LTAP contributors relevant to snow and ice removal as well as many other transportation topics.</td>
<td>No cost</td>
<td>NLTAPA Graphics Collection, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td>City of Morgantown Snow Plow Painting Program</td>
<td>Newsletter article</td>
<td>3 pages</td>
<td>LTAP staff, public works directors, elected officials, community members, etc.</td>
<td>Basic</td>
<td>Article that details the City of Morgantown, West Virginia’s painted snow plow outreach program aimed at area school students. Guidelines are also provided listing suggested steps for public works agencies wanting to start a similar program.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td>Small Highway Department Management</td>
<td>Workbook</td>
<td>92 pages</td>
<td>Recently elected or appointed town/village highway/public works officials.</td>
<td>Basic</td>
<td>This workbook is a guide for those managing small highway departments and covers teamwork, budget management, scheduling projects, setting up snow and ice control operations and handling complaints. Cornell Local Roads Program.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td>A Snow Plow - Cool!</td>
<td>Video</td>
<td>9 minutes</td>
<td>Second/Third grade children</td>
<td>Basic</td>
<td>Provides an understanding of the dangers of building snow forts next to the streets, building forts or tunnels with roofs, sliding into the streets and other safety issues around snowplows. Minnesota LTAP.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td>Winter Maintenance - Snow and Ice Control</td>
<td>Presentation materials (PPT)</td>
<td>8 hours</td>
<td>Local (municipal and county, primarily) snow/ice fighters and managers, as well as elected officials.</td>
<td>Intermediate</td>
<td>Six module workshop covers the full range of snow and ice removal and control, including program development, planning, pre-season activities, in-season operations, post storm activities, and post season activities. Delaware T² Center.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td>Snow and Ice Control Workbook</td>
<td>Workbook, Handouts, Training Outline, Checklists</td>
<td>176 pages (total)</td>
<td>Highway and public works officials, foremen and crew supervisors.</td>
<td>Basic</td>
<td>The workbook provides an overview of snow and ice control operations including administrative and legal issues, equipment and materials, strategies for snow and ice control and resources. The handouts are a collection of materials suitable for use in a training workshop or as a source of information. The training outline can be used to develop tailgate safety briefings, agency training.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
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## Winter Maintenance (Snow and Ice Control) Training Resources

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<tr>
<td><strong>Salt Mixing to Achieve Optimum Results</strong></td>
<td>Build a Better Mousetrap</td>
<td>N/A</td>
<td>State, regional, and county personnel who manage snow and ice materiel</td>
<td>Intermediate</td>
<td>Home-made solution for stretching salt dollars. They developed a means to mix the salt with a fine limestone at a 50/50 ratio, and then add a deicing liquid to it.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td><strong>Modified Salt Chute</strong></td>
<td>Build a Better Mousetrap</td>
<td>N/A</td>
<td>State, regional, and county personnel who manage snow and ice materiel</td>
<td>Intermediate</td>
<td>Home-made solution for better road application of material. By bypassing the truck's salt spinner, this chute allows for maximum flow of a material onto the middle of the roadway, increasing the effectiveness of the material and allowing the brine solution to work more efficiently. Tests show greatly reduced scatter and experience has shown a reduction in the amount of material used.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td><strong>Curb Cleaner</strong></td>
<td>Build a Better Mousetrap</td>
<td>N/A</td>
<td>State, regional, and county personnel who manage snow and ice materiel</td>
<td>Intermediate</td>
<td>Home-made solution for removing accumulated snow in urban parking lanes.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
</tr>
<tr>
<td><strong>Complete Salt Conveyor System</strong></td>
<td>Build a Better Mousetrap</td>
<td>N/A</td>
<td>State, regional, and county personnel who manage snow and ice materiel</td>
<td>Intermediate</td>
<td>Innovative use of existing equipment to stack salt into a dome quickly to avoid delaying the drivers delivering the salt. Drivers are paid by the load delivered and will haul to agencies that are most efficient at offloading.</td>
<td>No cost</td>
<td>NLTAPA Resource Database, <a href="http://www.ltap.org/">http://www.ltap.org/</a></td>
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| **Winter Roadway Maintenance Computer-Based Training (CBT)** | DVDs                | 43 hours | State, regional, and county personnel who manage or execute snow and ice response | Basic            | Nine DVDs, as follows:  
  - Anti-icing / RWIS (24 hours)  
  - Selecting Snow & Ice Control Materials to Mitigate Environmental Impacts (2 hours)  
  - Equipment Maintenance (2 hours)  
  - Proper Plow Techniques (2 hours)  
  - Deicing (4 hours)  
  - Blowing Snow Mitigation (3 hours)  
  - Winter Maintenance Management (2 hours)  
  - Performance Measures for Snow and Ice Control Operations (4 hours)  
  
