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# Southeast Regional Winter Maintenance Synthesis 2019



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## SICOP National Strategic Winter Maintenance Plan

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# Challenges of Winter Maintenance in a Moderate Weather Zones

As an initiative of the National Strategic Winter Maintenance Plan published by the Snow and Ice Pooled Fund Cooperative Program (SICOP), evaluating winter maintenance operations techniques for use in moderate weather zones to improve resiliency. Planning for and conducting operations in moderate weather zones is a difficult proposition. Balancing the need for specific equipment and materials against the probability of events and the range of events from snow/ice to flooding can be a difficult juggling act, especially in increasing improbability of weather severity and frequency due to climate change. Evaluating the applicability of various winter maintenance techniques and technologies can help in decision making. This synthesis juxtaposes the resources and techniques of participating states throughout the SASHTO Region. As a tool in and of itself, this synthesis will provide state DOT's within an ancillary outlook of the recourse allocation and selection of neighboring states and an overall view of the region.

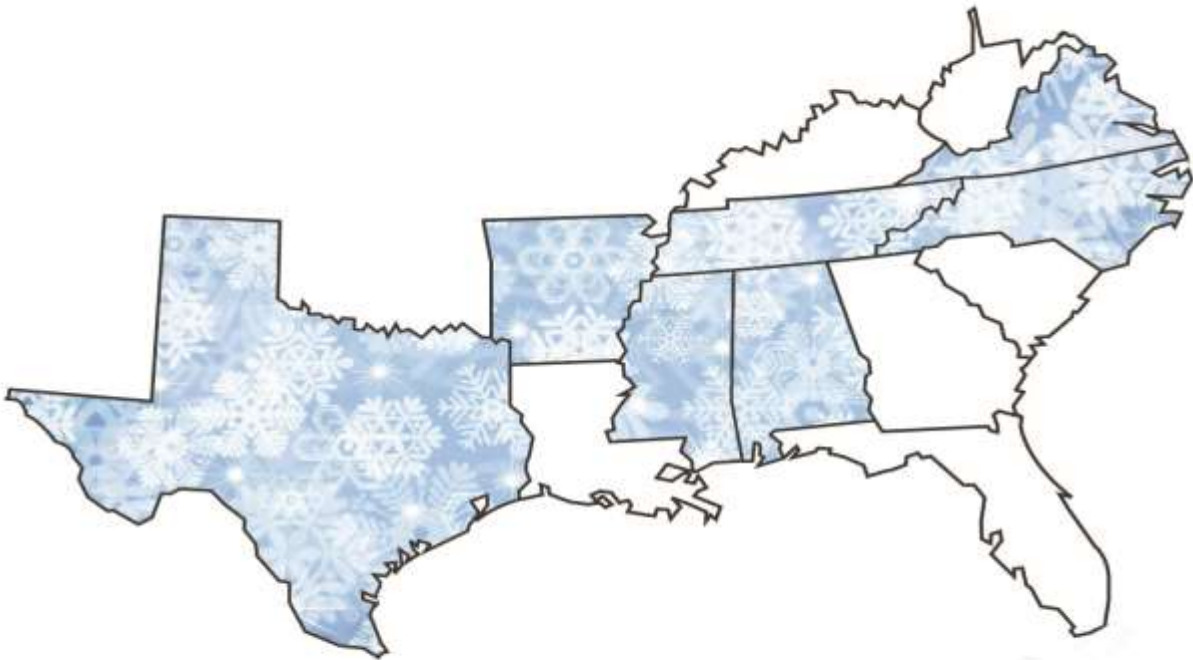
Winter Maintenance is often treated as an emergency event in moderate climate zones in states that also deal with regular Hurricane and Tropical Storm Emergency Response. All participating states have a Winter Storm Emergency Response Plan in place. As a follow-up to this synthesis, a common location to share these documents will be obtained.

***“Expect the best, plan for the worst, and expect to be surprised” –Denis Whatley***

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## Participating States:

The following map represents those states that participated in the synthesis. Roughly 60% of the states are included (Florida is not considered as they have relatively negligible assets for winter maintenance). In future iterations of this synthesis reports we hope to have 100% participation across the region so that it can aid in both decision making on resources allocation as well as be a means to exchange.



