



# moving FORWARD

FALL 2015

A quarterly review of news and information about Pennsylvania local roads.

## Prepare Now for Winter Road Service Agreements

### New option this year allows reimbursement for actual costs

With winter approaching, now is a good time to review any winter service agreements your municipality has with PennDOT. New this year, PennDOT is offering an agreement option in

which municipalities will be reimbursed for actual costs for providing winter maintenance of state roads.

Here are the three types of winter service agreements that PennDOT offers to municipalities:

**1. Winter Traffic Services Standard Agreement** – This is the most common type of agreement. Under these

agreements, which can have terms of up to five years, PennDOT pays municipalities an upfront annual lump sum to remove snow and ice from state roads from October 15 to April 30. PennDOT then pays a winter severity adjustment at the end of the season; the amount depends on how the winter relates to PennDOT's five-year average historic cost.

To determine if this agreement rate, which varies from county to county, will cover expenses, municipalities should look at the costs of purchasing salt, anti-skid materials, and other supplies and providing equipment maintenance, labor, and overhead.

Municipalities that want to renew or establish a winter road service agreement should notify their PennDOT district maintenance office now. For agreement renewals, the cutoff date for a municipality to legally withdraw in writing is September 15. For all new agreements executed this fall and for calendar year 2016 renewals and beyond, that date has been changed to July 31.

**2. Agility** – Agility agreements are popular in the northwestern tier of the state, but any municipality across the state can use this option. As an example of such an agreement, a municipality would plow state roads in the winter season in return for PennDOT providing summer road activity services, such as tar and chipping a roadway surface.

**3. Actual Cost Reimbursement** – New for this winter season is an actual cost reimbursement program that will reimburse municipalities for their actual costs of performing winter maintenance. This is a good option for municipalities that have experienced increases in development and thus a higher level of expectation from the public for more responsive winter road maintenance along state highways, says Daryl St. Clair, chief of PennDOT's Maintenance Technical Leadership Division.

Under this mechanism, PennDOT will pay an upfront lump sum amount equal to that of the standard agreement and will then reimburse municipalities up to \$1,800 per lane mile to cover their actual costs. Municipalities must keep track of their costs under the program.

Should the actual cost be less than the standard reimbursement, PennDOT will deduct that

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#### Winter is coming! Are you ready?

With the winter season looming, make sure your road crews are prepared to fight winter storms. Turn to page 2 for tips on preparing for winter operations.

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# Winter is Coming! Is Your Municipality Ready?

## Preparing for winter should be a year-round affair for municipalities

by Robert M. Peda, P.E., Navarro & Wright Consulting Engineers, Inc.

With the winter season looming, municipal road crews must be prepared to fight winter storms to the satisfaction of their community and in the most efficient and cost-effective way possible.

Communicating with residents this fall is a good place to start. Before the first storm even hits, municipalities should include articles in their newsletter that spell out the levels of service residents can expect during winter storms and provide some wintertime advice, such as preparing for travel, clearing driveways, and maintaining mailboxes located in the right-of-way.

Municipalities should also make sure road crew personnel, both new and seasoned, are up-to-date on the latest winter maintenance strategies and are prepared to tackle oncoming winter storms. In addition, public works officials should have winter-ready operation plans in place that address various procedures, such as calling in equipment operators during a storm, communicating with stakeholders, arranging weather-forecasting services, stockpiling winter materials, preparing equipment for winter storm fighting, and formalizing the approach for managing a wide variety of winter storms.



When winter strikes, will your municipal road crew be ready?

Remember that no two storms are alike, so to be as effective as possible in your snow-fighting efforts, you will want to implement “smart salting” techniques to ensure the correct amount of proper material is used at just the right time. As a storm progresses, keep in mind that material application rates and plowing may have to be altered.

With hands-on experience, your municipality’s understanding of smart salting techniques will grow. A good practice is to prepare notes after each storm that address the characteristics of the storm, the air and pavement temperatures, the type and frequency of materials used, and the achieved results. At the end of the winter season, managers, supervisors, and equipment operators should perform an after-action review in which they evaluate their performance against their winter service goals and identify ways to improve performance for the next winter season.

### Meeting High Expectations

When it comes to snow and ice removal, motorists are becoming

more accustomed to higher levels of service, and they expect their roads to be cleared for travel as soon as possible following a storm. Fortunately, new technologies and improved practices in winter operations have made it possible to provide higher levels of service at a reasonable cost. To accomplish this, a municipality must plan its approach for the winter season in advance and make a determination on the level of service it can reasonably provide with the resources it has on hand.

