

DON'T RISK IT - MANAGING ROADWAY WINTER MAINTENANCE LIABILITY EXPOSURE

Ron W. Eck, P.E., WV LTAP Senior Advisor

Winter weather conditions can adversely affect traffic safety and can lead to motor vehicle crashes resulting in fatalities, serious injuries, and/or significant property damage. These consequences raise concern among public agencies over the threat of tort claims arising out of alleged negligence in the conduct or performance of snow removal and ice control activities. What do road agencies need to be aware of in this regard, and how can they reduce their liability risk?

ESSENTIALS OF TORT LAW

A **tort** is a wrong that results in injury or damage. It is the violation of a duty owed to the injured party. What are the duties of a road agency? The principal duty is to provide reasonably safe roads. While what is reasonable would ultimately be determined by a jury, note that there is no duty to guarantee the safety of the road user or to provide 100 percent safe roads. In those instances where a road agency may not be able to provide reasonably safe roads, there is a duty to warn of existing hazards.



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Country Roads & City Streets is published three to four times per year. The purpose of this newsletter is to provide information that is beneficial to decision makers, elected officials, and roadway construction, maintenance, and management personnel.

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MISSION:

The mission of the WV LTAP is to foster a safe, efficient, and environmentally sound surface transportation system by improving skills and increasing knowledge of the transportation workforce and decision makers.

To help achieve this mission, training, demonstrations, technical assistance, and resource materials are provided.



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Standard of care is the legal term for the criteria by which reasonableness is judged. Examples of winter maintenance standards of care include the *American Association of State Highway and Transportation Officials (AASHTO) Maintenance Manual*, the *WVDOH Maintenance Manual*, and your agency's winter maintenance policies and guidelines.

There is an element of time in assessing the reasonableness of a road agency's actions. The term **notice** means when the road agency was informed about a specific problem with the roadway system. Notice could be a phone call, an email or even an editorial in the local media. The concept of **constructive notice** is stricter. It basically says that even if the agency was not specifically informed about a roadway deficiency, after a reasonable time, a prudent road agency should be aware of that deficiency.

COMMON WINTER MAINTENANCE TORT CLAIMS

A common tort claim involving winter maintenance is the allegation of failure to keep the roads passable during a storm. The reality is, generally, the "storm-in-progress" rule applies, meaning there is no duty to remove general accumulations

of snow. Thus, it will be difficult for a plaintiff to be successful with this theory of liability unless they can show that there was a clear disregard of agency priorities or a failure to warn of, or alleviate, problem areas.

Note, however, that plowing-related tort claims during or shortly after storm events are not uncommon. These usually involve higher-speed roads. The claim may be that the cloud of snow cast into the air partially or totally obscured driver vision, causing them to run off the road or strike another vehicle. If the plaintiff's vehicle strikes the plow truck, the plaintiff may claim that the truck was not clearly visible due to deficiencies in lighting and/or retroreflectivity. Make sure your trucks have appropriate lights and retroreflective material; inspect these items before each run. After a storm, do not ignore widening and clean-up. Windrows of snow in front of guardrails need to be removed so traffic barriers can function as designed. Be especially attentive to drainage problems created by plowed or shoveled snow. Meltwater can freeze, creating an isolated icing condition.

Do not make the mistake of thinking all winter tort claims arise out of storm events. Attention also needs to be paid to isolated icing conditions. The courts have imposed a

duty to use chemical and/or abrasives on roadways when an agency has notice (actual or constructive notice) of a particular isolated or hazardous condition. Examples of situations that have a high potential for isolated icing conditions, and for which roadway personnel should be on the look-out, include:

- Clogged inlets where water runs across the inlet and then enters the traveled way and freezes
- High shoulders where water cannot drain from the pavement and accumulates inside the edge line
- Driveways where water flows from the driveway onto the roadway or, due to deficient drainage under the driveway, water accumulates at the driveway and enters the traveled way

Other isolated roadway conditions that should be monitored include icing where a section of roadway is shaded by trees and preferential icing of bridge decks. Be sure to identify (document) potential isolated icing conditions during winter maintenance dry runs. Correct these situations before winter or warn motorists of the condition.

REDUCING RISK

Following the winter maintenance risk management checklist below should help your agency reduce its tort liability exposure and help in defending claims that are made.



- Develop and follow a snow policy or plan
- Follow rationale procedures for setting winter maintenance priorities
- Don't promise more than you are able to deliver
- Provide an inspection system
- Establish a citizen response system
- Document, document, document!
- Train employees at all levels about equipment, materials and methods (WV LTAP can help)

WV LTAP FAVORITE RECIPE - TOFFEE PECAN BARS

Kim Carr

One of my favorite desserts is pecan pie, which is why I love this bar. It is easy to make and tastes great warm or chilled. Please drop me an email (kim.carr@mail.wvu.edu) and let me know if you enjoyed this dessert.