It should be noted that this region has states with widely varying sizes of road networks, vastly wavering topography across some states as well as sub-climate zones that differ that can drive the resource allocation to vary greatly which is something to be considered when review the synthesis. Roughly 60% of the states Florida is not considered as they do not have many

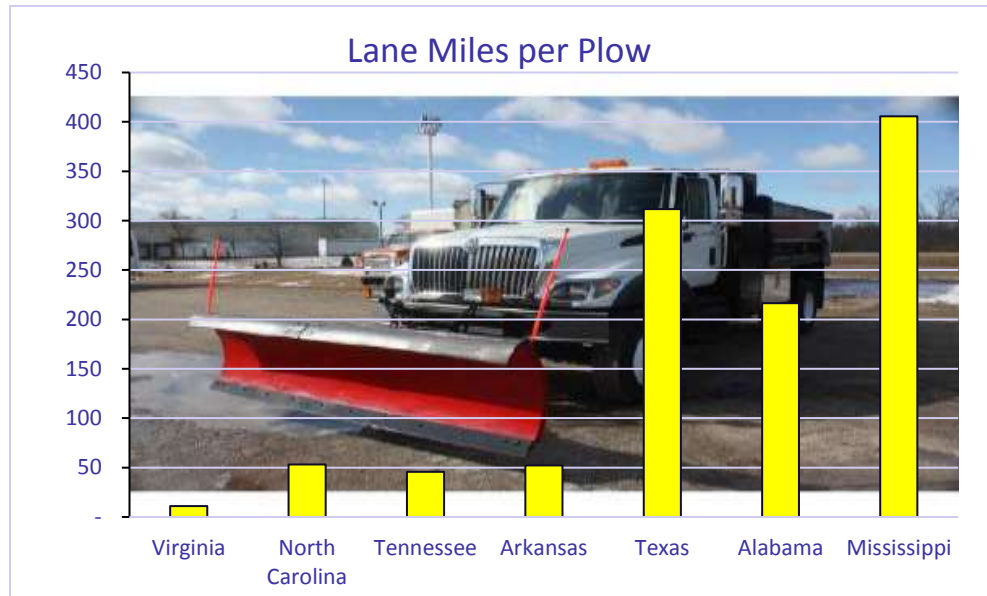
For enhanced comparative precision, most assets are evaluated as a function of the associated lanes miles of maintained highway network. Even with a relatively level approach in term of comparison, previously mentioned variations across the region should still be considered.

## Equipment Assets:

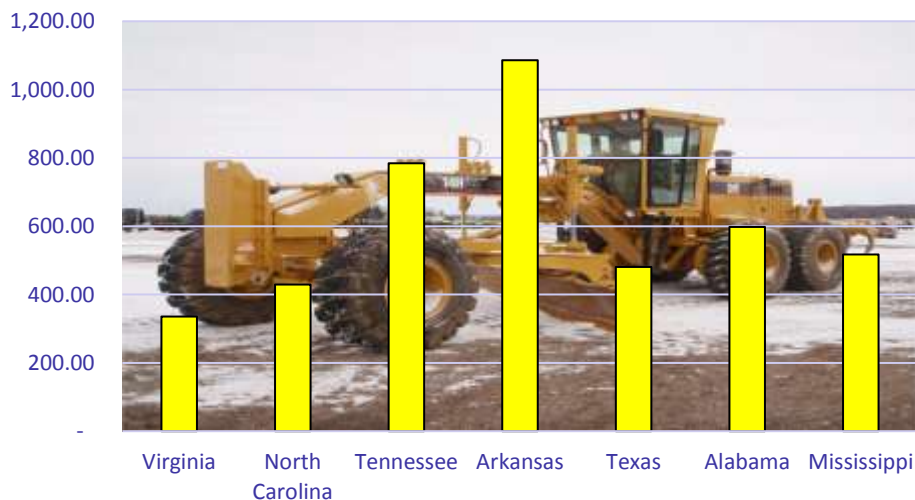
Most states across the region use the typical snow fighting equipment assets such as snow plows. The following shows comparatively how the lane miles per snow plow compare across the region. Northern state with mountainous regions understandably have more assets to cover their network than other states.