Preparation is the key to success for any municipal government striving to meet the expectations of the motoring public for snow and ice removal. Year-round planning, coupled with the use of new storm-fighting technologies, gives municipalities a tremendous edge in carrying out their winter operations.

A simple way for municipalities to plan for winter operations is to follow a checklist of activities identified by seasons, then incorporating these specific actions into their seasonal work plans. Let’s examine these activities seasons-by-season.



### Fall

**Schedule Winter Maintenance Training** — Road crew members should be properly trained on a wide variety of winter-related topics, including the municipality’s level of service goals, familiarization with snow routes (includes a dry run of the route), spreader calibration, callout procedures for equipment operators, snow and ice removal techniques, safety issues, equipment checklists (preventive maintenance and safety), materials selection and melting capability, equipment preventive maintenance, and documentation procedures.



Winter maintenance training is an important component for ensuring employee readiness for winter storms.

**Apply Decision Making** — The decision-makers for your municipality’s winter operations should communicate with identified stakeholders (such as police, emergency management, schools, hospitals, and internal organizations); identify the responsible individual(s) for monitoring field conditions; decide on communication methods with workers and stakeholders; ensure

the proper state of equipment repair; calibrate spreaders and keep the records in the crew cab and with the supervisor; define the callout process for snow equipment operators; and establish public notification protocols.

**Arrange Weather Forecasting** — Municipalities should identify reliable and accurate sources of weather information so that they can track a storm and ensure they are applying “smart salting” techniques that match the forecast.



*If you have an accurate weather forecast, you can better prepare for a storm.*

**Make Improvements to Stockpile Areas** — Municipalities should make sure the area where they keep their stockpiles of materials is winter-ready. This involves controlling runoff, making building repairs, and constructing or repairing loading pads.

**Ensure Proper Material Storage** — Be sure your initial supply of salt is delivered by November 1. You should store your anti-skid in a sunny area to reduce the chance of freezing, and should cover or store indoors all salt, salt mixtures, and deicers.

**Raise Safety Awareness** — The safety of the crew and public around vehicles, equipment, and materials related to snow-fighting operations should be a top priority of your municipality. All personnel should be provided safety awareness presentations that cover equipment, materials, and facility operations and review the importance of proper housecleaning for maintaining a safe facility that is environmental friendly.

**Communicate Service Levels to Residents** — Municipalities should take advantage of their fall newsletter to publish the goals of their snow-fighting operations and to pass on the level of services that municipal residents can expect once winter storms hit.

**Address Contingency Planning** — As part of this planning, municipalities should address the proper stockpiling of materials, including their source and availability, resources for handling equipment repairs, the use of supplemental resources or PennDOT Agility agreements for emergency situations (manpower and equipment), traffic management scenarios, public notification, and communications redundancy for operations.

## Winter

**Activate Callout Procedures** — A designated manager or supervisor is responsible for initiating callouts to crew members who must report for work during a snow or ice storm. A record-keeping method for documenting the time of callout and assignments should be established.

**Know the Plowing Operations Approach** — Plowing should begin after 1 or 2 inches of snow accumulates. The plow speed should not exceed 25 miles per hour, and plowing should occur from the road center toward the outside. Once the storm has ended, crews should go back and conduct a final cleanup and widening of the cleared roadway; salt may be lightly applied at this time.

**Employ the Spreading Operations Approach** — Plow operators should spread salt or anti-skid at speeds not to exceed 25 miles per hour. Materials should only be spread after snow has sufficiently accumulated on the pavement to hold the material being spread. Allow time for the salt to work before the next pass of plowing, and evaluate each application before reapplying more material. If soft slush fans out like water behind the tire, the salt is still working, but if it thickens and is thrown up directly behind the tire, it's time to reapply.

Remember to change application rates as the storm progresses. The storm type will dictate the frequency of plowing and material application rates. Safeguard the environment by avoiding overuse or misuse of salt.

**Apply Material to Problem Areas** — Secondary roads with low traffic volumes are primarily cleared by plowing. However, critical areas such as steep grades, sharp curves, intersection approaches, and other hazardous locations should receive spot applications of an antiskid/salt mix once noticeable snowfall has accumulated.

