

CHAPTER 2**CLEAR ROADS****Table of Contents**

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2-1.0 INTRODUCTION

The removal of snow and ice from the highway system in Minnesota is one of the most important jobs confronting maintenance personnel during the winter season. Putting a priority on snow and ice removal has a positive impact on safety and the economy. Minnesotans have invested large sums of money in the trunk highway system; therefore, they expect to travel on well-maintained facilities throughout the year. MnDOT realizes that a large segment of our economy is based on highway transportation and we must utilize reasonable means to minimize hazards, slippery road surfaces, costly delays, and energy usage to the highway user.

Safety for the highway user and serviceability of trunk highways are the primary considerations of MnDOT. Snow and ice removal operations must be carried out so as to provide safety for the public as well as for employees. Effective snow and ice control is achieved through planning, preparation, and execution of good tactical procedures. This chapter outlines elements that affect those three functions.

2-2.0 MNDOT SNOW AND ICE PLAN

Scope and purpose: The purpose of the MnDOT Snow and Ice Plan is to articulate MnDOT's plan for providing staffing for snow and ice control services for Minnesota's trunk highway system. The MnDOT Snow and Ice Plan provides background for decisions, building on fundamentals starting with the tie to our customers. The document is designed to identify areas where MnDOT will deliberately operate consistently and areas where the department will deliberately operate independently from district to district. Copies of the MnDOT Snow and Ice Plan can be obtained from the MnDOT District Maintenance Engineer Office of Maintenance or Office of Human Resources.

2-3.0 MNDOT POLICY, MAINTENANCE BULLETINS AND AGREEMENTS

MnDOT Policy and Guidelines regarding winter operations apply, namely [MnDOT Operations and Engineering Policy - OE015, Closure of Trunk Highways, Severe Winter Storms or Natural Disasters](#) and [MnDOT Closure of Trunk Highways for Severe Storms or Natural Disasters Guidance](#).

There are also Maintenance Bulletins, The [Open Roads Agreement](#) with State Patrol and District Road Closure Guidelines which apply.

2-4.0 GUIDELINES STATEMENT

MnDOT is committed to providing the public with the level of service for snow and ice control that is described within the following Operation Guidelines. These recommended levels of service should be interpreted as standard operating procedures. In certain situations, however, the District Maintenance Engineer or designee may exercise judgment when maintenance requirements differ from these guidelines.

Customer surveys were conducted periodically since 1994 by MnDOT to assess satisfaction with products and services including year round maintenance operations. In 1999, an exclusive snow and ice operations survey was conducted and a follow-up survey was done in 2007. Two factors included in these surveys were level of importance of snow and ice removal and level of satisfaction with MnDOT's snow and ice operations. The results from the surveys were used to develop and confirm MnDOT's current Operation Guidelines, which includes the performance measure Bare Lane Regain Time. Snow and ice operations have been identified as a priority service in those and satisfaction with the service remains at a high level.

The Maintenance Business Management Team (MBMT) consisting of District Engineer representatives, District Maintenance Engineers and Office of Maintenance Staff have developed and approved the Operation Guidelines. Suggestion for changes to the guidelines should be referred to the MBMT Chair.

2-5.0 OPERATION GUIDELINES

The guidelines apply to the traveled portion of all roadways and clean-up operations. Section 2-5.03 addresses clean-up operations.

2-5.01 CLASSIFICATIONS AND LANE MILES

Roadway Classifications for snow and ice operations are assigned to roadways under MnDOT jurisdiction according to traffic volume. Five different road classifications based on volume ranges have been established as noted in Table 1. The District Maintenance Engineer or designee is responsible for establishing classifications for roadways in their District. The most recent MnDOT Traffic Flow Maps containing the Average Annual Daily Traffic (AADT) for each segment of roadway should be used, except more detailed AADT maps within corporate limits of cities may be used.

The following table contains ranges and allowances to be used in designating the classification of segments.