Some states such as North Carolina are utilizing wing plows at (47 statewide) to help extend snow removal coverage onto shoulders or adjacent lanes and/or to allow for added clearance of

snow debris from the travel lanes. They also utilize tow plows for that provide similar functional advantages like a wing plow in cover multiple lanes in a single pass while also adding additional treatment material for the additional lane.



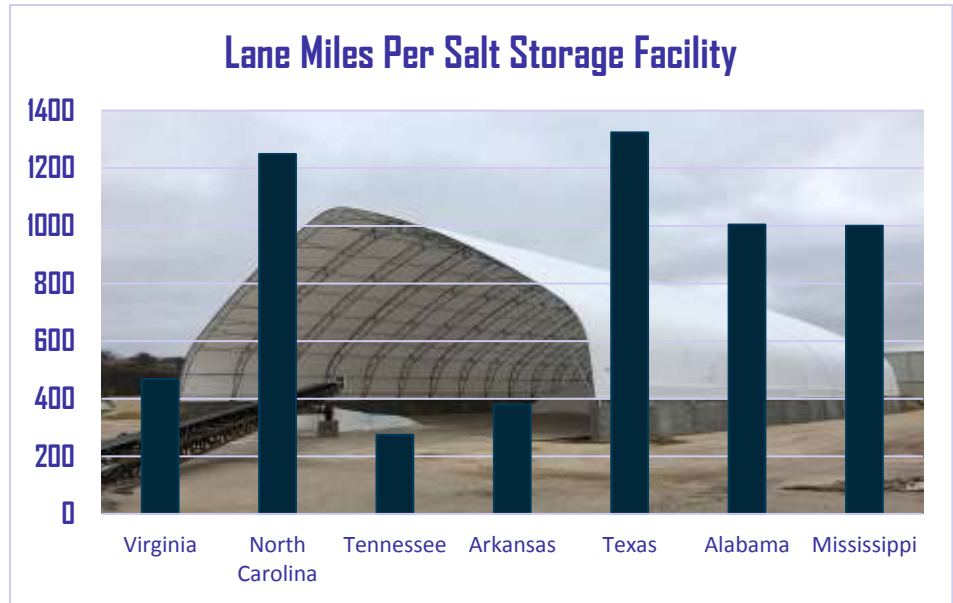
**Lane Miles per Motor Grader**



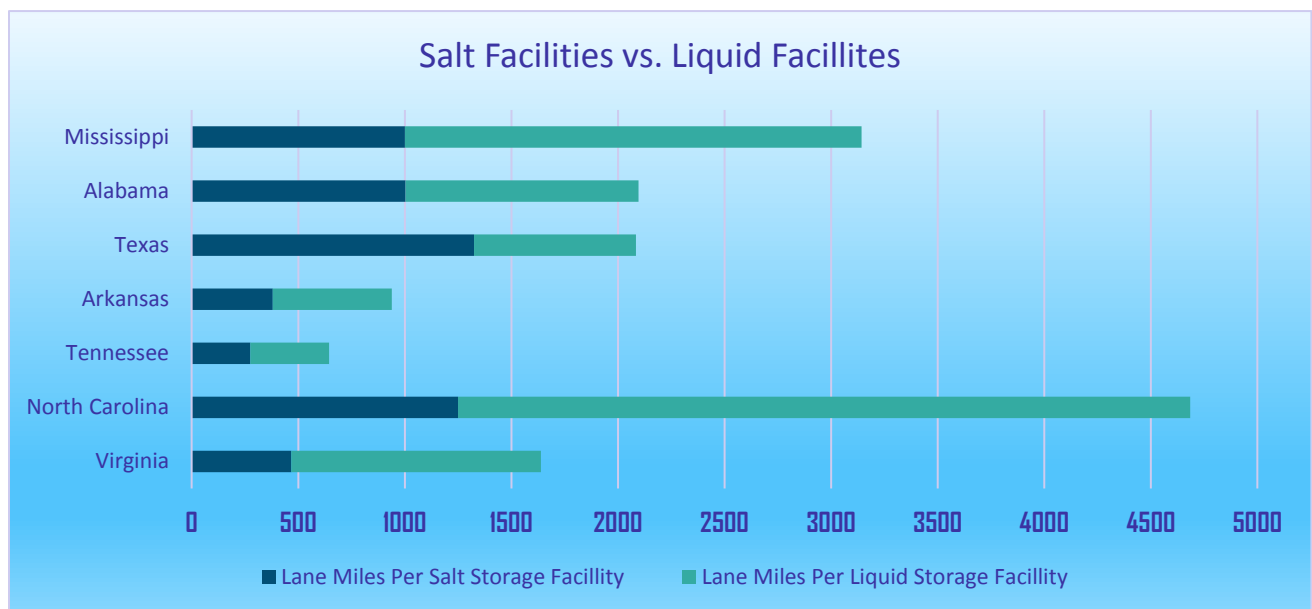
Most states utilize equipment typically used for other maintenance activities such as Motor Graders to supplement snow removal operations. Only North Carolina (8) and Texas (4) use Blower Equipment.