**Know Your Material's Capability** — For example, remember that straight salt is not effective at melting snow and ice if temperatures are below 15 degrees F. Likewise, anti-icing should only be performed if pavement temperatures are at or above 15 degrees F.

**Prewet Salt and Anti-skid** — By prewetting salt and anti-skid, you will reduce bounce and scatter and initiate faster melting since prewettted materials melt at slightly lower temperatures. This practice will help to increase the level of service for motorists. Salt is prewettted at 6 to 12 gallons per ton and anti-skid at 10 to 30 gallons per ton.

**Perform Anti-icing Ahead of Time** — Municipalities can employ a proactive strategy, referred to as anti-icing, by applying liquid chemical during normal work hours 12 to 18 hours before a storm is scheduled to hit. This action will facilitate melting before the first round of plowing and spreading. It also prevents snow and ice from bonding to pavement

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*Plowing should begin after 1 or 2 inches of snow has fallen.*

## Winter Is Coming! *continued from page 3*

surfaces. Not only will this practice mean you will use less chemicals in the long run, but you will find it allows for easier cleanup after the storm and helps to ensure that all material stays on the road surface.

To apply anti-icing techniques, closely monitor the weather and follow the recommendations for applications. Remember not to use anti-icing liquid techniques unless pavement temperatures are at or above 15 degrees F. For additional technical information on pre-wetting and anti-icing, refer to the article, “Salt Brine for Winter Services,” in the Fall 2014 issue of LTAP’s *Moving Forward* newsletter. You can find the newsletter on the LTAP website, [www.ltap.state.pa.us](http://www.ltap.state.pa.us), under LTAP Tools, Public Resources, and Documents.

**Keep Records of Storms** — By keeping track of storm type, weather conditions, material application rates, and results, you will be able to analyze your material application rates for cost effectiveness and efficiency, and fine-tune your approach for managing future winter storm events.

### Spring

**Review the Operations of the Previous Winter** — Compare the results of storm-fighting techniques from your winter operations records, and determine if the municipality’s winter service goal was met. Managers and equipment operators should also perform an after-action review that identifies what actually happened during the storm, what went well that should be continued, and what operations can be improved prior to the next winter season.

**Establish Changes in Procedures or Materials Management** — Based on what you learned from your review of last winter’s operations, you should make any necessary changes in your winter operation procedures and materials management before the next winter season begins.



*Make sure you cover or store your road salt under roof to prevent runoff and potential environmental contamination.*

**Inventory Material Supplies, and Determine Quantities for Next Season** — Generally, use a five-year average as a starting point in establishing a baseline inventory for the next winter season. Generate purchase orders by the end of June.

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## Caught Short on Salt Supply? PennDOT May Be Able to Help

If your municipality is caught short on salt this winter, you may be able to borrow salt from PennDOT. Keep in mind that such borrowing of materials may only be done for limited occurrences assuming that a municipality is out of or close to out of salt. In addition, the municipality must have a contract in place with a salt supplier that will ensure the borrowed salt will be replaced as soon as the municipality receives its delivery of salt.

The municipality may not replace the salt with anti-skid. Furthermore, the municipality is expected to apply all salt-conservation measures when using the salt. Remember, the salt is only on loan and must be resupplied to PennDOT as soon as possible.

Here’s the procedure for borrowing salt:

- The municipality should contact its county emergency management agency representative and provide the following information:
  - Amount of salt (tons) on hand at municipality
  - Estimate of how long the salt will last (number of storms)
  - Whether salt is on order (tonnage amount and with what supplier)
  - Expected date of back-ordered delivery (supplier to municipality)
  - Amount of salt (tons) requested of PennDOT
  - The number and size of trucks that would pick up the salt from PennDOT
  - Possible pickup times
  - Contact information, including the municipality’s location
- The county emergency management agency representative contacts PEMA, who would verify that all of the above information has been provided.
- The PEMA State EOC Logistics Section contacts PennDOT Area Command, which in turn contacts the PennDOT District Office.
- The District Office determines if there is sufficient supply on hand to lend to the municipality, including which stockpile the supply is located.
- The Area Command returns information to PEMA with approval or non-approval and direction for procedures to follow.
- PEMA will notify the municipality of PennDOT’s decision and, if approved, any directions for picking up the salt.
- PennDOT will also get in touch with the Pennsylvania Turnpike, if necessary, to see if it has sufficient salt quantities to loan out.

