



Written Snow and Ice Control Plan and Policy Documents are Essential for Winter Maintenance Agencies

BY

Duane E. "Dewey" Amsler Sr. PE.
AFM Engineering Services

CREATING AND MAINTAINING AN APPROVED WRITTEN SNOW AND ICE CONTROL PLAN IS ONE OF THE MOST IMPORTANT THINGS A HIGHWAY MAINTENANCE AGENCY CAN DO FOR ITSELF, ITS GOVERNMENTAL ENTITY, ITS COMMUNITY AND ITS CUSTOMERS.

BENEFITS OF A WRITTEN SNOWFIGHTING PLAN AND POLICY

The primary benefits of creating a plan include:

- Agency managers and supervisors are forced to plan ahead. This avoids chaos when difficult situations arise and provides a framework for efficient and effective routine operations.
- As a result of a good planning process, there will be a higher and more consistent level of service that results in increased safety, higher mobility (in general and for emergency services) and fewer "lost" days for the business, education, transportation and manufacturing sectors.
- Managers, supervisors, maintenance workers and the governmental community at large, will all be on the same page in terms of policy, operational procedures and operational issues.
- Exposure to tort liability will be limited if the plan is reasonable, has realistic goals, is resource driven and is followed to the extent possible.

- The public will have a clearer understanding of agency operations. This will generally result in reduced complaints and request for service.



- The agency will have a forum for continuous improvement and a basis for comprehensive training.

The benefits of governmental agencies, educational facilities and major employers having a comprehensive written snow and ice control plans have long been recognized. Al Gesford, a Technology Transfer Specialist with the Institute of State and Regional Affairs at Penn State University, is a long time advocate of carefully crafted written plans and policies. He helped create the "Winter Planning and Organization" section of the Salt Institute/LTAP

Winter Maintenance Training Program and prepared a training document entitled "10 Lessons For Winter Operations Survival". This document focuses primarily on plan and policy issues. He has presented the essence of that document at many training forums throughout the country, and has inspired many agencies to create written policy documents.

I was fortunate to be assigned the task of updating the written snow and ice control plan and policy for the New York State Department of Transportation in 1991. We employed a committee process to blend new technology and ideas with existing policy. The resulting document has stood the test of time well and is, only now, under revision. I have had scores of occasions to provide expert testimony on that document as it related to particular snow and ice claims against NYSDOT. As long as the guidelines in the policy have been followed to the extent possible, there has been very little successful litigation.



The experience of three agencies that have crafted comprehensive snow and ice control plan and policy documents is instructive:

Indiana Department of Transportation

Tom Konieczny, LaPorte District Highway Management Director for INDOT, offers the following about the creation and implementation of a comprehensive snow and ice control plan and policy:

“In 2000, after seeing many exciting innovations in snow fighting around the country, Indiana DOT made a commitment to modernize its winter maintenance efforts. We created a Winter Operations Team to review and disseminate information which leads to recommendations regarding snow and ice removal materials, equipment, and activities. One objective was to provide more consistent service on a state-wide basis. As part of this effort, the Team prepared a Total Storm Management Manual as a tool that provides guidelines and options in an effort to keep Indiana Highways open and safe during the winter season. The manual covers a wide range of topics: administrative and management issues, equipment, snow and ice control materials, weather information systems, storm operations, and miscellaneous issues such as training aids and reports. It is a resource that has everything needed in one location. It is both for the novice and the veteran. Although initially there was some reluctance to change, most of our employees have noticed a difference and have embraced our new direction. It has delivered us from a reactionary agency to one that is proactive and innovative and striving to enhance safety, mobility, and economic growth for our customers.”

Tom further indicates that most of the benefits listed above have, in fact, benefited INDOT. The INDOT manual is available at: <http://rebar.ecn.purdue.edu/JTRP/> under “Current Issues”

Rockland County, NY Highway Department

Charles H. “Skip” Vezzetti is the Superintendent of Highways for Rockland County. Skip’s first exposure to the benefits of a written plan and policy was at an APWA Snow Conference about 20 years ago while he was Highway Superintendent for the Town of Orangetown, Rockland County. He remembers the liability-limiting potential as being a good reason to start the process. With broad-based input, he crafted a written policy for Orangetown. The scope of the policy grew and eventually contained a comprehensive materials management plan that allowed the Town to win several “Excellence in Storage” awards from the Salt Institute. During his current tenure with Rockland County, He created a similar, but more comprehensive, written plan and policy. That policy is on the County web page at: <http://www.co.rockland.ny.us/Highway/construct.htm>. Skip feels that the policy is a great internal and external communications tool that helps maintain uniformity of service and keep his “customers” informed. The county receives very few complaints about its snow and ice control services. The commitment to excellence that drove the creation of plan and policy has had important spin offs in terms of keeping the highway forces up to date in terms of innovative equipment, ground speed controlled materials application and level of service appropriate strategies and tactics.