INGREDIENTS

- | | | |
|---|--------------------------------------|----------------------|
| 2 Cups All-Purpose Flour | ½ Cup Confectioners (Powdered) Sugar | 1 Cup Butter (Cold) |
| 1 Egg | 1 Teaspoon Vanilla Extract | 1 Cup Chopped Pecans |
| 1 Can Sweetened Condensed Milk (<i>You can also increase this to two cans if you want a thicker, richer bar.</i>) | | |
| 1 Package Milk Chocolate Toffee Bits or Plain English Toffee Bits (8 to 10 ounces) | | |

DIRECTIONS

- Combine the flour and sugar then cut in the butter until the mixture is crumbly.
- Press mixture into a greased 9 x 13 baking pan and bake at 350 degrees for 15 minutes.
- While crust is baking, combine the egg, milk, and vanilla. Mix Well.
- Fold in the toffee bits and chopped pecans and spoon over the crust.
- Bake for an additional 25 minutes or until the filling is a golden brown.
(*You will need to bake longer if you use two cans of sweetened condensed milk*)
- Chill until firm.



CHARLESTON, WV'S FIRST PAINT THE SNOW PLOW PROGRAM

Ashley Peterson, WV LTAP

Snow plow operators in Charleston, WV will be riding in style while clearing away snowfall this winter. For the first time, the City of Charleston's Street and Stormwater Departments partnered with local schools to have works of art painted on snow plows as part of the Paint the Snow Plow Program. Over 200 students from six schools participated. The students were able to show off their artistic talents while learning more about the City's maintenance responsibilities and the importance of preventing environmental pollution. **The participating schools were: Overbrook Elementary, John Adams Middle School, Bible Center School, Stonewall Jackson Middle School, Horace Mann Middle School, and Capital High School. (To see more photographs on the entries, visit <http://charlestonstormwater.org>.)**

PROGRAM THEME

This year's Program served as a way to increase awareness and educate local schools and the public regarding the importance of recycling with the theme **"Recycle! Keep litter out of our rivers!"** According to information from the Charleston Stormwater Program, trash and debris, especially plastics, play a large role in waterway pollution as they are carried by stormwater into drain inlets, through storm drains, and dumped into streams and rivers. Much of this litter does not biodegrade for years, and plastics do not degrade for thousands of years. Keeping this theme in mind, students were asked to design their art depicting the importance of recycling and include the theme's phrase on the blade. The City of Charleston's Street Department picked up completed blades in early October and each plow will be used to manage snow removal in the area that it was painted.

After all blades were painted and picked up, the Charleston Stormwater Program posted each blade's picture to their website and asked the public to cast their vote for a People's Choice winner. After two weeks of voting, Horace Mann Middle School won this award. The school's art teacher Mary Gilkerson said the inspiration for her students' blade came from her sons' love of fishing. "I discussed with the students the importance of recycling and keeping our rivers clean to create a healthy habitat for the variety of fish that live in our West Virginia rivers. Many people eat the fish caught in our rivers, so it is important [to] maintain a healthy environment for them to live."

This is a great community outreach and educational program, and the WV LTAP wants to know if your city or town has a program of this sort. Please email Kim.Carr@mail.wvu.edu to share your program's details, or to learn how to start your own program.

Horace Mann Middle School had the winning design. Their plow blade is the second from the right.



THE COST OF LITTERING

Kim Carr, WV LTAP

There is a real cost associated with littering, and we all have a responsibility to keep litter off of our roadways and out of our rivers and streams. There's a saying, "We all live downstream." Please think about that. If you are driving, walking, or biking and have trash, please put it in a trash receptacle. If your garbage bag gets ripped open and is strewn around your neighborhood, please pick it up. After all, it's your garbage.

Always secure your loads. Littering is often not done intentionally, but it happens when debris falls or blows out of trucks. Don't have loose items in the back of your truck, such as empty soda cans, and when you are hauling items, keep your loads secured and covered.

If you're a smoker, please properly dispose of your butts. Don't throw cigarettes out of your vehicle window. Don't stamp them out, leaving them on the sidewalk or ground. **Cigarette butts and cigar tips are litter.**

PreventCigaretteLitter.org suggests smokers:

- Carry a portable or pocket ashtray when smoking outside.
- Place cigarette butts and cigar tips in a car ashtray, a portable auto ashtray (which fits in the cup holder), or a container with a secure top.
- Use a proper receptacle to dispose of cigarette butts and cigar tips. Ash receptacles are needed at the places where people must stop smoking before they proceed.



DID YOU KNOW?

When cigarette butts become litter, they have a negative impact on the environment. The filters are made of a plastic that can take up to

10 years to decompose.

Source: csmonitor.com/Environment/2009/1118/earth-talk-little-cigarette-butts-make-big-litter-impact

WEST VIRGINIA CODE

CHAPTER 22. ENVIRONMENTAL RESOURCES. ARTICLE 15A.