**Questions?** Contact the municipal services representative at your PennDOT district office.

## STIC Spotlight

### Adaptive Signals:

#### The Optimal Balance of Red Light/Green Light

Poor traffic signal timing contributes to traffic congestion and delay. Conventional signal systems use preprogrammed, daily signal timing schedules that are labor intensive to update. In contrast, adaptive signal control systems use real-time traffic information to continually determine which lights should be red and which should be green. By adjusting the timing of red, yellow, and green lights, the adaptive signal control technologies accommodate changing traffic patterns and ease traffic congestion.

Adaptive signal deployments in Pennsylvania have been effective since selected corridors have diverse traffic demands over a normal day. PennDOT's Adaptive Signal Control System Evaluation (TE-153) helps identify the objectives, requirements, and appropriate solutions to address the corridors' needs by following the Modal Systems Engineering Document for Adaptive provided by Federal Highway Administration.

#### How do adaptive signals work?

Adaptive signal control technologies determine which lights should be red and which should be green through data received from strategically placed sensors. The process is simple. First, traffic sensors collect data. Next, adaptive signal control technologies evaluate the data to determine when and how long lights should be green. Finally, the signal technology implements signal timing updates. The process is repeated every few minutes to keep traffic flowing smoothly. The data collection and analysis are done automatically, and signal timing updates are made continually as traffic situations occur.

#### What are the benefits?

- Improves travel time and reduces delays by more than 10 percent. In areas with particularly outdated signal timing, improvements can be 50 percent or more.
- Improves travel time reliability by progressively moving vehicles through green lights.
- Reduces traffic congestion, fuel consumption, and greenhouse emissions.
- Adapts automatically to unexpected changes in traffic conditions, such as crashes and special events.
- Prolongs the effectiveness of traffic signal timing.
- Reduces complaints received in response to outdated signal timing.
- Makes traffic signal operations proactive by monitoring and responding to gaps in performance.



*Pennsylvania's State Transportation Innovation Council (STIC) has selected adaptive signals as an innovative technology for improving travel efficiency and reducing congestion on roads. The Federal Highway Administration has also included adaptive signal control technologies as part of its Every Day Counts program, which is an initiative designed to identify and deploy innovation that shortens project delivery, enhances safety, and protects the environment.*

- Reduces intersection congestion that causes many crashes. Studies indicate crashes could be reduced by up to 15 percent through improved signal timing.

#### What does the future hold?

Pennsylvania has successfully implemented 176 adaptive traffic signal projects in various locations around the state. Another 246 projects are planned for an expected total of 422. PennDOT is constantly considering road projects that would benefit from these systems and encourages local governments to employ this technology at their intersections where feasible.



*Adaptive signal systems keep traffic moving smoothly.*



To learn more about High Friction Surface treatment, visit  
[www.fhwa.dot.gov](http://www.fhwa.dot.gov)  
[www.moderndot.pa.gov](http://www.moderndot.pa.gov)

State Transportation Innovation Council (STIC) (717) 772-4664  
[RA-pdPennDOTSTIC@pa.gov](mailto:RA-pdPennDOTSTIC@pa.gov) [www.moderndot.pa.gov](http://www.moderndot.pa.gov)

# Upcoming 2015 Classes

To Register:  
PHONE: 1-800-FOR-LTAP (367-5827)  
WEBSITE: [www.ltap.state.pa.us](http://www.ltap.state.pa.us)

*This represents some of our scheduled courses. Look for updates on the website.*

## Americans with Disabilities Act (ADA)

October 14, Warren County

## Managing Utility Cuts

October 29, Centre County

## Pavement Markings

December 4, Chester County

## Polymer Modified Emulsion Asphalt Paving System (Micro-Surfacing)

**\*\*New class\*\***

October 19, Adams County

## Project Estimating Using Mathematical Principles

November 18, Chester County

## Risk Management Strategies

October 13, Union County

## Road Surface Management

October 22, Erie County

## Safe Driver

November 19, Columbia County

## Signs & Safety Features for Bridges/Culverts **\*\*New class\*\***

October 1, Chester County

October 6, Adams County

October 22, Cambria County

November 4, Northumberland County

## Stormwater Facility Operation & Maintenance

October 23, Crawford County

## Warm Mix Asphalt

November 12, Chester County

## Winter Maintenance

October 8, McKean County

October 21, Luzerne County

October 26, Mercer County

November 17, Cumberland County

December 9, Chester County

## Work Zone (Temporary) Traffic Control

October 6, Chester County

## Congratulations to the following Roads Scholar recipients:

- John Drago, Conewago Township, Adams County
- James Eyler, Hamiltonban Township, Adams County
- Robert Riggie, PennDOT, Dauphin County