Township of Cranberry, PA Highway Department

Duane McKee is the Director of Public Works for the Township of Cranberry. In 2004 the Township decided create a snow and ice control plan and policy that would help them in materials management, public communication/acceptance and provide a tool for modernizing operations and equipment. The Township went about it in a little different manner. It hired a consultant with significant experience in creating snow and ice control plans to assist them through the process.

The Township created a diverse committee including: representatives from several stake holding departments, township managers, highway supervisors and equipment operators to provide input and review material provided by the consultant. As the Township had to provide little staff time, the process only took about 2 months from start to final draft.

A separate, but integral part of Cranberry’s snow and ice plan is a materials management plan. The plan uses situational analysis and identifies all of the business practices employed to minimize environmental pollution. These become the basis for its policy.

Since implementation, Cranberry has used the plan and policy as a primary training document. Duane feels that there has been significant improvement in providing a uniform level of service and a much better understanding of operational policies. This has resulted in fewer snow and ice service complaints. The plan is available on the Township web page (<http://www.twp.cranberry.pa.us/publicworks/SNOWICECONTROL04.pdf>)

Using the plan as a roadmap for continuous improvement, Cranberry is phasing-in ground speed controllers and truck mounted pavement temperature sensors through new equipment buys. They installed a “poor man’s RWIS” (a \$20 bulb thermometer cemented into an area of the parking lot) that provides surrogate pavement temperature information to assist in determining ice control treatments on the roads. Chemical application rates are now designed to reflect current pavement temperature, weather conditions and the presence or absence of ice/pavement bond.

CREATING A WRITTEN PLAN AND POLICY

The process for creating a written plan and policy is extremely important to the overall success of the effort.



One key element for success is to secure broad-based participation. Representation and input from the following may be helpful in crafting a widely accepted plan:

- Highway agency (probably should lead the process)
- Police agency
- Fire control agency
- EMS and major medical facilities
- School district
- Elected legislative body
- Local transit
- Major local employers
- Road/streetside business owners
- Local automobile clubs
- Local media
- Community groups (churches, PTAs, service groups)
- At large customers (road users and roadside property owners)

Form a smaller working committee. It is not practical to have a large working committee comprised of representatives from all of the above groups. Some may have to provide input by only reviewing and commenting on draft documents or attend a few meetings where they can comment on drafts.

The working committee should have top-to-bottom representation from the highway (lead) agency. Committee members should look for examples of plan and policy documents from neighbor agencies, LTAP Centers, the "Winter Planning and Organization" section of the Salt Institute/LTAP Winter Maintenance Training Program, the agencies cited in this article and internet resources. Much of that will be unnecessary, as most of the topics will be discussed in this document.

Once an agency has crafted a plan it feels will serve the agency and community at large, that plan must be approved by the municipality's legal staff and ultimately by the governing legislative body.

ELEMENTS OF A WRITTEN PLAN AND POLICY

Each plan should create a roadmap for readers. A general introductory section should contain information that will guide the reader in terms of: content, purpose, how the document was created, sources

of information that appears in the document, the general philosophy of agency snow and ice control operations and how the agency will use the document. It should also define many of the terms that appear in the document. As an example:

- Shall and Must = a required course of action
- Should and Recommended = a recommended course of action
- May = an optional course of action

Consider a statement that alerts the reader that the resources available are finite and during and immediately after intense and unexpected weather events, despite heroic efforts by crews, it may be impossible to restore bare/wet pavement conditions.

Section 1: Communication and cooperation

This section should contain how "customers" can contact the highway agency to request service or report bad road conditions. It might include telephone numbers, e-mail addresses and/or website URLs. Customers should be urged to use restraint in this area, particularly with telephone contacts, as there is likely to be a large volume of calls during winter weather events. If the agency is able to provide weather, road condition and treatment progress information, how the public can access that information should be detailed here as well as listing other locations and sources of information about winter maintenance activities.