TABLE 1: RANGES & ALLOWANCES

Classification	AADT	10% Allowance	Lower Limit of AADT
Super Commuter	Above 30,000	3,000	27,000
Urban Commuter	10,000 – 30,000	1,000	9,000
Rural Commuter	2,000-10,000	200	1,800
Primary	800 – 2,000	80	720
Secondary	Below 800	n/a	n/a

When the road classifications are studied in detail, many roads will have short segments of different volume over their length. Providing different maintenance priorities to short segments of the same roadway is impractical for our maintenance personnel. Therefore, the District Maintenance Engineer or designee may make adjustments in classification of these segments to assure continuity in field operations on routes within the District and at the boundaries with other Districts.

The following guidelines are used for determining the classification of a roadway segment and the lane-miles within it.

The table below identifies highway system components that are included in the lane mile calculation for each classification and are actual lane mileage unless noted below.

Super Commuter	Urban Commuter, Rural Commuter, Primary and Secondary
Thru Lanes	Thru Lanes
Truck Lanes	Truck Lanes
Acceleration and Deceleration Lanes	Acceleration and Deceleration Lanes
Bypass and Passing Lanes	Bypass and Passing Lanes
Complex Interchanges (directional and cloverleaf = 5 miles)	

HOV/HOT/MnPass lanes (unless already counted in thru lane miles)	
Bus Shoulders	
Ancillary Lanes including Collector-Distributor Roads	

Turn lanes, shoulders, median openings, frontage roads, Simple Interchanges (diamond) roadways for weigh scales, rest areas and information centers are not included in lane-mile calculations.

Current mileage plus mileage that is anticipated to be added by the winter season is taken into consideration.

All Interstate highways are classified as Super Commuter or Urban Commuter regardless of AADT.

All computations are carried out to the hundredths place for route classification level. Final totals are all rounded off to the nearest whole number as follows:

- 0.5 or greater = 1
- 0.49 or less = 0

A roadway segment is defined as the distance between two points on a roadway which are identified on the Traffic Flow Map by the AADT count. Contact the District Traffic Engineer for the latest AADT Maps.

Examples:

1. When the AADT count on both ends of a roadway segment meet the criteria for the same classification, the lane miles are designated as that classification.

2. When the AADT count on both ends of a roadway segment do not meet the same classification criteria there are two potential designations and the following procedure is used to ensure a segment is appropriately classified:

- Determine the average AADT.
- If the average AADT is within the higher classification, the entire segment is identified as the higher classification.

Example: $1000 + 700 = 1700 \div 2 = 850 > 800$; therefore, according to Table 1 this segment should be designated as PRIMARY.

- If the average AADT meets the criteria for the lower classification but within 10% of the higher classification, the lane miles of that segment may be designated as the higher classification.

Example: $1000 + 500 = 1500 \div 2 = 750 > 720$; therefore, according to Table 1 this segment should be designated as SECONDARY but may be designated as PRIMARY.

2-5.02 SNOW AND ICE REMOVAL PERFORMANCE MEASURES

MnDOT's Snow and Ice Removal Performance Measure is the Bare Lane Indicator Regain Time which is different for each route classification. See Table 2. This is intended to be a seasonal measure and individual event or monthly reports may fall outside of the regain time ranges."

Snow and Ice removal from the roadway is an emergency operation and normally takes precedence over other work.

Snow and ice removal operations begin when conditions, or forecasted conditions, may result in the loss of "bare lane." Bare lane is defined as: driving lanes will be free of ice and snow between the outer edges of the wheel paths and have no greater than 1 inch accumulation on the center of the roadway. Snow and ice removal operations are to continue throughout the event to reach and maintain bare lane conditions. This should continue as long as adequate visibility permits and reasonable results are obtained. Once bare lane has been obtained and maintained, clean-up operations can be started.