## FREE Training Courses

by the American Road & Transportation Builders Association (ARTBA)

LTAP has partnered with ARTBA to provide two free training courses this fall:

**Preventing Runovers and Backovers:** This three-hour course is promoted by OSHA and helps to reduce fatalities and accidents in the roadway construction industry by separating trucks and heavy machines from workers on foot in the work zone.

**Time:** 8:30 to 11:30 a.m.

**Roadway Safety Plus-RS +:** This two-hour course enables attendees to use the RS+ Software, which is possibly the most advanced interactive software for roadway construction safety. Participants are taught how to use this program for their continued learning and how to provide this training to others.

This course is aimed to managers, supervisors, foremen, and personnel in charge of the workers' safety training. Free RS+ software is provided to each participant.

**Time:** 12:30 to 2:30 p.m.

**September 16,** Middletown, Pa.

**September 17,** King of Prussia, Pa.

**October 6,** New Stanton, Pa.

**October 7,** New Castle, Pa.

**October 8,** Wheeling, W. Va.

To register, go to [www.ltap.state.pa.us](http://www.ltap.state.pa.us) and look under "News." For questions, email [ltap@psats.org](mailto:ltap@psats.org) or call 717-763-0930 and ask for LTAP.

## National Traffic Incident Management (TIM) Emergency Responder Training

Developed by the FHWA, this free course focuses on TIM fundamentals and terminology, notification, scene assessment and safety, command responsibilities, and traffic management. Courses are being offered this fall. Go to [www.psats.org](http://www.psats.org) (choose "Training" and click on "FHWA - Traffic Incident Management") to register for a class.

## Planning Partners Corner

### 2015 National LTAP/TTAP Conference Provides Education and Networking

by Barry Mayes, North Central MPO/RPO Partner

The National LTAP/TTAP Conference is an opportunity to hear about what is new and exciting related to transportation throughout the nation and Puerto Rico. In July, I attended the 2015 National LTAP/TTAP Conference in Savannah, Ga., with Lou Ferretti of PennDOT and Karen Atkinson of PSATS.

This year's conference commenced with a Joint Professional Development Program, dubbed LTAP/TTAP U, that offered "newbies" a review of what is going on in today's LTAP/TTAP programs. In addition to general sessions, which featured various speakers, a "hot topics" session, and opportunities for LTAP/TTAP regions to meet, sessions, led by LTAP/TTAP staff, were held on the following topics:

- **Safety** – Local Road Safety Plans; Safety Needs for Rural Roads Customers; Safety Outreach

- **Training Resources/Technologies** – Creating a Good Poster; Benefits of Transitioning to e-Learning in an Age of Open Community; Applying e-Learning Skills to Course Development
- **Professional Development** – People Come in All Shapes, Sizes, and Colors; Finding, Recruiting, and Training Trainers; Creative Thinking
- **Communications** – Electronic Newsletter for LTAP/TTAP Centers; CRM, Event Management Systems, and Managing a Customer Database; Best Practices for Marketing your LTAP/TTAP Center; Panel Discussion

The 2016 Annual Conference will be held next summer in Madison Wis., and hosted by the Great Lakes Region. For anyone involved in the LTAP program, I urge you to take advantage of attending the conference to obtain educational and networking opportunities and to bring technology transfer opportunities to your region. 🚀

#### LTAP SUCCESS STORY

## Before & After



BEFORE



AFTER

Residents of Oley Township, Berks County, had complained that drivers, especially those new to the area, were confused at the intersection of Main Street and Deturk, where three approaches had stop signs and one did not. During a site visit to the township, LTAP technical experts recommended supplement signing and suggested adding a W4-4p sign ("Oncoming Traffic Does Not Stop") be added to the stop signs to clarify traffic control at the intersection.

**Want to make your streets safer?**  
Schedule a **FREE Tech Assist** with LTAP today!

#### Winter Road Service Agreements *continued from page 1*

amount from the following winter season's upfront payment. Consideration for a severe winter adjustment will be made if a winter season results in costs exceeding \$1,800 per lane mile. Adjustment costs cannot exceed that of the standard agreement program.