A section on how customers can help facilitate winter maintenance operations should appear in this section. Items like parking regulations, snow emergency routes, snow removal operations, tire/chain requirements, abandoned vehicles and generally not driving during events should appear here.

Another section on how customers can help by keeping trash cans, basketball devices, large obstacles, snow forts, and fencing away from the road, and removing snow from around hydrants can be helpful.

A reminder that it is illegal to relocate snow into the road should also appear here (this applies to both residential and commercial snow plowing/blowing/showeling operations). A copy of the applicable section of State or Provincial law should be placed in the Appendix. This is a good location for safety tips about removing and storing snow from driveways and walk ways, and general winter safety driving and preparedness information. A section on how the agency will deal with plow damage to mailboxes, turf and other features should also appear here.

This section is a good location for a multi agency organizational and communications directory as it relates to snow and ice control and other emergency situations.

A listing of the roads within the political subdivision that are NOT maintained by the agency is always helpful. Here contact information for the responsible maintenance agency should also be provided.

Section 2: Level of Service

This is where the agency describes what customers can expect in terms of snow and ice service. In addition to providing customer expectations, it will be the standard of accountability in the event of slippery roads and related litigation. Common descriptors include:

- When treatments are supposed to begin after a storm starts
- Road conditions at various points in time, during and after a winter weather events
- The level of effort that will be provided for various storm conditions
- A priority classification of the entire road system (A, B, C; 1,2,3; Red, Yellow, Blue, etc.),
- Treatment timing and sequence (priorities) for various storm conditions by time of day and day of week
- The time(s) service will be diminished or not provided
- When "clean up" operations will begin



It is important for the agency and its customers to realize that available resources dictate the level of service that can be provided. Although there may be political pressure to put a happy face on the service capabilities, it is wise to state only what can actually be provided. Candid statements about not being able to provide the goal level of service during unusually severe and long duration events, and other circumstances that may diminish the capability of the work force are a good idea.

Define how level of service is determined. A good way to do this is to establish a "design storm" intensity and duration that may be exceeded about 10% of the time in any given year (the 90th percentile storm) for your area. This will vary considerably depending on location, but 1 inch of snow per hour for a period of 12 hours may be a good starting point. Once this is established, use treatment cycle time capability (based on the availability of people and equipment), and the type of treatment capability (solid chemicals, abrasives/chemical mixtures, liquid chemicals, plow only, etc.) to determine how you will describe level of service. Here you can cite the other factors that interact to impact cycle time and routing decisions. These include:

- Higher volume/slow traffic moving roads
- Critical locations
 - hills
 - curves
 - intersections
 - school bus routes
 - transit routes
 - emergency services considerations
 - high snow and ice accident locations and other problematic areas
 - business routes
 - snow emergency routes
- Other situations unique to the local community

Section 3: Planning

This section is primarily to provide a blueprint for the agency to conduct the year-around activities that relate

to snow and ice control. A good approach is to use the seasons of the calendar year to describe agency activities that should be accomplished in a timely manner, in those time frames.

Spring activities may include:

- Equipment breakdown and storage
- Materials inventory
- Review the effectiveness of operational procedures
- Highway inspection
- Analysis of winter data
- Review the effectiveness of personnel and staffing policies
- Review equipment performance and maintenance activities
- Review contract, interagency and inter municipality cooperative performance
- Clean-up of winter materials
- Damage repair
- Soliciting feedback from customers on the past winter service performance

Summer action items may include:

- Ordering/bidding materials and equipment
- Drainage improvements
- Obstacle remediation
- Drainage structure adjustments
- Practical improvements to high snow and ice accident areas
- Training for new operators and staff

Fall activity items may include:

- Finalize all cooperative and contract agreements for snow and ice equipment and services
- Make sure weather information and other information systems are fully functional
- Make sure weather information and other information systems are fully functional
- Start sequentially bringing snow and ice equipment on line
- Make necessary changes to plan and policy document (see Part I of this series)
- Commit necessary operational changes to writing
- Refresher training for seasoned operators and staff and continuing training for new operators and staff
- Snow and ice meetings with union(s)
- Calibrate materials spreaders