## Road Treatment Materials:

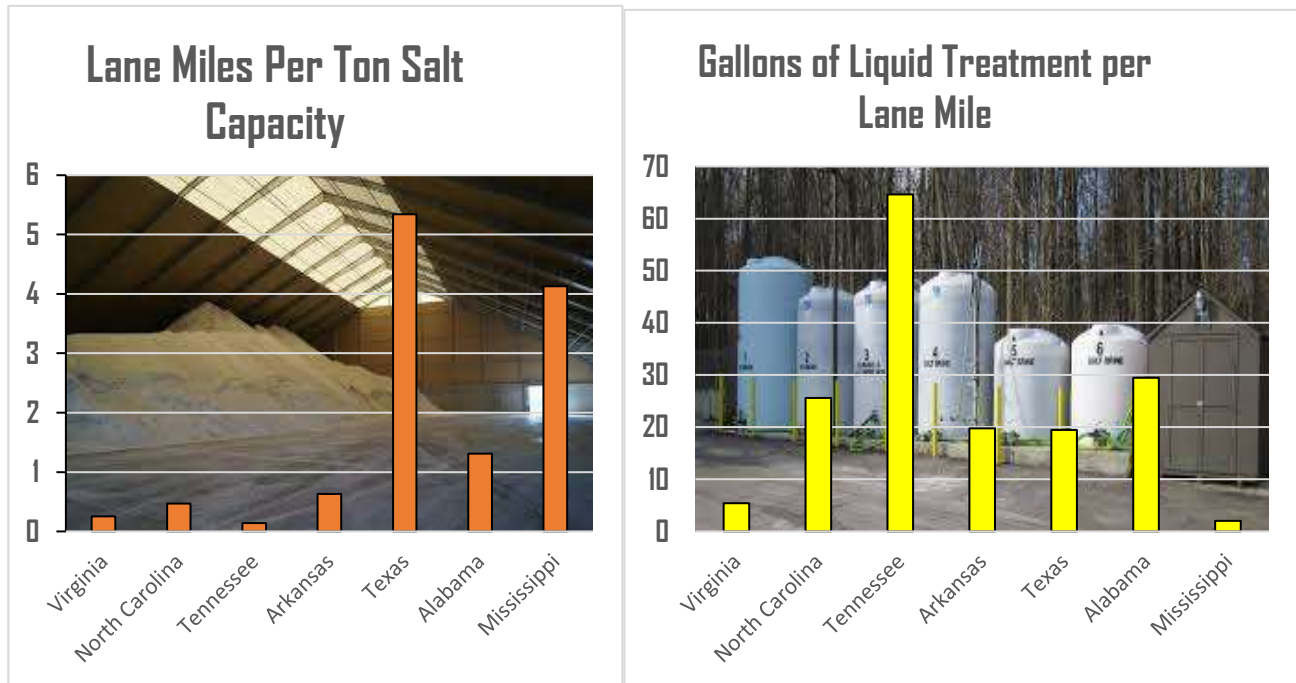
All states assessed across the region utilize both solid roadway treatment in the form of rock salt (either bulk purchased or bag) as well as liquid application treatments. This graph shows the lane miles of maintained highway network covered by each rock salt storage facility.