"Reimbursing municipalities for their actual expenses makes it fair for everyone," says Don Sirianni, director of public works in Springfield Township, one of five townships in Montgomery County that participated in a pilot project last winter to test out an actual cost reimbursement program for winter services.

"We are ready to do it again in a second. The required paperwork was not overbearing, and we received twice as much reimbursement per mile through the pilot to cover our actual expenses," he says.

Compared to the \$874.24-per-mile rate it would have received under a standard agreement, Springfield's actual reimbursement for

### Approximately 15 percent of state roads are maintained through service agreements with municipalities.

costs was a little more than \$2,000 per mile under the pilot project last year. The reimbursement covered the total cost for Springfield Township's labor, equipment, materials (salt and brine), and overhead.

Municipalities should consider the legal ramifications of entering into each of these types of agreements and review these contracts with their solicitor to determine the best option for their circumstances, advises St. Clair. PennDOT must approve all contracts before municipalities begin any winter maintenance. For more information, including other agreement mechanisms and options, call your PennDOT district maintenance office. 🚀

## Smartphone Application for Curve Safety Wins National Build a Better Mousetrap Award

The winner of the national Build a Better Mousetrap competition this year was a mobile technology application for determining real-time curve safety developed by the Virginia Department of Transportation.

“Our goal was to improve on the traditional ball-banking process to generate engineer-grade safety data with less labor and at a reduced cost,” says Jacob Dellinger, who along with Nathan O’Kane developed the application.

The innovative technology, which uses standard smartphone components to improve curve safety analysis, was announced as the winner at the National LTAP/TTAP Annual Conference held July 20–23 in Savannah, Ga. The national competition recognizes the most innovative solutions to common transportation problems, focusing on the development of tools and equipment modifications or processes that increase safety, reduce cost, improve efficiency, and the quality of transportation.

Looking to the future, O’Kane and Dellinger plan to develop additional tools that can help to make current transportation safety analyses more efficient and cost-effective. They are working on an early prototype to address guardrail safety. The team hopes to build an app that will help traffic engineers systematize how they assess site risks, such as drop-offs, so that they can build and maintain safer guardrails along the most dangerous sections of highways.

Do you have an innovative tool or process that you developed for your municipality? Consider entering it in the 2016 Build a Better Mousetrap competition. Pennsylvania’s entry form will be out in December. 🚩



### Winter Is Coming! *continued from page 4*

**Perform Spring Cleanup** — At the materials storage area, repair stockpile facilities, as needed, and ensure all winter material chemicals are properly stored or covered. Inspect, repair, and store winter snow-removal equipment. Clean any remaining anti-skid from the roadways and drainage basins.

**Conduct Roadway Inspections** — Document necessary repairs to roadway pavements, drainage facilities, guiderail, and other roadway appurtenances, including damaged tree removals.

### Summer

**Perform any Necessary Work** — Assign work tasks for necessary repairs that were documented during the spring season review.

**Update Snow Routes** — This involves balancing resources, deciding on the level of service and the type of equipment assigned to the route, and incorporating any changes related to school bus routes, emergency services, or additional roadway mileage that has occurred through new development or as a result of the municipality entering into a winter service agreement with PennDOT.

**Negotiate with Outside Services** — Establish contracts with any companies or persons who are expected to supplement your

municipality’s winter operations during extreme weather events.

**Familiarize Operators with Their Equipment** — During the summer downtime, equipment operators should go over the basics of snow removal operations performed with trucks, graders, and loaders; review how to mount the spreader and plow; practice their driver skills such as turning and backing up; and familiarize themselves with spreader controls.

By focusing on winter maintenance activities throughout the year, municipal officials will be better able to evaluate their operations and plan for changes so that they are prepared in time the next winter maintenance season rolls around. 🚩

### Resources

Additional resource information may be found in the following documents:

- PennDOT, Maintenance Manual, Publication 23, Chapter 4
- The Salt Institute, *The Snowfighter’s Handbook*

### Want Off the Mailing List?

If you do not want to receive a copy of this newsletter, please send an email to [ltap@pa.gov](mailto:ltap@pa.gov). The newsletter is available electronically on the LTAP website under Publications on the right-hand side of the page.



**pennsylvania**  
DEPARTMENT OF TRANSPORTATION

PennDOT Local Technical Assistance Program

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