(8) "Litter" means all waste material, including, but not limited to, any garbage, refuse, trash, disposable package, container, can, bottle, paper, covered electronic devices, ashes, cigarette or cigar butt, carcass of any dead animal or any part thereof or any other offensive or unsightly matter, but not including the wastes of primary processes of mining, logging, sawmilling, farming or manufacturing.

The State of West Virginia spends more than **\$1 million annually** to remove litter from state highways.

The annual cost of roadside litter control nationwide is \$115 million.

Highway litter costs West Virginians:

- in tax dollars to clean up public areas
- by detracting from the natural beauty of the state
- by harming birds, animals, and fish
- in road and water safety with hazards to motorists, bikers, hikers, picnickers and swimmers
- by degrading the quality of life in the state
- in economic development prospects choosing a cleaner site for new business

The items most often found during litter cleanups are fast-food wrappers.

The second-most-often found items are aluminum beer cans, followed very closely by soda cans.

Source: WVDOT Website
transportation.wv.gov/highways/maintenance/adoptahighway/Pages/LitterFacts.aspx



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ROAD FACTS INFORMATION SHEET

Road Facts has been designed to help provide useful tips and facts regarding roadway issues. The Road Facts series can be downloaded from the WV LTAP website (wvltap.wvu.edu) as a PDF or Microsoft Publisher file. The Publisher files are formatted so agencies can add their individual contact information if desired. The WV LTAP does ask that the main text not be changed or altered without permission. Agencies are encouraged to post these information sheets on their webpage, distribute printed copies to elected officials and citizens, send out in mailings, etc. The WV LTAP staff welcomes your suggestions for new topics and will continue adding new sheets as they become available.

WHY BRIDGES SWAY AND BOUNCE

We often think of bridges as being solid and rigid structures that shouldn't move at all. However, bridges are designed to move, which helps prevent snapping and breaking.

Bridges sway from side-to-side due to wind blowing across them, and they bounce up and down as traffic or people pass over. Bridges address this swaying and bouncing in much the same manner as trees. When a tree is still a sapling and is hit by strong winds, its elastic nature allows it to bend without cracking. A mature tree hit by the wind will do one of two things — stay in place or crack and eventually fall. Bridges are designed to sway, bounce, expand, and contract, reacting much like saplings; a rigid bridge would act more like a mature tree.

Bridges also have expansion joints built in to address the expansion and contraction due to changes in temperature. Materials expand and contract with change in temperature the same way the air pressure in car tires change. When it is hot outside, material expands, and when it is cold, the material contracts. The expansion joints on large bridges look like interlocking teeth. The joints on smaller bridges are made of a plastic material and you may notice a slight bump when entering or exiting a bridge. The bump is due to leaving the ground and entering the "floating" bridge deck.

So, the next time you are sitting in traffic on, or driving across a bridge, and the bridge feels like it is bouncing, just remember, this regular movement is part of the bridge design and is not a sign that the bridge is going to collapse.



WV LTAP Photo of the old Cheat Lake Bridge.

BUILD A BETTER MOUSETRAP WINNERS RECOGNIZED

The 2016 WV LTAP Build a Better Mousetrap Competition was announced to help collect and disseminate real-world examples of best practices, tips from the field, and assist in the transfer of technology. In the summer edition of the newsletter we showcased this year's winning entries. Below are representatives from the three winning agencies shown with their agency's plaque. We encourage you to reach out to the agency's contact or let the WV LTAP staff know if you would like to learn more about these ideas. (Complete write-ups of each of these entries is on our website - wvltap.wvu.edu - in both the summer newsletter pdf and in the Build a Better Mousetrap drop down under the services tab.) We will be doing this competition again in 2017, so get your ideas ready to submit!



Kim Carr presented the 1st Place Build a Better Mousetrap award to Carl Williams, Safety Officer for the WV Parkways Authority.



Charles Smith from the WVDOH, District 7, accepted the 1st runner-up award on behalf of David Miller, Craig Boggs, and Gary Gadd.



Gus Suwaid, WVDOH-D6 Acting District Engineer/Manager, presented the 2nd Runner-Up award to Charlie Swart, Design Engineer.

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Have you checked out and liked our Facebook page yet?

www.facebook.com/WVLTAP/



HELPING WITH FLOOD RECOVERY - A PERSONAL PERSPECTIVE

Alex J. Gennuso, WVU Civil and Environmental Engineering Student

The WV LTAP staff is fortunate to be housed in a university setting where we get to interact with a variety of students. What we have learned over the years is that we have some amazing students with a passion to help others. This desire to help has been readily apparent this year following the flooding that occurred. The following article was written by Alex Gennuso, an undergraduate student who is working with the WV LTAP. Alex is also an officer for West Virginia University's American Society of Civil Engineer's (ASCE) Chapter, and it was in this capacity that he volunteered to help with flood cleanup and rebuilding. The following article, written by Alex from his point-of-view, captures his experience.

Earlier this year, flooding occurred throughout the southern part of the state that devastated homes, businesses, and vital infrastructure. With some families living in tents, and businesses closed, the residents of these affected counties were in dire need of help. The fall semester provided an opportunity for me, as an officer of ASCE, to volunteer my skills and knowledge to help a few of these families move out of tents and into more permanent residences.