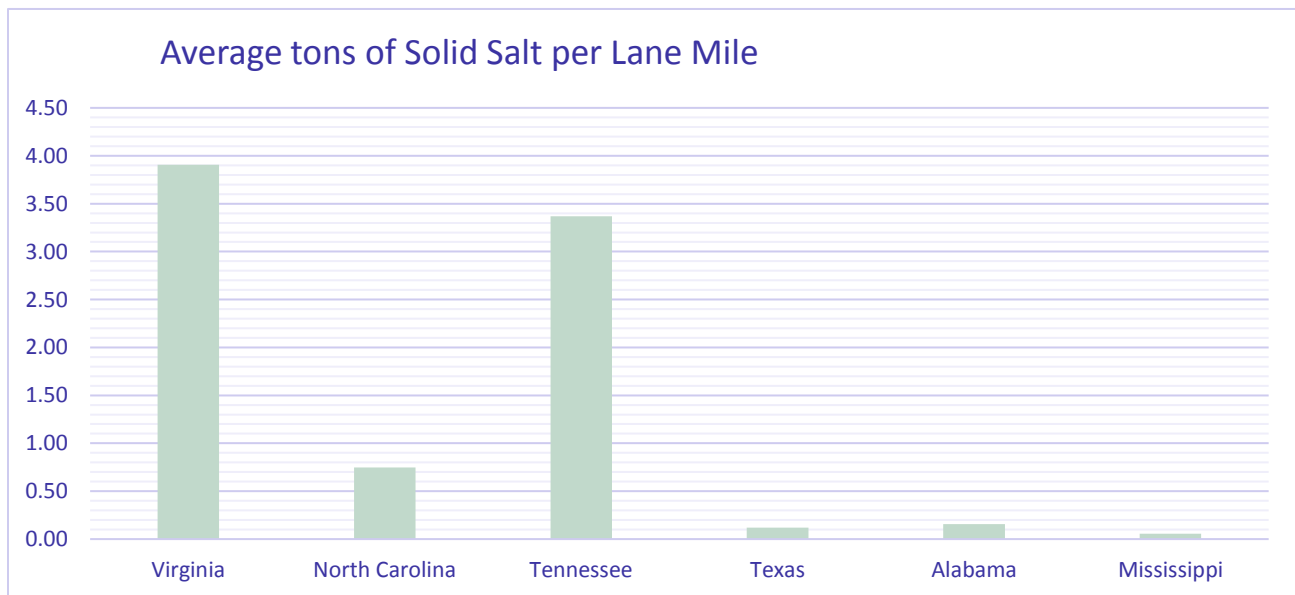
Liquid Systems across the region are predominantly used for pre-treatment, however some states use this type of treatment as an active treatment. That can be compared to the lane miles covered under by salt facilities throughout the maintained network, most dedicate more resources to solid treatment facilities, however it can be said that liquid facilities more effectively cover more territorial area.



The salt capacity that can be stored throughout the network can be compared to the lane miles that each ton is dedicated to cover. Also if this is comparatively juxtaposed to the amount of gallons dedicated to each lane mile of network lends to indicate how dedicated the agency is to this type of treatment resource.