Bare Lane Regain Time is the time from the end of the event until bare lane is obtained. It is also called the Bare Lane Indicator. The Bare Lane description is the same for all routes. The Target Regain Time is dependent on the classification of roadway (Table 2). It is the operator's responsibility to record the Event End and Bare Lane Regained date and time. The District Maintenance Engineer or designee will select an individual to record the Event Start and Loss of Bare Lane date and time.

The District Maintenance Engineer or designee may determine that a change in the level of service is warranted for a period of time. Examples of conditions that may cause a change in the level of service are:

- Breaks between shifts during off peak hours to reduce operational costs
- Continued service to avoid snow compaction problems

The District Maintenance Engineer or designee may also determine that discontinuation in service is warranted for safety reasons. Some conditions that may cause discontinuation in service are:

- Limited visibility, which would make operations hazardous to personnel

- Extremely cold temperatures (< -40°F)

During winter storms a winter maintenance schedule requiring split shift work hours may be employed in order to provide the level of service recommended. Each District will develop a schedule of effort necessary to achieve Target Regain Times.

TABLE 2: BARE LANE INDICATOR GUIDELINES

Classification	AADT	Target Regain Time	Bare Lane Description
Super Commuter	Over 30,000	0-3 hrs.	Bare Lane is defined the same for all classifications as follows:
Urban Commuter	10,000 – 30,000	2-5 hrs.	All driving lanes are free of snow and ice between the outer edges of the wheel paths and have less than 1 inch of accumulation on the center of the roadway.
Rural Commuter	2,000 – 10,000	4-9 hrs.	This is the condition at which most drivers feel safe and comfortable when driving at posted speeds.
Primary	800 – 2,000	6-12 hrs.	The Bare Lane Regained date and time should be logged when this condition is obtained.
Secondary	Under 800	9-36 hrs.	

Operators plow and apply chemicals to roadway as assigned until Bare Lane is reached as defined by road classification and bare lane definition. See [Bare Lane Training PowerPoint](#) and [Highway Systems Operations Plan 2012-2015](#) for related information and guidance.

Operator's report when Bare Lane is achieved and the data is recorded in the Bare Lane Indicator Application within the Resource Consumption Application (RCA).

Entry may be by individual operators or by a District designee. See the District Maintenance Key Expert Group (MKEG) representative for questions and additional details.

Bare lane regain time may not be the same along an entire route. The Bare Lane Regain Time or “Regain Time” (RT) is the average regain time per maintenance route. Regain Time reports may be generated for each road classification for each District or Statewide by event or for all snow and ice events for a specific reporting period.

MnDOT has a seasonal rollup measure that is used for reporting to management and the legislature. The rollup measure is: Frequency of Meeting the Bare Lane Indicator Regain Time. This is calculated by the percentage of events within the target regain time range for each maintenance route by designated classification. The target frequency range is typically set between 55-70 percent.

2-5.03 CLEAN-UP OPERATION PRIORITIES

Clean-up operations may start as soon as the event has subsided or bare lane has been obtained unless adverse weather and other operational needs warrant a change.

All safety features along the roadway shall be cleaned up as soon as possible so they function properly.

2-5.03.01 SNOW AND ICE CLEAN-UP PRIORITIES

PRIORITY A

Removal of compacted snow from safety devices (impact attenuators, bridge crash rails, concrete safety barriers, plate beam barrier or similar types) is priority A when it averages $\frac{2}{3}$ the height of the device.

High Tension Cable Barrier (HTCB) clean-up priority will be established by the District as conditions warrant.

Sight distance and median opening (e.g. crossroads, crossovers, U-turns/ J-turns, etc.) clean-up should be accomplished as conditions warrant. Each District may designate other intersections for sight distance and median opening clean-up if prompt attention is required.

Single pass through rest areas, bus rapid transit and staffed weigh scale sites.

If inadequate snow storage exists and the flow of traffic is impeded by the plowed snow, then the operations of removing snow by further plowing or hauling should be conducted on the same schedule as mainline operations.