| Cost (NLTAPA Clearinghouse) | NLTAPA Resource Database, [http://www.ltap.org/](http://www.ltap.org/), AASHTO, [http://www.transportation.org/sites/sicot/docs/CBT_Flyer_v2b%5B1%5D.pdf](http://www.transportation.org/sites/sicot/docs/CBT_Flyer_v2b%5B1%5D.pdf) |
| **Maintenance Training Series: Weather-related Operations** | Web based          | 60 minutes | State, regional, and county personnel who manage operations programs | Basic            | While the majority of the Weather-related Operations course concentrates on snow and ice storms, many of the elements apply to other weather events as well, such as tornadoes,                                               | No cost               | National Highway Institute: available on |
# Winter Maintenance (Snow and Ice Control) Training Resources

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<tr>
<td>COURSE NUMBER: FHWA-NHI-134109H</td>
<td>Document</td>
<td>72 pages</td>
<td>Snow/ice fighters and managers</td>
<td>Intermediate</td>
<td>Provides information for successful implementation of an effective highway anti-icing program. It is written to guide the maintenance manager in developing a systematic and efficient practice for maintaining roads in the best conditions possible during a winter storm. The manual includes recommendations for anti-icing practices and guidance for conducting anti-icing operations during specific precipitation and weather events.</td>
<td>No cost</td>
<td>Federal Highway Administration, <a href="http://www.fhwa.dot.gov/reports/mopeap/eapcov.htm">http://www.fhwa.dot.gov/reports/mopeap/eapcov.htm</a></td>
</tr>
<tr>
<td>Principles and Tools for Road Weather Management</td>
<td>Instructor Led Training</td>
<td>1 day</td>
<td>Transportation professionals in highway maintenance and/or highway operations</td>
<td>Basic</td>
<td>Provides training to develop tools and strategies for addressing road weather problems. Includes overview of the types of road weather problems and their associated costs, as well as basic meteorology for non-meteorologists. Participants are exposed to various strategies for addressing road weather problems, including Road Weather Information Systems (RWIS) and the development of crosscutting decision support systems to respond effectively to weather situations. In addition, road weather solutions unique to maintenance management, traffic management, traveler information, and emergency management are discussed.</td>
<td>$300 per participant – 20 participants minimum, 30 participants maximum</td>
<td>Available on internet at: <a href="http://www.nhi.fhwa.dot.gov/">www.nhi.fhwa.dot.gov/</a></td>
</tr>
<tr>
<td>Tort Liability of Highway Agencies</td>
<td>CD Download</td>
<td>13 articles</td>
<td>Snow/ice managers, as well as elected officials and representing attorneys</td>
<td>Advanced</td>
<td>Covers basic theories of tort liability of public transportation agencies, activities that give rise to transportation tort liability, immunities and defenses, trial preparation, procedural consideration, and shifting or sharing tort liability.</td>
<td>No cost</td>
<td>Transportation Research Board, <a href="http://www.trb.org/Publications/Blurbs/152200.aspx">http://www.trb.org/Publications/Blurbs/152200.aspx</a></td>
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**Course Number:** FHWA-NHI-137030

**Description:**

Principles and Tools for Road Weather Management

Instructor Led Training

1 day

Transportation professionals in highway maintenance and/or highway operations

Basic

Provides training to develop tools and strategies for addressing road weather problems. Includes overview of the types of road weather problems and their associated costs, as well as basic meteorology for non-meteorologists. Participants are exposed to various strategies for addressing road weather problems, including Road Weather Information Systems (RWIS) and the development of crosscutting decision support systems to respond effectively to weather situations. In addition, road weather solutions unique to maintenance management, traffic management, traveler information, and emergency management are discussed.