In late August, approximately 20 students from different engineering majors piled into rental vehicles packed with any and all tools we had available, making the two-and-a-half-hour trip to Bomont. Upon exiting the highway, we started driving on back country roads located along the river; this is when we saw our first glimpse of the damage caused by the flood waters. With roads left covered in dried mud, numerous landslides, and various crews doing what they could to salvage the road that paralleled the river, we finally realized it was as bad as reported.

The meeting point for volunteers was a small elementary school, remotely located. We pulled into the parking lot, with each of us jumping out and stretching from the 2.5 hour trip, eager to get started. We were welcomed by a preacher from a few counties over who was coordinating the volunteer efforts in the area. Our group included individuals with varied backgrounds and skill sets. The preacher asked if anyone had knowledge on laying subfloor, and as I have experience in that, two friends and I raised our hands and said we could get the job done. The rest of the group was split up, with some volunteers doing electrical work and some doing general labor work. With our jobs assigned, we piled back into different vehicles to head out to our designated area, down a hollow where a double-wide sat near a stream that flowed down the middle of the valley. Pulling up to the double-wide, we could see how high the waters of a nearby stream rose. After talking with the homeowner, we learned that the home we were looking at was not the same home he and his family used to live in; the flood completely destroyed that home. The double-wide that now sat on the side of the mountain was donated, as was all the machinery needed to excavate the new home site.



These student volunteers are working on digging a trench that is a necessary part of the process for getting the family's home connected to their septic tank.

After finalizing our tasks, we jumped into action, moving existing furniture, running extension cords, and setting up our cutting stations in an effort to make the process safe and efficient. While I worked with two others on installing the sub floor, other volunteers worked on a separate house, doing labor intensive jobs such as digging a trench that was needed to install pipes to connect the house to the septic tank.

We were able to get the subfloor completely installed and the efforts made by the volunteers brought the two families one step closer to moving into their new homes. By the end of the day our group was tired, but we left with our spirits higher knowing that we were able to help and bring some hope to these families and get them closer to moving out of tents and into their new homes.

HIGHLIGHTS FROM THE 2016 SNOW & ICE CONTROL WORKSHOP



Bob Arbogast, Occupational Safety Specialist for WVDOH District 4, emphasized operator and equipment safety.

State and municipal roadway employees and officials throughout West Virginia attended the 26th Annual Snow and Ice Control Workshop held on September 28 in Bridgeport at the Bridgeport Conference Center.

The Snow and Ice Control Workshop is the largest event hosted by the WV LTAP each year; this year's Workshop was no different as we welcomed 160 attendees, despite the last minute location change. To help West Virginia agencies and municipalities prepare and combat winter weather, the event featured a variety of topics and demonstrations, which are detailed in this article.

Matt Carter from the Delaware LTAP was this year's featured speaker. Matt opened the workshop with an introduction on snow and ice control, including weather basics, the importance of winter weather training, and ways an agency can establish and communicate their level of service. He also discussed how critical it is to develop, review, and revise a snow and ice removal plan. Other aspects of a snow and ice removal plan covered in this presentation included standard operating procedures, route maps/

assignments, budgeting, and acquiring equipment.

Matt also discussed practices agencies should do before and after a winter storm such as clearing drainage ways and conducting interim pavement repairs in his *Maintaining Your Infrastructure During and After Storms* presentation. Lastly, during his *Safety: Everyone has a Role* presentation, Matt spoke on the importance of developing a culture of safety within an organization and provided tips to keep in mind when loading trucks, putting on tire chains, backing up, and more.



As budgets for many agencies remain tight, understanding how to properly store and use deicing and anti-icing materials is vital for winter maintenance. Jeff Pifer from the WVDOH explained best practices for storing and using these materials to not only help organizations' budgets, but the environment as well.

Treating roads in the midst of a winter storm is difficult enough and you don't want to risk potential equipment failures in the process. Aaron Stroud and Rodney Taylor from the WVDOH provided practical tips for operators and mechanics to use to help

their equipment run efficiently before a winter storm hits and without complication during the storm.

This year's Workshop closed with *Don't Risk It: Decreasing Liability*, which was presented by WV LTAP senior advisor Ron Eck. Ron discussed the importance of completing the job in a manner that reduces an agency's liability or chance of being sued.

Each year, the Snow and Ice Control Workshop features outdoor demonstrations. One of the presenters during this portion of the event was Bob Arbogast, WVDOH District 4's Occupational Safety Specialist. With a plow truck and driver on-site, Bob briefly discussed problems to look for when doing a pre-trip walk-around, as well as proper procedures to follow during operations. He stressed the importance of each driver communicating after their shifts regarding any equipment issues and pointed out features to be aware of when installing and removing plow blades.

Thank you to all who attended, presented, exhibited, and assisted with this year's Workshop. If you have any topic ideas or suggestions for next year's event, please email Kim at kim.carr@mail.wvu.edu.