Snow and ice removal for Bicycle and Pedestrian facilities has historically been done via agreement with local agencies. This is a result of MnDOT's Construction Cost Participation Policy which assigns maintenance of most facilities to local agencies and they generally have the equipment and resources for snow and ice operations of this type. Some are formal written agreements and others are not. Districts should review these agreements and pursue establishment of written agreements. Coordination with the local partner(s) is essential for efficient and effective clean-up of bicycle and pedestrian facilities.

The Americans with Disabilities Act (ADA) requires that pedestrian facilities remain accessible to those with disabilities. Information on ADA can be found on MnDOT's [Accessibility](#) webpage. To facilitate effective use of resources Districts will maintain a listing of priority pedestrian access routes, that will be cleared during Priority A Clean-up operations and communicate these with their local partners as applicable. These areas may include major trunk highway river bridges, signalized intersection with audible pedestrian signals, crosswalks associated with bus stops and sidewalks and trails with significant pedestrian volume.

PRIORITY B

Removal of compacted snow from safety devices (impact attenuators, bridge crash rails, concrete safety barriers, plate beam barrier or similar types), averaging less than 2/3 the height of the device, clearing of full width shoulders and cable guardrail. May be accomplished during the normal work schedule.

PRIORITY C

Drift prevention for future storms. May be accomplished during the normal work schedule.

PRIORITY D

Regaining snow storage space for future storms and other areas such as access to cabinets and communication tower sites as needed. May be accomplished during the normal work schedule.

Snow Removal in Parking Lanes on State Highways is accomplished in coordination with local governments. The [MnDOT Cost Participation & Maintenance Responsibilities with Local Units of Government Manual](#) (section II.D.4a, Roadway & Shoulder Maintenance) identifies the local unit of government as the responsible agency for snow removal from parking lanes & shoulders where parking is allowed.

MnDOT Districts may offer to assist with the snow removal efforts as outlined below:

- In larger snow events, or after several smaller events, MnDOT may offer to assist with the snow removal effort from the parking lanes.
- Typically when MnDOT assists with the snow removal, the state performs the loading of the snow and the local unit of government performs the hauling and disposal.
- In lieu of performing the work together, the parties may enter into a separate agreement where one party can reimburse the other for the performance of a portion of the work.

2-5.04 MNDOT SNOW AND ICE OPERATIONAL GUIDELINES

The following are additional details that may be addressed in District operational guidelines.

2-5.04.01 PHYSICAL FACILITIES

A brief description of all physical facilities operated by the district should be included. Sub-areas, truck stations and material storage areas should be plotted on a map. Useful data regarding each location (i.e. number and class of trucks used for snow and ice control for each truck station, capacity of salt storage for each location, etc.) should be recorded.

2-5.04.02 COMMUNICATIONS

An effective communication system is a very important portion of a winter maintenance operation plan. Snow and ice operations are physically demanding, sometimes performed alone in remote areas, and are potentially dangerous. At the crew level, the ability to communicate on matters of public safety, crashes/incidents, work coordination, personal safety, weather conditions, road conditions, and work progress is absolutely vital.

It is generally the responsibility of the Maintenance Supervisor or designee to submit Road Condition Reports ([Section 2-9.0](#)). In addition, a system for notifying employees of a snow emergency should be developed and included in the plan. A method of reporting mechanical difficulties or the need for emergency parts during non-working hours should also be included.

2-5.04.03 MAINTENANCE ROUTES

One of the most important aspects of the operation plan is the assignment of snow removal routes by district. Each individual route should be designated in a table and/or map. Information contained may include:

- Route identification
- Name of operator(s) assigned
- Equipment assigned (i.e. capacity of vehicle, sand/salt)

- Shift assignments
- Shifts per segment
- Number of roadway segments on the route
- Classification of roadway segments on the route
- Number of lanes for each segment
- Total lane miles for each classification
- Number of interchanges by classification
- Plow speed for each segment
- Salting/Sanding speeds
- Posted speed limit for segment
- Special instructions
- Cycle time- MDSS/AVL

2-5.05 IMPLEMENTATION

The final and most significant portion of any winter operation plan is how the plan is actually implemented. Information on implementation procedures are provided in the district snow and ice control plans.