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<tr>
<td>Control</td>
<td>Presentation</td>
<td></td>
<td>Maintenance training materials and operational control plans</td>
<td>Basic</td>
<td>Control program, it describes the purpose of snow and ice control and how to achieve an appropriate level of service, including the importance of involving other jurisdictions, the media, emergency management services, and the public in developing policies and practices to provide the level of service. It encourages an organizational culture that promotes innovative practices and procedures to improve operations, reduce costs, and provide a safe environment for road users. Chapters include personnel practices, equipment types and capabilities, weather information, and the materials and chemicals for snow and ice removal. 1999.</td>
<td>$20</td>
<td>Salt Institute, <a href="http://www.transportation.org">www.transportation.org</a></td>
</tr>
<tr>
<td>Snowfighters</td>
<td>Video</td>
<td>21 minutes</td>
<td>Snow/ice fighters and managers, as well as elected officials.</td>
<td>Basic</td>
<td>A comprehensive training video for use by snowfighters whose job it is to keep traffic safely moving when snow and ice make it very difficult. The booklet explains basics of snow removal, equipment preparation and maintenance, salt application rates, salt vs. abrasives, fuel consumption, history and uses of salt, etc. in an informative, interesting manner.</td>
<td>No cost</td>
<td>Salt Institute, <a href="http://www.saltinstitute.org/Publications-A-V/Snowfighters-video">http://www.saltinstitute.org/Publications-A-V/Snowfighters-video</a></td>
</tr>
<tr>
<td>Winter Maintenance Training CD set</td>
<td>Presentation materials (five modules)</td>
<td>8 hours</td>
<td>Local government public works technical personnel from the Public Works Director and Engineer, to the Road/Street Superintendent and public works technicians.</td>
<td>Basic</td>
<td>This two CD set contains five snowfighter training programs in MS PowerPoint, four PDF and MS Word format handout documents. Plus e-copies of Salt Institute’s winter maintenance training materials. Developed in cooperation with LTAP Centers.</td>
<td>No cost</td>
<td>Salt Institute, <a href="http://www.saltinstitute.org/Publications-A-V/Winter-Maintenance-Training-CD-set">http://www.saltinstitute.org/Publications-A-V/Winter-Maintenance-Training-CD-set</a></td>
</tr>
<tr>
<td>Guidelines for the Selection of Snow and Ice</td>
<td>Document</td>
<td>211 pages</td>
<td>Developers of winter maintenance training</td>
<td>Advanced</td>
<td>In-depth operational and performance discussion of chemicals and abrasives, juxtapositioned with environmental considerations and their appropriate use.</td>
<td>No cost</td>
<td>Transportation Research Board,</td>
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<tr>
<td><strong>Winter Maintenance Technical Peer Exchange, A Final Report</strong></td>
<td>FHWA 2304P63420031000 Harrisburg, PA; March 2005</td>
<td>Document 70 pages</td>
<td>Developers of winter maintenance training materials</td>
<td>Intermediate</td>
<td>Results of a 2½ day technical peer exchange involving FHWA, two DOTs, twelve LTAPs, the Salt Institute, and Penn State University. Topics included policies, strategies, training options, technical clearinghouses, LTAP roles, technical issues such as abrasives and chemical use, introducing new technologies, legal issues, and risk management.</td>
<td>No cost</td>
<td>Mark Sandifer, <a href="mailto:mark.sandifer@fhwa.dot.gov">mark.sandifer@fhwa.dot.gov</a> Matt Carter, <a href="mailto:matheu@udel.edu">matheu@udel.edu</a></td>
</tr>
<tr>
<td><strong>APWA's North American Snow Conference</strong></td>
<td></td>
<td>Conference and training 4 days</td>
<td>Snow/ice fighters and managers, as well as elected officials.</td>
<td>Varies</td>
<td>The 2013 Snow Conference will bring together more than 1,500 snowfighters from cities and towns, county and rural street divisions, and state and provincial departments of transportation. It’s four days of education and networking, featuring an exhibit floor with the newest equipment and products available, quality education programs and technical tours, and opportunities to exchange ideas with manufacturers, distributors, consultants and other public works professionals. The Snow Conference website with full program, travel and registration information will be available in December 2012. April 7 - 10, 2013; Charlotte Convention Center, Charlotte, North Carolina</td>
<td>$425 (2012 Conference, members)</td>
<td>American Public Works Association, <a href="http://www.apwa.net/snow/">http://www.apwa.net/snow/</a></td>
</tr>
<tr>
<td><strong>Effective Use of Chemicals and Abrasives for Winter Road Maintenance</strong></td>
<td></td>
<td>Streaming video 2 hours</td>
<td>Managers of winter maintenance operations, as well as elected officials.</td>
<td>Basic</td>
<td>Learn the basics of chemical and abrasive usage for snow and ice control, review new chemicals, and gain an understanding of how pre-wetting and anti-icing can be effective for improved safety of local and state roads. This course will cover: Snow and Ice impacts on road safety; Basic use of</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