- Mark obstacles and do "dry runs"
- Trim overhanging trees
- Install snow fence
- Mark drainage structures
- Coordination meetings with all involved agencies
- Establish and reestablish contact with media and other information outlets

Ongoing winter activities may include:

- Getting psychologically, physically and operationally prepared for the first and succeeding storms (whenever they arrive),
- Review performance after each storm and make adjustments as necessary
- Maintain materials inventory control
- Timely performance of safety restoration and cleanup operations after each storm should include:

achieving and maintaining satisfactory pavement surface conditions
 clearing sight distance problems
 pushing back
 maintaining "problematic" areas
 drainage restoration
 clearing bridges safety appurtenances as necessary
 clearing drifted areas
 clearing sidewalks
 clearing hydrants
 clearing crosswalks
 clearing signs and signals

This section is a good location to include the "continuous improvement" activities that occur through out the year. These would include: post storm meetings, post season meetings, pre season meetings, various training forums, various committee activities, and "living document" provisions for the plan and policy document.

Section 4: Record-keeping

A basic record keeping system for snow and ice control operations is a very valuable asset. It has a number of benefits including being a powerful tool for use in:



- Defense against frivolous tort claims and other allegations
 - Development of budget request and defining impacts of budget reductions
 - Measurement of the efficiency and effectiveness of agency operations
 - Measurement of the success or failure of improvement efforts
- Here the agency should define the essential content, or provide appended examples of: operator reports or trip tickets, supervisor reports, equipment operation and maintenance reports and management reports.

Section 5: Risk Management

In this section the agency should describe activities and programs that relate to snow and ice risk management. These may include:

- Insurance or self-insurance status
- Safety training programs
- Programs to identify and remediate high accident locations
- Weather and road condition information systems (internal and for public distribution)
- Accident investigation/documentation procedures
- Training on agency policy and procedure
- Training on how to create and maintain records
- Environmental risk management (details are covered in the "MATERIALS MANAGEMENT PLAN", later in this document).

Section 6: Appended information

This section should contain a listing and location of the various appended information that appears at the end of the document. These may include:

- Beat or route maps
- Personnel policy documents
- Relevant portions of union agreements
- Personnel and equipment rosters
- A listing and locations/maps of parking sites for use during storms and clean up operations
- Snow storage/disposal locations
- Maps showing emergency snow routes and level of service classifications

- Locations of emergency shelters
- Copies of any applicable local laws or ordinances
- Copies of applicable portions of State or Provincial Highway Law, Insurance Law and Vehicle and traffic Law

These lists are necessarily incomplete, as there are other items to consider on a local basis, but it should give a general idea of the more important items that should be included in a well crafted written snow and ice control plan and policy.

OPERATIONS

Your snow and ice control plan and policy will only be so many words unless you include a section on the nuts and bolts of the plan in terms of operations and materials management. This will encompass several sections, beginning with:

Section 7: General approach to snow and ice control operations

This section should review the strategies and tactics employed by the agency, their background, rational and specific areas and times they will be utilized. This should be fairly specific and detailed, as it will be a basis for training agency personnel. Here, a clear definition of fundamental snow and ice control terms should be provided, or reference provided for items such as:

- Anti-icing
- Deicing
- Temporary friction improvement
- Prewetting
- Pre-treating
- Material spread pattern
- Material discharge rate
- Material application rate
- Ice control chemicals
- Chemical form
- Gradation or grain Size distribution
- Solution
- Chemical concentration
- Chemical dilution
- Eutectic temperature
- Eutectic concentration
- Endothermic
- Exothermic
- Hygroscopic
- Abrasives
- Mixed abrasives

- One-way plow
- Reversible plow
- Wing plow
- "V" plow
- Underbody plow
- Plow angle of attack
- Plow rake angle
- Minimum depth of snow that can be plowed
- Snow plowing
- Tandem plowing
- Close echelon plowing
- Benching or shelving
- Windrow of plowed snow
- Snow removal
- Other locally defined terms and procedures

A more complete list (glossary), and associated definitions for most of the terms that appear in this article, that is suitable for placing in the body of the plan and policy document or in an appendix can be found at: www.saltinstitute.org/snowfighting/glossary.html