2-5.05.01 VEHICLES & EQUIPMENT

In order to provide adequate service to the public, equipment should be inspected routinely to assure optimum performance. In addition, to assure consistent application of materials on the roadway, all applicators (e.g. spreaders, sprayers, etc.) should be calibrated yearly as specified by the manufacturer.

As part of the yearly inspection of vehicles each District should consider conducting a trial operation. This “test run” is very helpful in detecting problems with equipment and refreshing operators’ techniques.

2-5.05.02 SNOW PLOWING

This section of the plan should serve as a guide to the operator for acceptable snow plowing procedures. The following types of information should be included:

- Work schedules
- Procedures for plowing across railroad tracks
- Procedures for plowing different types of roadway and shoulder surfaces
- Procedures for different types of events (e.g. rain, freezing rain, snow, etc.)
- Pre-event procedures
- Post-event procedures
- Procedures to prevent drifting
- Procedures when the road is blocked
- Clean-up procedures for markers and signs
- Clean-up procedures for drainage structures
- Procedures for plowing multi-lane highways and interchanges

- Procedures for plowing parking lanes, rest areas, bus rapid transit sites & pedestrian facilities.
- Procedures for plowing snow on median openings (e.g. crossroads, crossovers, U-turns/J-turns, etc.)
- Procedures for widening and snow storage operations
- Internal communication procedures
- Responsibilities of the operator when stalled or disabled vehicles are present

2-5.05.03 MATERIAL SELECTION & REPORTING

The plan should include procedures for the use of materials on roadways. The use of materials should be specified based on the following variables: type of precipitation, pavement temperature, air temperature forecast, percentage mix (salt/sand), classification of roadway, and location (i.e. intersection, hill, etc.). Procedures for completing material usage forms should also be explained. Examples of application rates and material usage reporting are provided in [Section 2-8.0](#).

2-5.05.04 SAFETY AND HEALTH

All operators must be informed to keep safety in mind at all times. The plan should include recommended procedures designed to reduce accidents. The recommended procedures should address the following:

- Safety equipment (e.g. high flags, seat belts, flares, etc.)
- Crash reporting
- Procedures for safe traffic control (MUTCD)
- Snow plow safety training

2-6.0 EQUIPMENT

2-6.01 PREPARATION AND INSPECTION

In order to provide adequate and necessary snow and ice control, equipment should be operational and available for use. Information pertaining to State and Federal inspection regulations is available in the Fleet Management Chapter of this manual.

Trucks should be in good working order with necessary parts available. Snow plows and wings should be mounted on the trucks and inspected for proper operation.

Auxiliary equipment, such as tire chains, shovels, lights, etc., should be available and operational.

All snow and ice control equipment should be inspected thoroughly before the winter season. To assist in this procedure, a checklist of some type should be used.

An example of such an inspection checklist can be provided by the Truck Station supervisor.

Early in the season, before the usage of snow and ice equipment is required, an inspection of all routes should be conducted. These pre-season route checks should be used to observe and note the following:

- Location and proper markings of impact attenuators, bridge crash rails, Jersey barriers, plate beams or similar types of barriers.
- Bridge expansion joints, expansion joint plow guards, manhole covers or other obstacles that might be unseen due to snow and become a hazard during snow and ice removal operations.
- Route changes or revisions that may have occurred since last season.
- Reduced overhead clearances and lane widths.
- Broken or missing curb sections.

The District Maintenance Engineer or designee should provide a complete list of pre-season policies and procedures to maintenance personnel.

2-6.02 CALIBRATION

Calibration is an integral part of the winter season preparation and should be conducted on all snow and ice equipment.