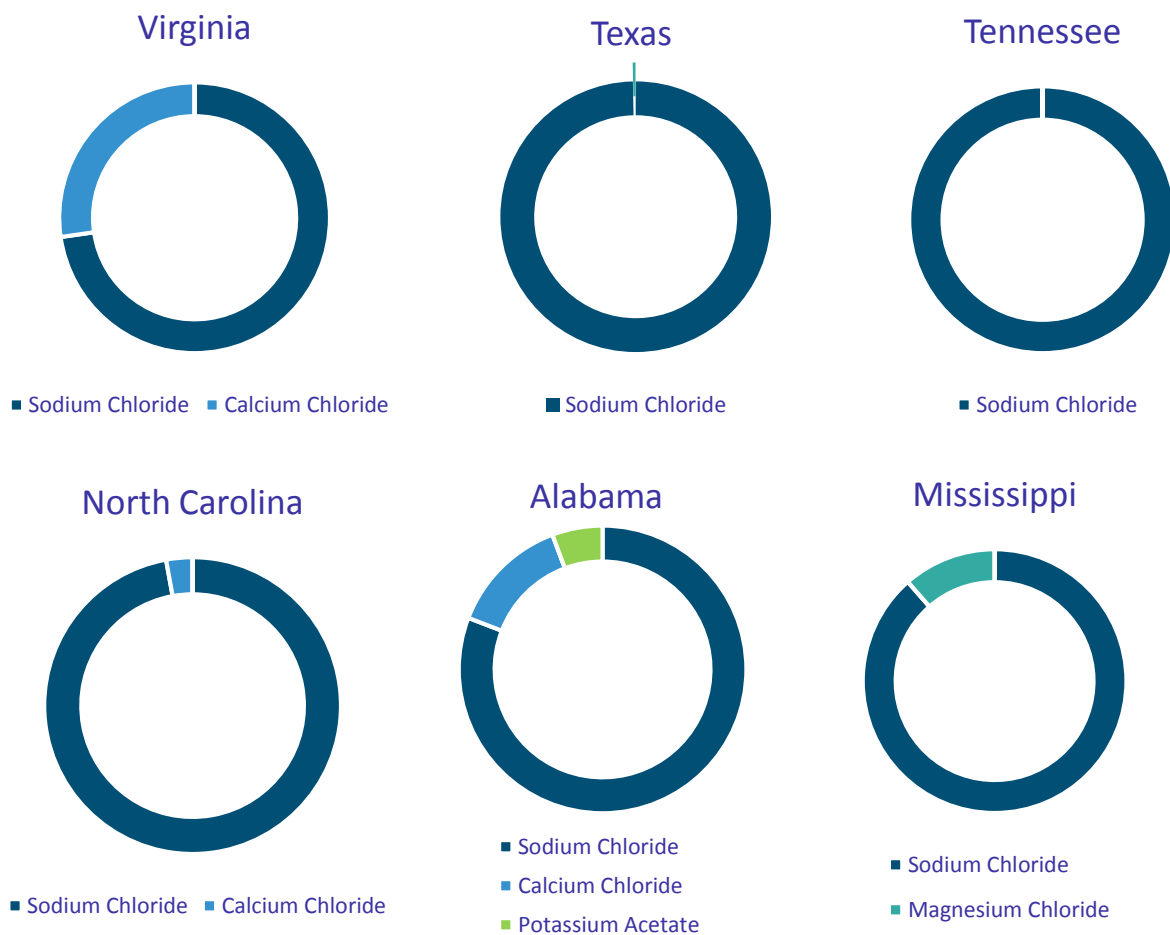


The following depicts the Average tons of solid Sodium Chloride depressed annually as an indication of overall prevalence of winter maintenance needs which is an expected summary based on sheer latitude and climate zones of the various states



## Liquid Treatment Types:

Each participating state predominately uses a mixture of liquid treatments in their respective arsenal of winter maintenance resources. In some cases that is due to lack of justifiable investment in salt brine mixing and storage locations and availability of pre-packaged alternating treatments are available for stockpile in totes. The following diagrams show the diversity breakdown of these types of treatments.



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## **Road Condition Forecasting and Staff Training:**

Most states rely on the National Weather Service forecast or free weather radar tools to make operational decisions. Future iterations of this synthesis will evaluate the amount and usage of RWIS stations as well as vehicle mounted weather sensors to for decision making. Only Arkansas (Iteris) and Alabama (Baron) use contracted road condition forecasting services at this time.