Matt Carter from the DE LTAP was this year's featured workshop presenter.

ROUNABOUT MAINTENANCE MANUAL

Indiana LTAP Center, Purdue University, Civil Engineering - Excerpts reprinted with permission.

The following information is excerpted from the “Roundabout Maintenance Manual,” produced by the Indiana LTAP located at Purdue University. The manual in its entirety can be found online at <http://rebar.ecn.purdue.edu/ltap1/multipleupload/Maintenance/Roundabout%20Maintenance%20Manual.pdf>. This is a great resource for anyone wanting to learn more about maintenance issues related to roundabouts.

INTRODUCTION

In recent years, roundabouts have become more prevalent in the United States. Their growing popularity is a result of their proven advantages over other signalized and non-signalized intersections. Agencies across the country are adding roundabouts to their roadways at a growing rate. Once the roundabouts are placed, it is up to the road owners to maintain them. Roundabouts require a more detailed maintenance plan than a regular intersection, and their unique design and function can present maintenance challenges.

This maintenance manual serves as an additional resource for communities who have implemented roundabouts or are considering them. There are a few other published guides, such as the *NCHRP Report 672, Roundabouts: An Informational Guide*, and the *Wisconsin DOT Facilities Development Manual*. However, the information covered in these guides is very broad. This manual will provide specific information regarding roundabout maintenance.

Research for this manual began by determining the most common questions and problems relating to roundabout maintenance, as well as existing materials published on roundabout maintenance. A survey was created for agencies with the most experience in maintenance. Cities in and around Indiana with the highest number of roundabouts were determined and contacted to complete the survey. Agencies returned written responses or were interviewed

regarding maintenance. The gathered information was compiled to create this document. A summary of the information in this guide has been published in a small flipbook as well.

The information and statements in this document are suggestions for roundabout maintenance practices, not standards. Best maintenance methods and practices will be determined as more time passes and more roundabouts are installed. This guide is a preliminary look at maintenance procedures based on the knowledge agencies have gained thus far. Owners must realize that every roundabout is different due to size, traffic amounts, individual features, and necessary maintenance tasks.

SECTION I: WINTER MAINTENANCE

The circular shape of roundabouts must be considered when clearing snow from these roadway features. Improper plowing and deicing can result in damage to curbs from the plows and create dangerous driving conditions for motorists.

SNOWPLOWING

Typically, no special equipment is required for plowing roundabouts; however, drivers should be trained in advance on proper roundabout plowing techniques. The best method for snow

removal is to start in the center of the roundabout. It is up to each individual community whether they would like to plow the truck apron. Some believe it should be plowed for the trucks and vehicles that utilize it. Others do not plow the apron for preservation purposes. This prevents plows and salt treatments from damaging the aprons.

Note that not all truck aprons are wide enough to fit the plow blade, and therefore cannot be plowed. Regions that receive large amounts of snow should consider this in the design and planning of their roundabouts. One agency surveyed said that they made all of their truck aprons twelve feet wide to accommodate plows. Depending on the amount of snow expected for the region and the size of plow trucks used,

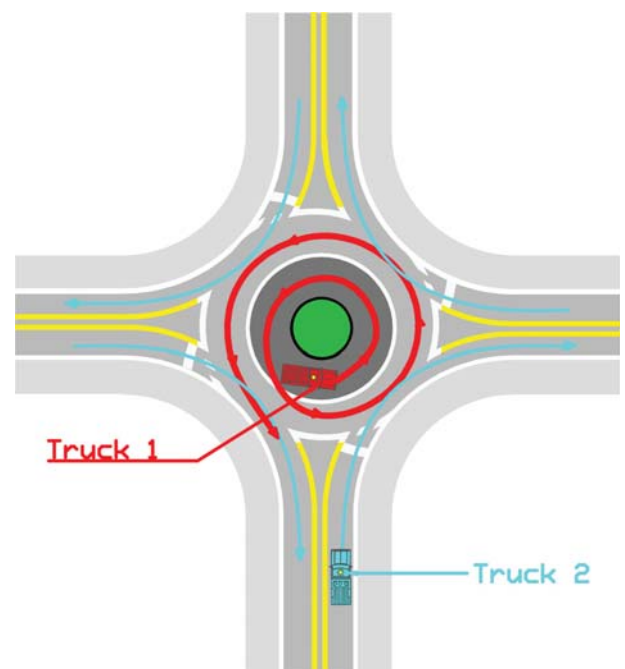


Figure 1. Diagram for snow removal procedures in a roundabout.

aprons should range from 10-12 feet if plowing will be necessary.

If a truck apron will be plowed, direct drivers to mount the apron and clear it first. Then, work in continuous circles in the same direction as traffic and gradually plow to the outer edge of the roundabout. A secondary truck, meanwhile, can remove snow from the roundabout exits and entrances. If a secondary driver is not available, the original driver can clear the approaches once the circulatory roadway has been cleared.