2-7.0 MATERIALS

MnDOT operates under a high expectation to balance safety, mobility, environmental and budgetary priorities. In order to mitigate environmental impacts, provide safe winter driving conditions and maintain mobility during winter storm events, MnDOT employs a variety of strategies and materials to help keep the roads clear while continually striving for more effective and efficient use of all types of snow and ice treatments on our roadways.

The primary materials used in maintaining roads throughout the winter season are abrasives and chemicals. Abrasives/sand can be treated with a variety of winter chemicals. Information can be found in the [Minnesota Snow and Ice Control Handbook](#).

2-7.01 CHEMICALS

The primary types of chemicals that MnDOT uses are Sodium Chloride and Potassium Acetate. There are also a variety of blends and additives that are approved for use. See the MnDOT Approved/Qualified Products [Snow and Ice Chemical Products List](#).

Guidance on the use of deicing chemicals can be found in the [MnDOT Winter Chemical Catalog](#).

2-7.02 ABRASIVES

Abrasives are typically used in extreme, adverse conditions when the effectiveness of chemicals are reduced. Abrasives also require post-season cleanup or both drainage structures/ponds, bridges and roadways/roadsides. See [Chapter 5.4.15 \(Removal of Debris & Rubbish\)](#)

2-7.03 MATERIAL TESTING

The complexity and number of materials used to fight snow and ice continues to increase at a steady rate, heightening the need for quality control. Field personnel are the first and most important link in receiving and testing materials. Testing and inspecting each delivery will help to ensure the quality and quantity of the material being received.

When testing liquid chemicals, the MnDOT publication [“Field Chemical Testing: Anti-icing and De-icing Liquids”](#) provides standardized methods for field testing and sampling along with information on proper chemical handling procedures and required personal protection. In addition, this publication covers the required process for sending samples to the MnDOT Materials and Research Lab.

If problems or praises arise with the vendor’s material, a Vendor Performance Report Form should be filed with the Department of Administration. Additional information on why and how to file a Vendor Performance Report Form is available online at the [Department of Administration, Material Management Division](#) website. The [Vendor Performance Report Form](#) can be accessed online.

2-7.04 Storage

Proper storage of anti-icing, de-icing materials and abrasives can be a difficult task without proper planning and preparation. (Minnesota Rule 7060.0600 prohibits discharge of waste into the subsurface that may result in polluting ground water.) [EHSO \(Environment, Health and Safety Online\)](#) offers information online about proper chemical storage.

If MnDOT property is damaged, by the vendor, a [Vendor Performance Report Form](#) must be immediately filed with the Department of Administration, Material Management Division. Storage facilities should be inspected after each delivery for property damage (e.g. damage to gates, damage to salt storage shed, severe rutting of unpaved surfaces, etc.).

2-7.04.01 LIQUID CHEMICAL STORAGE

The use of liquid chemicals for anti-icing, deicing, pre-wetting and pre-treating has greatly expanded the number of snow and ice fighting options available to the Department. MnDOT's [Environmental Stewardship](#) webpage contains additional information.

2-7.04.02 ABOVEGROUND STORAGE TANK

The Minnesota Pollution Control Agency (MPCA) requires that any aboveground storage tank with a capacity of 500 gallons or more be registered MnDOT follows MPCA rules on storage.

The Minnesota Rules Chapter 7151 requires that aboveground storage tanks greater than 1,100 gallon capacity or greater than 500 gallon capacity and located within 500 feet of surface water, have a safeguard to contain a release from the tank. Additional information can be found in the [MnDOT De-Icing Production and Storage System Guidelines](#).

2-7.04.03 SALT BRINE PRODUCTION SYSTEM

This system should be housed in a location other than the maintenance garage due to its highly corrosive nature.

Information regarding building design for salt brine production structures can be obtained via the Building Services Section.

