Winter Maintenance Preparation

One way to keep cool when the temperature reaches the 90s is to think cool thoughts. Many of us have just returned from our annual summer vacations or are enjoying the beautiful warm weather. However, before we know it and much before we want it, the warm breeze will turn cooler and winter will be upon us. We all know what happens next; snow and winter maintenance operations will be here.

Though public works officials and employees think of late summer and fall as the seasons to fix roadway assets, they can’t lose track of the fact that winter operations are a year round activity. The first snow storm leaves a lasting impression with residents and sets the tone for how they perceive winter maintenance operations. Proper planning and preparation now can go a long way in making operations a success and ensuring that your department comes out on top in the first fight with Mother Nature.

What should be done now? The obvious is preparation of bids for material and equipment purchases. But what else should you be working on? For starters, as major roadway maintenance projects wind down, you should be fixing the items that caused grief last winter. Minimal efforts now can eliminate many headaches this winter. Hopefully your winter plan contains a wrap up meeting from the spring. Dust off the notes and review the areas that presented problems last winter. Schedule drainage repairs that caused ice problems. Trim or remove trees that damaged equipment. Review the concerns that were expressed by residents. Do any driveways need attention to keep from icing roadways? What about mail boxes? Can they be set back or altered in any way to avoid damage? A little community work now will make your job easier once the action starts.

Take a few minutes to check on supplies in your garage. Do your spreaders or plows need to be sandblasted or repaired? Early fall is the time to thoroughly inspect all equipment and order parts. Start making the repairs and plan to calibrate the spreaders. Check out your building and grounds facilities. Are the material storage buildings in need of repair? Do mixing and loading areas need to be paved? These areas must be addressed now before the material starts...
Another summer has ended and it’s time to consider winter operations. This article provides tips for tiginting winter weather.

**Prepare Equipment**

Keep trucks and equipment in good condition. Perform a pre-trip inspection and routine maintenance. Report needed repairs immediately.

Calibrate spreaders for the specific material. Spreader models vary. Refer to manufacturers’ recommendations. The Massachusetts LTAP Center produced a DVD demonstrating calibration. The UNH T2 Center sent one to each municipality this past summer (with special FHWA funding) and has copies for loan.

**Snow and Ice Control Strategies**

There are three strategies for snow and ice control: anti-icing, plowing, and, deicing. Municipalities may not use all. Many use a combination. Records from past storms and weather predictions, enable supervisors to make informed decisions when planning for a winter storm. Accurate forecasts are critical to know when a storm will arrive, how air and pavement temperatures will change, and wind direction and velocity. Managers may use records and predictions to determine which strategies and materials to use, along with, application rates, and frequency of treatment. Use current and predicted pavement temperature to select the appropriate snow and ice control strategy. Chemical effectiveness is directly related to pavement, not air, temperature. Salt, for example, becomes less effective as the pavement temperature approaches 18°F.

**Anti-Icing**

Anti-icing is a proactive approach to snow and ice control. Treatments consist of...
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applying liquid chemicals or pre-wetted salt to pavement before, or at the beginning of, a storm. Treatments create a barrier to prevent snow and ice from bonding to pavement. This allows accumulated snow to be pushed off the road, leaving the pavement relatively dry.

**Anti-icing has several benefits:**

1. it reduces the total chemical use,

2. it reduces materials and equipment costs and time,

3. pavement conditions are better when ice formation is prevented, and

4. it makes post-storm cleanup easier and faster. Reapply chemicals after plowing and before pavement temperature drops. Reapply before the snow and ice bond to the pavement. Anti-icing may be less effective during heavy, freezing rain, in blowing snow conditions, or in intense snowfall when the storm gets ahead of antiicing

**Anti-Icing Tips**

- Apply using stream nozzles so materials are distributed directly on the wheel paths.

- Anti-icing is often effective for heavy frosts. Apply chemicals early in frost conditions or light freezing drizzle.

- When conditions could produce frost or black ice, apply on selected sections of the roadway (e.g., bridge decks). Consider spot applications on hills, curves, and intersections.

- When possible, apply material during low-traffic periods.

- Do not apply chemicals under excessively windy situations.

- Reapplication may not be necessary. Residual chemicals may remain for several days.

**Plowing**

Remove snow as quickly as possible, to reduce compaction. Use underbody blades to remove compacted snow or slush. Adjust the blade angle to maximize cutting efficiency or snow-throwing capabilities. Do not push or blow snow off a bridge into the water or onto traffic below.