In some areas, storage of the plowed snow can become an issue. Snow should always be plowed to the right and outside of a roundabout. It is not advised to use the central island as a snow storage space. Snow stored on the central island can cause issues with drainage as well as melting and refreezing onto the circular roadway. This not only creates unsafe driving conditions, but increases maintenance costs due to the extra labor and deicing materials needed to clear the runoff. Snow storage in the central island can also prevent trucks from using the truck apron. If snow buildup on the outside of a roundabout becomes an issue, snow should either be pushed back further from the curb or hauled from the area.

Communities new to roundabouts often run into the problem of plows damaging the corners on roundabout entries and exits, or other curb areas. The repairs for this are an unnecessary expense and are unsightly for drivers passing through the intersection. Thankfully, a number of precautions can be taken to prevent plows from damaging roundabouts. In areas where heavy snowfall is expected, snow poles can be used to mark roundabout boundaries. Some communities also requested plow drivers to reduce their speeds when clearing roundabouts. Another

preventative method includes designing or re-designing roundabouts to have mountable curbs. Mountable curbs reduce the damage caused by snow plows because they allow the plows to move up and down on the curb, making it easier for plows to clear truck aprons and maneuver around corners.

One advantage roundabouts offer in regards to snowplowing is a safe place for plows to turn around. Instead of backing up in an intersection, drivers can navigate through a roundabout to change the plow's direction. This is much safer than backing the truck and should be taken into account when planning plow routes. Agencies should use roundabouts to their full advantage as turnaround points on snow plow routes.

DEICING

There is some debate whether the best method for deicing is with liquid or granular chemicals. Among the agencies interviewed for this guide, it was concluded that the better solution is granular salt. Liquid treatments are utilized by some communities, but this study concluded overall that granular treatments were more effective. Salts work with lower temperatures and larger amounts of snow, so it is recommended to use them when treating roundabouts. Using a liquid treatment in roundabouts can create a slick surface for vehicles. If liquid is used, it is recommended to use it in combination with salt treatment.

Be cautious when selecting what type of salt to use. Some communities have reported damage to landscaping from salt getting onto the vegetation.



Figure 2. Example of damage to the curb in a roundabout from a plow.

Excessive use of salt can also cause damage to curbs and other elements of the roundabout; however, this problem is to be expected on any roadway.

EQUIPMENT

There is no special equipment needed for plowing and deicing roundabouts. Either single axle or tandem plows can be used. However, there are some specific maintenance tasks that can increase the durability of the plow trucks themselves. Some communities interviewed during the research process noticed more wear on the passenger side springs. This occurs due to the higher amount of weight and pressure put on the passenger side of trucks that frequently travel through roundabouts. They advised purchasing stronger and more durable springs for the trucks. One agency stated that now they are using 9,500# springs on the driver side of the front and 10,500# springs on the passenger side.

Tires are another concern. Maintenance trucks that frequently pass through roundabouts often notice more tire wear on the passenger side of the trucks, due to the increased turning. To mitigate this extra wear, trucks that frequent roundabouts may need to have their tires rotated more often than trucks traveling on straight roads.

TIPS FOR SNOWPLOW OPERATORS AT HIGHWAY RAILWAY CROSSINGS

Operation Lifesaver, Canada. (operationlifesaver.ca/) Reprinted with Permission.

The following information is from a publication titled “**Tips for Snow Plow Operators**” that was published by Operation Lifesaver, located in Canada. This is essential information for any snowplow operator who encounters railway crossings.



WV LTAP Image.

Snowplow operators frequently encounter highway railway crossings. Special caution is required at these crossings to protect the operator, roadway users, the railway, and employees.

Laws and policies vary in each province [state] and company—know the law, regulations and policies that apply in your province [state] and within your organization!

Following the plowing procedures recommended below can prevent needless tragedies.

APPROACHING A CROSSING

- If required, stop the plow before reaching the crossing no closer than five (5) metres [~ 15 feet] from the nearest rail.
- Before resuming, make sure there is enough room on the other side for the whole unit to clear the tracks, including your vehicle’s overhang.

Know the length of your vehicle! Remember, the train will be at least a metre [~ 3 feet] wider than the rails on both sides.

- Ensure it is safe to cross the tracks by looking both ways. Open windows/doors and turn off radios or fans so as to see and hear better. Ensure you can see past obstructions such as mirrors, pillars, or attachments.
- Raise the plow blade and wing or other attachments high enough to clear the tracks and signals.
- To avoid stalling, use a gear which will let you cross the tracks without shifting.
- Be especially careful at crossings without gates, flashing lights or bells. Even if there are active warning signals, and they do not indicate a train is approaching, you must look and listen to be sure it is safe to proceed.
- After you have started over the tracks, if the crossing lights begin to flash, **KEEP GOING**. It is safer to continue forward than to reverse.

SNOW, SALT, & CHEMICALS

Avoid piling snow on or near railway crossings. Windrows must be kept to a minimum as they reduce visibility at crossings and may be hit by a passing train. Thrown ice or hard packed snow could result in possible injury to the public.