2-8.0 CHEMICAL MANAGEMENT

MnDOT is committed to using the minimum amount of chemical necessary to return the roadway to its designated level of service within the appropriate timeframe (Table 2). Several ways of accomplishing this have been provided in the following subsections.

2-8.01 CHEMICAL APPLICATION

Supervisors should monitor road conditions and review chemical usage reports to ensure routes are meeting recommended level of service and recovery targets without excessive use of chemicals.

2-8.02 ANTI-ICING

Anti-icing is a proactive measure for preventing the formation of the bond between a freezing precipitate (e.g. frost, freezing drizzle, etc.) and the pavement by the application of a freeze-point depressant chemical. Additional information can be obtained from the [MnDOT Anti-Icing Guide](#).

2-8.03 DEICING

Deicing is a reactive measure of applying a chemical to a frozen precipitate (e.g. ice, snow, frost, etc.) that is already bonded to the pavement surface. Detailed information on deicing procedures is found in the [Minnesota Snow and Ice Control Handbook](#).

2-8.03.01 PRE-WETTING

Pre-wetting is the addition of a liquid to a material at the application point (i.e. the spinner or auger). This helps the material to adhere to the road, reducing bounce off and the sweeping effects of traffic and the wind. Additional information can be found in the [Minnesota Snow and Ice Control Handbook](#).

2-8.03.02 SUPER SATURATED SALT OR SLURRY

Super Saturated Salt or Slurry is a method where a high volume of liquid is added to the granular salt. Two 400 gallon tanks, located within the box, pump brine at approximately 90 pounds of liquid/210 pounds of salt resulting in a salt slurry that activates very rapidly.

2-8.03.03 STOCKPILE TREATMENT

Pretreating includes the addition of a liquid to a material at the stockpile to enhance deicing performance. Care must be taken to ensure that excessive chemical runoff does not leak from the pile into maintenance site drains. [See Section 3.1.3.2 of the FHWA Manual of Practice for an Effective Anti-Icing Program](#).

2-8.04 EQUIPMENT WASHING OPERATIONS

Equipment washing guidelines can be found at [Center for Environmental Excellence](#) which is published by the [American Association of State Highway and Transportation Officials \(AASHTO\)](#).

2-9.0 511/CONDITION ACQUISITION AND REPORTING SYSTEM (CARS)

The 511 Traveler Information web sites, smart phone app and phone are user options intended to provide the traveling public with up-to-date road work, winter road conditions, special event and crash/incident information. Situations that may significantly impact their travel time or the district feels present an unusual safety concern are the focus.

The 511 program has two main functionalities:

1. Winter Road Condition Reporting

2. Work Zone, Special Events, Emergency and Incident Data Entry into CARS

2-9.01 WINTER ROAD CONDITION REPORTING

Winter road condition reporting is extremely important to the traveling public and the public in general. Compliance with the procedure is necessary to meet customer expectations. The reporting is done in partnership with the Minnesota State Patrol in accordance with the [511 Winter Road Condition Reporting Responsibilities](#) guidance.

Conditions are reported by Maintenance route/511 segment in accordance with the [Minnesota Road Conditions Terms](#).

2-9.02 WORK ZONE, SPECIAL EVENTS & INCIDENT DATA ENTRY INTO (CARS)

[CARS](#) is a comprehensive Internal program in which operators enter construction/maintenance events, road closures, crashes/incidents and other unplanned events such as flooded roads. The CARS program feeds the public 511 system. For the 511 Protocol click here: <http://ihub/rtmc/511/511Protocol.html>. For construction projects, hyperlink(s) for the project and/or district web site(s) should be provided.

2-9.03 EMERGENCY REPORTS

In addition to the times mentioned above, each district must report whenever any emergency condition is developing (i.e. roads blocked, opened, etc.) and report it immediately. These situations should be entered into Mn/CARS only when it is likely to cause disruption to the traveling public and should be deleted from the system as soon as the incident is cleared. Information about incidents should be clear, concise, and consistent.