**Deicing**

In deicing, chemicals are applied to snow and ice. Normally this occurs at the end of a storm, after the snow/ice has bonded to the pavement. Deicing chemicals lower the freezing point of water (causing melting). Reapply when the chemicals become diluted.
Commonly used chemicals are sodium chloride (NaCl), calcium chloride (CaCl2), magnesium chloride (MgCl2), and calcium magnesium acetate (CMA). Salt and calcium chloride are most widely used. Salt brine freezes at 18°F and a calcium chloride solution (29.8 percent concentration) freezes at -20°F.

Salt provides immediate skid protection. To work effectively as a deicer, salt must be a brine state. If salt is applied dry, the moisture to create a brine, must come from pavement surface or from the air. When the pavement temperature is below freezing, salt loses its effectiveness because pavement moisture is frozen.

When deicing on two-lane roads with low to medium traffic volumes, apply a windrow of salt along the center line. Traffic will move salt off the center line. The resulting salt brine will melt across the pavement cross slope and across the width of the road. This method provides vehicles with clear pavement under at least two wheels. On curves, spread salt on the high side of the curve.

Solid calcium chloride is more effective at lower temperatures and works quicker than salt. Store calcium chloride in moisture-proof bags. Otherwise, it may lose its ability to draw moisture and may form large chunks.

Pre-wetting
Pre-wetting salt is common. Pre-wetted salt melts faster. Wet salt is less apt to bounce or be blown off, the road by traffic. This saves 20 to 30% material costs.

Some agencies pre-wet salt by spraying it as it is loaded into the truck. For more uniform application, use a truck-mounted equipment to spray salt as it leaves the spreader.

Salt brine is gaining popularity. Some agencies produce their own brine. Brines with concentration rate greater than 23% risk failure.

Liquid calcium chloride draws moisture from the air and releases heat as it dissolves. Calcium chloride melts snow/ice at lower temperatures (than salt). Apply at six to ten gallons per cubic yard of salt. Liquid calcium magnesium acetate and magne-

After the storm
Maintain accurate records to track and manage current operations, as well as, provide information for future operations.

Snow Storage
After removing snow and completely clearing traffic lanes and parking spaces, load the snow into trucks and haul it to remote storage areas. Locate storage where it can handle the snow-melt runoff without overburdening existing drainage features and without violating Environmental Protection Agency requirements.

Source: Smith, Duane, Local Roads Maintenance Worker’s Manual, Center for Transportation Research and Education, CTRE Project-5-173 p. 111-139

Winter Driving Tips
The Arizona Department of Transportation (ADOT) is committed to making travel safer in Arizona. Winter can be a dangerous time with ice, snow and freezing weather causing unsafe conditions. Enjoy the diverse weather that Arizona has to offer and drive safely.

To make your winter driving safe and enjoyable, ADOT offers these driving tips:

1. **Check the weather and road conditions.**
Before starting on your trip, check weather and road conditions with the local radio or TV stations. Of course you can always get up-to-date weather and road conditions by calling 511 or 1–888–411–ROAD for current information.

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WINTER MAINTENANCE PREPARATION (CONTINUED FROM COVER)

rolling in.

Schedule a fall meeting for the entire team. The meeting can serve as a refresher for experienced employees and an introduction to winter maintenance for new hires. Set an atmosphere that allows for an open exchange of information. Discuss what worked last season and what needs to be changed to improve services for your customers.

Review routing of equipment. Can any deadheading be avoided by changing routes? With the cost of fuel escalating, be as efficient as possible with equipment and manpower. Set up routes that bring the equipment back to the storage areas as they empty out. Pick a date to schedule dry runs to familiarize operators with routes.

Meet with representatives of other agencies to discuss winter maintenance plans and ways to work together. Include members of the local police and fire departments, emergency management officials, and school transportation personnel. Encourage feedback and consider developing an advisory committee to meet periodically. Publicize the meeting with your local media to ensure positive coverage up front.

This a good time to request training videos from AZ LTAP such as:

**WM11 Anatomy of a Winter Storm**
*Minnesota DOT 11 Minutes*
A depiction of the dangers and hardships that snow plow drivers and motorists encounter during a snow storm

**WM04 Plow Power**
*American Public Works Association 15 Minutes*
This video illustrates safety and snow plowing techniques on city streets, at intersections, and in subdivision cul de sacs.