Annual training is conducted by most states including Operator Training for plow and anti-icing/de-icing equipment training which usually includes a “dry run” table top exercise featuring procedure reviews of safety protocol, response plan reviews, and equipment walk-throughs. Some more robust programs like VDOT and Tennessee provide simulator training for all operators as well as AVL Tracking training for administrative staff annually. In addition, VDOT offers Snow Road Monitoring Training to staff that support Winter Maintenance Emergency Response from other parts of the agency other than maintenance. Texas stresses NIMS training for response personnel as well as weather management training and blowing snow mitigation. All states strive to provide some sort of policy training and orientation for new hires that will have a role in pending events.

## **Annual Costs:**

Based on the consistent nature of winter weather events in northern most states of the region as opposed to the sporadic, yet recently more prevalent, events that sweep into the “deep south” below the 35<sup>th</sup> parallel, average budgeting for winter maintenance varies widely with VDOT a roughly \$200 million set aside to Mississippi that virtually has no winter maintenance budget save some minor equipment and material replenishment cost depending on previous season’s usage. For this reason, it is predominately difficult for these “deep south” states to make justifiable investments into resources that may be intermittently used and tend to focus on tempering public expectation of performance through messaging. Large scale events can be a “budget buster”. Additional probing into average expenditures vs. average budgets will be conduct in the next iteration of this synthesis.



## Appendix A: Winter Maintenance Synthesis Questionnaire

### SASHTO WINTER MAINTENANCE RESOURCES

State DOT: \_\_\_\_\_

#### Number of Equipment Assets

Vehicles: Plow Trucks

Vehicles: Road Graders

Vehicles: Blowers

Add-ons: Tow Plows

Add-ons: Wing Plows

Add-ons: Belly Plows

Add-ons: Prewetting Systems

Add-ons: Slurry Generators

#### Winter maintenance workers

Number of state winter maintenance full-time employees.

*(Authorized FTEs. Include the following positions receiving state benefits: all drivers, backup drivers, crew supervisors, assistants, and any applicable area managers who may oversee multiple crews. Do not include management above this level, mechanics/fleet personnel, or call center/EOC personnel.)*

Number of seasonal, temporary or part-time winter maintenance workers.

*(Include workers who typically do not receive state benefits.)*

#### Salt storage

Number of salt storage facilities owned or used by your State.

*(Please provide a count of different locations, not a total of individual sheds.)*

Total capacity (in tons) of salt storage facilities

#### Liquid storage

Number of liquid storage facilities owned or used by your State

*(Please provide a count of different locations, not a count of individual tanks.)*

Total capacity (in gallons) of liquid storage facilities

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**SASHTO MAINTENANCE MATERIALS USED LAST WINTER**

*(If unknown, please estimate based on purchase amounts or contract costs if possible.)*

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**Average dry material used per year (tons)**

Sodium chloride *(1 cubic yard ≈ 1.1 tons)*

Calcium chloride *(1 cubic yard ≈ 0.92 tons)*

Magnesium chloride *(1 cubic yard ≈ 0.78 tons)*

Abrasives *(1 cubic yard ≈ 1.4 tons)*

Other

**If you selected "Other," please list all other dry materials applied**

**Average liquid material applied (gallons; classify any blend by its primary component)**

Sodium chloride brine or blend

Calcium chloride brine or blend

Magnesium chloride brine or blend

Potassium acetate brine or blend

Enhanced brines

Agricultural byproduct

Other

**If you selected "Other," please list all other liquid materials applied**

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**Corrosion inhibitor**

	Always	Sometimes	Never
Does your agency use a corrosion inhibitor with solid deicing materials?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does your agency use a corrosion inhibitor with liquid deicing materials?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**(Optional) Clarifications or comments about your Maintenance Materials responses above, if needed.**

**SASHTO AVERAGE MAINTENANCE COSTS**

*(Direct or contracted)*

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Average statewide material cost	<input type="text"/>
Amount budgeted for statewide winter maintenance (avg per year)	<input type="text"/>

**SASHTO WINTER RESPONSE PLAN**

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Does your State have a Winter Emergency Response Plan/Policy?	<input type="text"/>
Would you be willing to share it?	<input type="text"/>
Does your State use a road condition forecasting program? If so which.	<input type="text"/>
Does your State conduct regular training on Winter Maintenance?	<input type="text"/>

**Brief description of your Winter Maintenance Training if answered Yes above.**