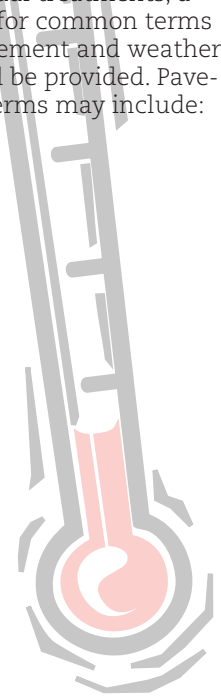
Section 8: Specific treatment guidelines

This section provides the specific guidance for all snow and ice control operations. Before getting into designing individual treatments, a set of definitions for common terms that relate to pavement and weather conditions should be provided. Pavement condition terms may include:

- Dry
- Damp
- Wet
- Slush
- Loose snow
- Packed snow
- Frost
- Thin Ice
- Thick Ice

Weather (Precipitation) Condition terms may include:

- None
- Light rain
- Moderate rain
- Heavy rain
- Freezing rain
- Sleet (ice pellets)
- Light sleet
- Moderate sleet





- Heavy sleet
- Light snow
- Moderate snow
- Heavy snow
- Blowing snow

Section 9: Treatment decision (design) process

This section should define the weather and other information resources utilized by the agency when making treatment decisions. It should also provide definition, significance and impact of the presence and magnitude of the treatment design factors including:

- Ice – pavement bond
- Pavement temperature and trend
- Solar radiation or sunshine
- Clear night sky radiation
- Geo-thermal effects
- Air temperature and wind
- Residual snow or ice on the pavement
- Type, intensity and trend of precipitation event
- Treatment cycle time
- Traffic volume, speed and timing
- Chemical type
- Chemical form

The analysis of items immediately above should be summarized into an application type and rate tables for the various pavement, weather, traffic and operating conditions.

Section 10: Snow plowing guidelines

This section should include specific procedures and requirements for:

- Plowing speed
- Snow cast
- Tandem and close echelon plowing
- Plow angles for various conditions
- Managing windrows
- Various lane configurations (passing, turning, deceleration/acceleration)
- Intersections and ramps
- Crossovers
- Cul-de-sacs, dead-ends and alleys
- Safety appurtenances
- Railroad grade crossings
- Shoulders
- Benching and shelving

Section 11: Materials spreading procedures

This section should include specific requirements for placing the material on the highway. Typical items include:

- Spreading Speed
- Spread Pattern for Various Conditions
- Banked Curves
- Hills, Curves and Intersections
- Banked Curves and Bridges
- Placement of Material in Lane(s)
- Parking Areas and Walkways
- Bridges and other Potentially Cold Spots
- Blizzard Treatment
- Thick Ice (Heavy Freezing Rain) Treatment
- Thin Ice (Frost and Black Ice) Treatment
- Snow Pack Treatment
- Railroad Grade Crossings

Section 12: Passive snow control

This section should contain the locations and type of passive snow control features employed and their maintenance requirements. It should also contain recommendations for design and reconstruction design options that minimize drifting and blow-overs.

Section 13: Personnel or personnel management

This section should contain detail on all the personnel rules and policies that relate to snow and ice control operations. Items that typically would be included in this category include:

- Training requirements and certifications
- Call-in procedures and requirements
- Overtime, shifts and scheduling
- Hours of continuous duty limitations
- Temporary and reassigned personnel
- Fitness for Duty – requirements and cites
- Relevant portions of union agreement
- Interaction with the public
- Family readiness

- Procedures for managing hired, reassigned, and cooperative personnel

Section 14: Equipment management

This section should contain the “nuts and bolts” (no pun intended) of managing the snow and ice control equipment fleet. This may be further broken down into the agency equipment and other equipment.

Agency equipment

This should contain the relevant policies and procedures associated with equipment owned or leased by the agency. These may include:

- Inventory requirements (parts, required numbers of each type of equipment and any “spare” equipment allowances)
- Routine inspection procedures
- Safe operating criteria for each type of equipment (operational)
- Criteria for “downing” or determining a piece of equipment is not roadworthy or safe to operate
- Maintenance schedule for each type of equipment
- Calibration procedures for the various materials distribution systems
- Fueling procedures
- Personnel authority to perform various types of maintenance/repairs
- Procedures and warrants for outsourced repairs/maintenance

Outsourced, cooperative or “borrowed” equipment

Everything necessary to acquire and manage other than agency equipment should appear here. Items may include:

- Who has what, and how many?
- Activation procedure
- Contract requirements
- Determination of priorities
- Work management procedures (if Operator comes with Equipment)
- Accounting and required paperwork