**WM05 Response to Winter**
*Pennsylvania Department of Transportation 21 Minutes*
This video explains the policies and procedures of the Pennsylvania Department of Transportation winter operations to give the public a better understanding of how they prepare for and delivers winter services. Winter driving safety tips are also discussed

**WM08 Using Snow Plows on Motor graders**
*Federal Highway Administration 16 Minutes*
The video instructs how to attach snow plows to the various brands of motor graders and gives basic information on how to use plows to remove snow from roads.

**WM09 White Gold**
*American Public Works Association 20 Minutes*
Presentation of aspects of snow fighting. Discussion includes training, public relations, planning, salt/abrasive application. Illustrates a variety of equipment and plowing methods.

**WM10 Snow Fighting from A-Z**
*Salt Institute 73 Minutes*

To request a video visit our website at www.azltap.org or contact our office at (602)712-4939.

During the fall, this checklist will aid in preparation for safe and successful winter operations:

- Place first order for material;
- Finalize rental agreements;

As the weather changes and route maintenance cannot be performed, start marking structures. Use the time to mark inlets, catch basins, ends of curbing and guide rails, and fire hydrants. Once covered with snow they can make snow removal a nightmare for your operators.

Last, but certainly not least is training. Working safely is a priority for every operation performed by maintenance personnel. Properly training your personnel can go a long way to ensuring a safe and efficient workforce. Be sure to include training in your winter maintenance preparation planning.
WINTER DRIVING TIPS (CONTINUED FROM PG. 4)

- Finalize snow agreements with neighboring agencies;
- Obtain weather service;
- Meet with local advisory committee;
- Finalize snow map and make revisions;
- Inspect and calibrate winter equipment;
- Meet with crew to schedule and conduct training;
- Mark all obstacles;
- Trim trees;
- Install snow fences;
- Prepare news releases;
- Meet with the media;
- Meet with the police, fire, and emergency management personnel;
- Conduct dry runs.

Adapted with permission from “Moving Forward” quarterly newsletter of the Pennsylvania LTAP, Fall 2006. By Sam Gregory, Technology Transfer specialist, PennDOT

Winter Driving Tips (continued from pg. 4)

2. Keep the fuel tank topped off.
Plenty of fuel means being able to keep warm in your vehicle longer if you become stuck in snow. It is recommended that you run your engine for a few minutes at a time and only with a window slightly opened to ensure adequate ventilation. Remember that 4-wheel drive does not mean 4-wheel stop. A 4-wheel drive vehicle will not stop any better in icy conditions. DO NOT DRIVE CLOSE TO THE CAR IN FRONT OF YOU—maintain a safe distance. If the car in front of you abruptly stops, you won’t be able to stop in time. This is especially true on icy roads.

3. Slow down, be patient, and drive safely.
Allow extra time for your trip if road conditions are icy or snow covered. Remember, if you start late, expect to arrive late and do not try to make up time by driving faster. You have better control over your vehicle on slick roads at slower speeds. Allow yourself more braking distance when approaching intersections. Anticipate that other drivers may not be able to stop in time and may slide through the intersection. Slow starts improve traction. Drive defensively!

4. Inform someone of your destination.
Tell relatives or friends of your itinerary. Alert them if there are any changes in plans and inform them of your safe arrival.

5. Carry extra food and water with you.
We recommend dried fruit, nutrition bars, and nuts.

6. Carry snow chains.
Even with 4-wheel drive, icy or snow-packed highways can be impossible to negotiate without chains. Even when the roads look clear, be careful of “black ice” which can form on roadways after dark or when temperatures drop. If you didn’t bring your emergency supplies and you become stuck, you can use your car upholstery and carpeting to keep warm.

7. Dress warmly.
Make certain that you have extra dry clothing in your vehicle. Blankets and sleeping bags should also be readily accessible.

8. Stay in your vehicle.
If you become stranded or broken down, remain inside the vehicle. It is safer there, sheltered from the cold weather and easier for the Department of Public Safety or ADOT crews to find you.

9. Leave room for emergency vehicles to pass.
If you need to stop for any reason, pull well off the roadway and turn off your vehicle lights. Where possible, find a well-lit parking lot or rest area to pull off.