2-9.04 MISCELLANEOUS REPORTS

Each identified key user must also enter information related to detour and permit restrictions. When providing detour or permit restriction information, the descriptive text should be clear, concise, and consistent.

2-9.05 THE STATE PATROL

State Patrol Dispatch operates statewide out of the Regional Transportation Management Center (RTMC), which is located at the Water's Edge facility. The dispatchers enter incidents/closures into CARS/511 outside of the MnDOT Statewide Traffic Operators work hours. They can also handle Maintenance dispatching and callout if necessary.

2-10.0 ROAD WEATHER TECHNOLOGY

2-10.01 MAINTENANCE DECISION SUPPORT SYSTEM (MDSS)

The Maintenance Decision Support System (MDSS) helps MnDOT make better decisions about their winter maintenance activities by providing reliable weather and road conditions and recommending the most cost-effective treatments.

Automated Vehicle Location (AVL) systems help support the MDSS by continuously recording plow truck locations and other pertinent information. This data is automatically forwarded to MnDOT maintenance supervisors, who can better respond to any weather related events.

Additional information can be found on the [Maintenance Decision Support System Automated Vehicle Location](#) webpage.

2-10.02 ROAD WEATHER INFORMATION SYSTEMS (RWIS)

Proper training and use of MnDOT's [Road Weather Information System \(RWIS\)](#) technology includes sensor outputs as well as atmospheric and road condition predictions to enable more accurate forecasts and needed actions.

INDEX OF LINKS

Accessibility

<http://www.dot.state.mn.us/ada>

American Association of State Highway and Transportation Officials (AASHTO)

<https://www.transportation.org/>

Center for Environmental Excellence

http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/4_6.aspx

Department of Administration, Material Management Division

<http://www.mmd.admin.state.mn.us/mn02005.htm>

EHSO (Environmental Health and Safety Online)

<http://www.ehso.com/ChemicalStorageGuidelines.htm>

Environmental Stewardship

<http://www.dot.state.mn.us/environment/>

Field Chemical Testing: Anti-icing and De-icing Liquids

<http://www.dot.state.mn.us/maint/research/chemical/The%20Field%20Book.pdf>

Highway Systems Operations Plan 2012-2015

<http://www.dot.state.mn.us/maintenance/hsop/>

Maintenance Decision Support System Automated Vehicle Location

<http://ihub/maintenance/mdssavl>

Minnesota Road Condition Terms

<http://hb.511mn.org/RoadConditions.htm>

Minnesota Snow and Ice Control Handbook

<http://www.mnltap.umn.edu/publications/handbooks/documents/snowice.pdf>

511/ - Condition Acquisition and Reporting Systems (-CARS)

http://ihub/rtmc/rtmc_511.html

MnDOT Anti-Icing Guide

<http://www.dot.state.mn.us/maintenance/pdf/research/AntiIcingGuide8Full.pdf>

MnDOT Chemical Evaluation Guide (Winter Chemical Catalog)

<http://www.dot.state.mn.us/maintenance/pdf/2017%20Chemical%20Catalog%20REV%2001.pdf>

MnDOT Operations and Engineering Policy - OE015, Closure of Trunk Highways, Severe Winter Storms or Natural Disasters

https://edocs-public.dot.state.mn.us/edocs_public/DMResultSet/download?docId=29197964

MnDOT Closure of Trunk Highways for Severe Storms or Natural Disasters Guidance

<http://www.dot.state.mn.us/policy/operations/oe015-guidance.html>

Operations and Engineering Policies

<http://www.dot.state.mn.us/policy/operations.html>

Road Weather Information System (RWIS)

<http://www.dot.state.mn.us/maintenance/rwis.html>

FHWA Manual of Practice for an Effective Anti-Icing Program

<http://www.fhwa.dot.gov/reports/mopeap/eapcov.htm>

Vendor Performance Report Form

<http://www.mmd.admin.state.mn.us/pdf/perform.pdf>