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<tr>
<td>Click, Listen &amp; Learn</td>
<td>Streaming video</td>
<td>2 hours</td>
<td>Managers of winter maintenance operations, as well as elected officials.</td>
<td>Basic</td>
<td>Provides how performance measures can be developed and applied in the field of winter maintenance. Four critical factors to be considered in developing performance measures in winter maintenance include: (1) the severity of the storm that the agency faces must be determined; (2) the effectiveness of the chosen tactics used to combat the storm; (3) the effort expended in fighting a given storm must be fully and accurately measured; and (4) the results or outcomes of the agency efforts must be measured in a reliable, objective, and repeatable way to assess strategic effectiveness. October 2009.</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
</tr>
<tr>
<td>Lessons Learned From Extreme Winter Events</td>
<td>Streaming video</td>
<td>2 hours</td>
<td>Local (municipal and county, primarily) snow/ice fighters and managers, as well as elected officials.</td>
<td>Basic</td>
<td>This program details how agencies in Washington, D.C. and Denver, CO have dealt with major winter events and what they changed because of it. They discuss actions taken such as implementing new programs (anti-icing, pre-wetting, contracting etc.) and looking for best practices (new routes, using liquids, new equipment). Consideration will be given to such items as: how did the budget change, who implemented the change, how did staff react and how the public perceived the changes. October 2011.</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
</tr>
<tr>
<td>Liquid Use in Winter Maintenance</td>
<td>Streaming video</td>
<td>2 hours</td>
<td>Managers of winter maintenance operations.</td>
<td>Basic</td>
<td>This session provides insights from both seasoned and new liquid users and answers several basic questions such as: How are liquids used? What are the benefits? When is it appropriate to use liquids? When is it not? What infrastructure is required? What are all these additives and should I use them? Will liquids save money, provide safer roads, or both? What climatic conditions affect the use of liquids and how to get started. March 2012.</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
</tr>
<tr>
<td>A Better Understanding of Chemical Deicing</td>
<td>Streaming video</td>
<td>46 minutes</td>
<td>Managers of winter maintenance operations.</td>
<td>Intermediate</td>
<td>Let's take the mystery out of the science behind chemical deicing. End-users need to know not only how environmentally-friendly and cost effective different products are, but also how deicer performance relates to factors such as temperature, humidity, and wind.</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
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<td>Using the Sperry - Piltz Ice Accumulation Index to Prepare for the Storm</td>
<td>Streaming video</td>
<td>50 minutes</td>
<td>Managers of winter maintenance operations</td>
<td>Advanced</td>
<td>In response to eight major ice storms since 2000, an ice algorithm was developed to predict (3-4 days in advance) not only the footprint of the approaching storm but also the total ice accumulation to expect. This index can be used to predict data that will allow sand/salt crews to be pre-staged days in advance but also alert utilities and emergency preparedness teams.</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
</tr>
<tr>
<td>The Fundamentals of Deicing Past and Present in the United Kingdom and North America</td>
<td>Streaming video</td>
<td>48 minutes</td>
<td>Managers of winter maintenance operations</td>
<td>Intermediate</td>
<td>Examines alternative approaches for deicing depending on climate and geography, how deicers work, how various deicers work in different situations, when and where deicers should be applied. Special focus will be given to use of additives in rock salt to enhance deicing performance. Storage practices, spread rates and patterns, melting capacities, and anti-corrosion properties will also be discussed.</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
</tr>
<tr>
<td>Write it Right: Developing an Effective Winter Operations Snow and Ice Control Manual</td>
<td>Streaming video</td>
<td>45 minutes</td>
<td>Managers of winter maintenance operations</td>
<td>Intermediate</td>
<td>Winter maintenance activities are so much easier when roles, policies, and procedures are clearly delineated. Plus – no manual today is complete without a component addressing the National Incident Management System (NIMS) requirements.</td>
<td>No cost (members)</td>
<td>American Public Works Association, <a href="http://www2.apwa.net/">http://www2.apwa.net/</a></td>
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Originator: Matt Carter – Delaware T² Center – matheu@udel.edu
Last Updated: Matt Carter – Delaware T² Center – matheu@udel.edu