Section 15: Post-storm cleanup and Safety restoration procedures

This section should contain, with specific location detail, the items of work and when they are to be performed. Items that may be included:

- Shoulder plowing
- Islands and pedestrian Areas
- Railroad grade crossings
- Warrants for hauling snow
- Procedures for loading, hauling and disposing snow
- Achieving and maintaining satisfactory pavement surface conditions
- Clearing sight distance problems
- Pushing back
- Maintaining “problematic” areas
- Drainage restoration
- Clearing bridges safety appurtenances as necessary
- Clearing drifted areas
- Clearing sidewalks
- Clearing hydrants
- Clearing crosswalks
- Clearing signs and signals

Section 16: Emergency operations

If the agency has a separate emergency operations manual, relevant portions may be incorporated into the plan and policies at this point. If not, an emergency operations plan should be included here. Critical information to be provided includes:

- Contact information for key functions in local, state and federal government, utilities and emergency aid providers
- Road and bridge closure plans
- Detours and emergency evacuation routes/plans for every possible scenario
- Potential sources of help and what each can provide
- Maps showing water level at various flood stages
- Sources of weather information
- Shelter information
- Sources of emergency provisions
- Alert and public information systems
- Reporting procedures
- Emergency fuel procurement

MATERIALS MANAGEMENT PLAN

It is crucial to include a comprehensive materials management plan, within the framework of the agency snow and ice control plan. This will clearly demonstrate that the agency is doing a credible job of planning and executing operations in a way that will have the least possible environmental impact. One of the best sources of information on this topic is found on the Transportation Association of Canada’s web page: <http://www.tac-atc.ca/english/information/services/readingroom.cfm#syntheses>

Policy statement

The first order of business is to clearly state, in a policy statement, the agency’s policy, objectives and commitment to minimizing environmental impacts and taking reasonable actions to actually reduce environmental loadings. The statement should emphasize that highway safety is the first priority in the agency’s snow and ice control operations.

Situational analysis

Here, the agency identifies the potential sources of negative environmental impact associated with snow and ice control operations and defines the locations of areas that known or may be environmentally sensitive to aspects of winter maintenance operations.

Material

- Sand
- Solid ice control chemicals
- Liquid ice control chemicals

Material storage and work locations

- Stockpiles
- Drainage
- Housekeeping
- Loading
- Wash water
- Equipment fluids

Potentially sensitive areas associated with on-road usage

- Groundwater recharge areas
- Vulnerable water tables
- Drinking water supplies
- Sensitive vegetation
- Sensitive water bodies
- Sensitive agriculture areas
- Sensitive non-plant species
- Other – locally-defined

Disposal sites

- Snow
- Abrasives

Planned approach

In this section, the proposed control measures for dealing with each of the items in the Situational analysis should be described. Some not-so-obvious measures may include:

- Equipment calibration
- Prewetting to make solid chemicals more effective
- Ground speed control of all materials dispensed
- Designing individual material treatments in response to weather and road conditions of the moment and rear future
- Spread pattern control

Training activities

The various training requirements/activities in support of the agency materials management program, for agency and hired forces, should be described here.

Monitoring, record-keeping, reporting, analysis and agency action

Here, the systematic process for assuring the materials management program is working, as intended, should be described in detail.



CONCLUSION

The list of possible topics for inclusion in municipal snow and ice control plans provided in this document is large, and probably incomplete. Realistically, it is not expected that every snow and ice control plan will contain all of the material listed. However, it is a good idea for an agency to at least consider all of the topics.

[Note: this document is posted on the Salt Institute website, <http://www.saltinstitute.org>, and will be updated periodically -DEA]

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Important Articles on Salt and Highway Deicing and Anti-icing

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Salt Institute Publications A-V List Ordering Instructions

www.saltinstitute.org/34.html

Snowfighters Training www.saltinstitute.org/snowfighting

Winter Maintenance Training Resource

http://www.saltinstitute.org/snowfighting/winop-resources/winops_resources.html



Salt Institute

700 North Fairfax Street
Fairfax Plaza, Suite 600
Alexandria, VA 22314-2040

Voice: 703/549-4648

Fax: 703/548-2194 Fax

Web Site: <http://www.saltinstitute.org>

e-mail: info@saltinstitute.org

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