- Do not pile snow under gate arms or mechanisms. This may result in the malfunction of railway signal equipment.
- When possible, do not pile snow on

access roads parallel and adjacent to the tracks.

- When possible, “clear” crossing approaches to bare pavement in order to expose railway/pavement markings.
- Never dump salt or chemicals directly on or near any highway-railway crossing. Salt or chemicals reduce the resistant [electrical resistance] properties of track ties and rock ballast. This in turn can cause the electrical signals carried through the rails to short out, resulting in activation of flashing light warning devices or malfunction of train signals.
- To prevent sand from being carried onto the tracks, ensure sand is not applied within three (3) metres [~ 10 feet] of railway crossing tracks.
- To prevent a build-up at the crossing, which could contribute to derailments, avoid or limit the use of abrasives at railway crossings.

EMERGENCY SITUATIONS/ REPORTING HAZARDS

If your plow stalls or gets stuck on a crossing, get out immediately and move quickly to a point at least 30 metres [~ 100 feet] away from the track and the truck. This will reduce the chances of being struck by flying debris if a train hits the vehicle.

If the plow or wing accidentally hits the rail, signage, or signal equipment, report it immediately. Notify your dispatcher and/or contact the railway directly.

Many railway companies post their emergency numbers prominently at crossings. If the number cannot be

located immediately, call 911 or the local emergency number. *

POLICE OFFICER OR FLAG PERSON AT THE CROSSING

If a police officer or properly identified railway flag person is at the crossing, obey directions. Remember, however, you are not relieved of the responsibility to ensure your personal safety, and you must confirm it is safe to cross the tracks by looking and listening for the approach of a train.

Please remember: **ANYTIME IS TRAIN TIME!** As you carry out maintenance at a railway crossing, crossing signals may activate as little as 20 seconds before a train arrives. An average large truck can take 18 seconds to clear the track area from a standing start.

* Section 8B.18 of the MUTCD provides the standard for emergency notification rail signs in the United States. The signs have a white legend and border on a blue background. Included on the signs is the emergency contact telephone number for the railway and the unique crossing identifier which provides the exact location.

SNOW AND ICE CONTROL BEST MANAGEMENT PRACTICES

Maine LTAP, Information from the “Maine Environmental Best Management Practices (BMP) Manual for Snow and Ice Control.” Reprinted with Permission.

The Maine LTAP, in conjunction with various agencies and contributors, has produced a document titled, “**Maine Environmental Best Management Practices (BMP) Manual for Snow and Ice Control.**” It is an excellent resource that presents tools and best practices for snow and ice control, when they should be used, and their limitations.

The WV LTAP staff has pulled a couple of sections from the manual that are included below and on the following pages. The manual has a lot of information that can be applied in West Virginia. To read the manual in its entirety, visit <http://maine.gov/mdot/csd/mlrc/documents/2015-08-17-June2015FINALversion.pdf>.

3.1 DEFINING A LEVEL-OF-SERVICE

WHAT IS IT?

Snow and ice control Level-of-Service (LOS) is a defined set of operational guidelines and procedures that specify the extent to which maintenance services will be provided. Due to the variable nature of the weather events and the fact that budgets and resources are limited, a defined LOS policy provides a realistic basis for a winter maintenance operations program.

HOW DOES IT WORK?

A LOS policy will require establishing a prescribed end-of-storm road condition for various types of roads, explaining what intermediate conditions are acceptable, and/or the frequency of snow and ice control maintenance operations. Some components of an LOS policy would include: overall approach, time to bare pavement, truck cycle times, % bare pavement, acceptable snow cover during and after a storm, materials used, typical application rates, plow route length, and time periods of reduced coverage.

HOW IS THIS BMP IMPLEMENTED?

The LOS policy should, at a minimum, be a published policy document that is used by



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the municipality or transportation agency to support and explain its overall approach to winter operations within the limits of its budgetary and staffing resources and within context to local sensitive environments. Some communities choose to formalize a LOS policy into local code along with other requirements for public and private property snow removal.

WHAT ARE THE PLANNING OR TECHNICAL CONSIDERATIONS?

The LOS policy will largely be determined by the importance of the road and the average daily traffic count, but may also include consideration of sensitive environmental areas. A community should define its LOS policy with the input of transportation stakeholders which will require an evaluation of traffic levels, road classification in both urban and rural areas, road speeds, average plow route length, and typical staffing and resources. These priorities identify the order in which the roads will receive attention when choices must be made and will also help to define the level of maintenance each priority level will receive under various activities. The use of geographic information systems (GIS) may make this evaluation easier and maps generated through the process assist in the graphical representation of traffic counts, road types, [and] environmental conditions that can assist a community in achieving informed input. While the focus of this BMP is on roads, LOS plans can be developed for parking lots and sidewalks as well.

WHAT ARE THE POTENTIAL BENEFITS?