10. Don’t follow snow plows too closely.
Stay back at least 50 feet. Remember, snow plows and other snow removal equipment travel slowly and make frequent stops. Plows are much wider than most vehicles; so do not pass snow plows while they are operating.
UNDERSTANDING WEATHER TERMS

11. BE SURE OF YOUR ROUTE BEFORE YOU LEAVE FOR YOUR TRIP.
Do not go exploring in the backcountry without some local knowledge, especially during a storm or an impending storm. The weather can change quickly in mountainous regions.

12. In poor visibility or even whiteout conditions, don’t drive faster than you can see ahead.
High speeds in poor or no visibility can lead to large chain reaction accidents. Remember you can’t see around mountain curves and corners either.

In addition to these winter driving tips, ADOT reminds all motorists to respect winter weather, conduct a pre-trip inspection of your vehicle, leave extra space between your automobile and others on the road, NEVER drink and drive, AND ALWAYS BUCKLE UP!

Understanding Weather Terms

**Advisory:** A weather event that may threaten life or property if caution is not exercised.

**Blowing Snow:** Wind-driven snow that significantly reduces surface visibility to less than seven miles

**Breezy:** Sustained wind speeds of 15-25 mph

**Chance:** A 25-55 percent probability that one point in a forecast area will have precipitation

**Flurries:** Light snowfall that generally does not produce measurable accumulation

**Freezing Drizzle or Rain:** The freezing of drizzle or rain when it hits objects that have a temperature of 32 degrees or below

**Frost:** A covering of small ice crystals that forms on or near the ground when temperatures approach or drop below 32 degree

**Hail:** Precipitation in the form of balls or lumps, usually consisting of concentric layers of ice. A thunderstorm is classified as severe when it produces hail 3/4 inch in diameter

**Ice Storm:** A freezing rain event that produces damaging ice accumulations of 1/4 inch or greater

**Likely:** A 55–75 percent probability that one point in a forecast area will have precipitation

**Numerous:** Showers or thunderstorms with 55-75 percent area coverage

**Rain:** A nearly steady and uniform fall of liquid precipitation over an area of several hours

**Scattered:** Showers or thunderstorms with 25-55 percent area coverage

**Severe Thunderstorm:** produces or exceeds either of the following: tornado, damaging winds of 58 mph or hail 3/4–inch diameter

**Shower:** Intermittent rain or snow

**Sleet:** solid grains of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes **Slight Chance:** 1–25 percent probability that one point in a forecast area will have precipitation

**Snow:** Steady fall of snowflakes for several hours over the same area

**Snowpack:** Combined layers of snow and ice on the ground at any one time

**Snow Showers:** Snow that stops and starts suddenly, and is characterized by rapid changes in both intensity and visibility

**Sustained wind:** Wind speed determined by averaging observed values in a one-minute period

**Warning:** Indicates a hazard weather element is imminent or has a very high probability of occurrence

**Watch:** Alerts the public to the possibility of severe weather or some other hazardous weather element

**Wind Chill:** Apparent temperature that describes the combined effect of wind and low air temperatures on exposed skin

This information is made available by ADOT in the interest of public safety
LTAP’s Ten Commandments for Snow Fighters

1. Thou shalt present thyself to thy job physically and mentally fit and properly clothed for any emergency in order to withstand the rigors of thy task.

2. Thou shalt never enter thy cab without inspecting thy lights, windshield wipers, defrosters, flares and other safety equipment.

3. Thou shalt know thy spreading and plowing routes, as well as the performance of thy spinner and the life of thy plow blade.

4. Thou shalt faithfully remain alert in order to avoid guardrails, headers, stalled cars, manhole covers, railroad tracks and mailboxes. Otherwise thee may smite thy windshield with thy head.

5. Thou shalt contain thy temper even though cars and trucks pass thee on both sides and tailgate thee too close for comfort. Anger only multiplies thy prospects of coming to grief by accident.

6. Thou shalt use thy radio as briefly as possible, if thee is fortunate enough to have one. Remember thy fellow workers may need to communicate in an emergency.

7. Thou shalt interrupt the flow of power to thy spreader before attempting to free any foreign objects or blockages if thee treasure thy fingers.

8. Thou shalt render thy truck and spreader out of gear and stoutly set thy brakes before dismounting from thy cab.

9. Thou shalt govern thy speed according to conditions, else thee may wind up with thy truck upside down.

10. Thou shalt mind thy manners on the roadway, clearly signal thy intentions, and remember that it is more blessed to give than to receive.

Arizona Local Technical Assistance Program
602-712-8461
Workshop/ Training
Newsletter
Heavy Equipment
Video Library
Road Scholar Program
www.azltap.org