A LOS policy allows a community to defend its decisions to provide for maximum efficient use of traction and anti-icing/deicing materials through timely and carefully controlled applications. This will provide for the safe passage of road users while respecting the environment in general and fresh water resources in particular. It can also list the priorities of specific roads in regards to traffic, environment or other factors.

WHAT IS THE COST TO IMPLEMENT?

The LOS policy development primarily requires an investment in time for roadway managers. The investment will depend on the level of detail of the policy and the desired level of engagement of road users and interested citizens. Additional investments may be made depending on the nature of the technology used to evaluate existing and future conditions, including GIS. The LOS policy development may require limited data collection regarding sensitive receiving waters and local road conditions (e.g. winter shade areas, difficult to manage surfaces).



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8.1 SIDEWALK & BUILDING ENTRANCES

WHAT IS IT?

Despite their somewhat small area, sidewalk and building entrances often are salted and sanded at a higher rate due to fear of "slip and fall" lawsuits. Sidewalks are often the most over-salted of all areas in winter maintenance. Sidewalks are the area of highest tracking into the building. Extra salt and sand contribute to slippery entryways inside the building. This section describes what the basic BMPs are for sidewalks and building entrances.

HOW DOES IT WORK?

Using BMPs assures these surfaces are safe for pedestrians while not wasting product, reducing product being tracked into the building, and reducing harm to local vegetation, streams, and groundwater.

HOW IS THIS BMP IMPLEMENTED?

Focus on aggressive mechanical removal of snow. Always remove snow prior to applying deicer. The less snow, the less deicer required resulting in a safer walking surface. Do not use a scoop for deicer distribution. Use hand-held spreaders or drop spreaders rather than broadcast spreaders to increase the amount of salt that ends up on the sidewalk. This makes the dispersed salt more effective and protects nearby landscaping vegetation.

If you are using a broadcast/rotary spreader, adjust the opening to limit dispersion of material onto the sidewalk or install shields to restrict the spread pattern.



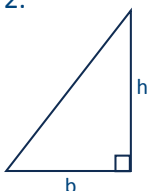
Look for opportunities to close extra entrances during the winter to reduce the need to use chemicals on all sidewalks and steps.

Guidelines for spreading deicer on steps, stairs, and small sites:

- Even spread pattern of granules, aiming to avoid the clumping of granules.
- No piles of deicer.
- No deicer on dry pavement.
- No deicer in vegetation.

If you are not responsible for sidewalk maintenance, consider providing this information to the building occupants to educate them on these best practices for winter maintenance.

The amount of deicer needed is based on the size of the sidewalk/entranceway. To calculate the area, review a scaled map of the facility so you can calculate areas. Determine the size of the area that will be treated. Measure the area to be treated using the following calculations:

| | | |
|--|--|--|
| <p>The area or square feet of a square or rectangle is Height (h) X Width (w)</p>  | <p>The area or square feet of a circle is πr^2 or $3.14 \times (r \times r)$ where the radius is half of the distance across the circle.</p>  | <p>The area or square feet of a right triangle is Base (b) X Height (h) divided by 2.</p>  |
|--|--|--|

Measuring your area along with knowing the pavement temperature will allow you to use application rate charts. A good source for application rates can be found in the *Minnesota Winter Parking Lot and Sidewalk Maintenance Manual (2010)* which can be downloaded from <https://deicemandave.files.wordpress.com/2014/09/parkinglotmanual-june061.pdf>.

WHAT ARE THE POTENTIAL BENEFITS?

Aggressive snow removal leaves less snow, which requires less deicer and creates a safer walking surface. Hand-held spreaders provide more even distribution, reduce the amount needed, reduce tracking into buildings, save money due to reduced material application, and reduce impact to the building from corrosion. Hand-held spreaders save at least 50% of the salt used spreading with a scoop, without reducing the level of safety.

WHAT ARE THE PLANNING OR TECHNICAL CONSIDERATIONS?

Explore closing any extra non-essential, high maintenance building entrances during the winter. Heated or textured mats may work for small problem areas such as sidewalks or steps. However note that deicers can harm heated sidewalks.

WHAT IS THE COST TO IMPLEMENT?

Although additional time may be required to assess and calculate sidewalk and entranceway, savings may be realized by minimizing the amount of salt and abrasives applied as a result of the pre-planning.

ROADWAY MANAGEMENT CONFERENCE FUTURE

The WV LTAP, along with the other states in the Mid-Atlantic LTAP region, are seeking input about revising the **Roadway Management Conference (RMC)**.

The RMC was intended for practitioners who construct and maintain state, county, and municipal roads and streets. These individuals face many challenges, such as stormwater management, continuing budget constraints, and experienced employees retiring. The RMC was designed to help these practitioners prepare for and successfully address such challenges.

A short online survey has been developed to help determine if the RMC should be revived and to make programming and logistical decisions about this event. Please take a few minutes and provide your feedback. Your input is needed!

To complete the survey, visit wvltap.wvu.edu.



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