



Winter Maintenance - Technical Backgrounder

- ✦ The department's policy for winter operation of provincial highways is to operate the highway system and services in a way that provides reasonably safe, convenient and economical highway transportation.
- ✦ The department has 85 winter maintenance sections located at various headquarters throughout the province. Each crew has designated highways that they are responsible for maintaining.
- ✦ At the present time we have 290 plow trucks active in the province.
- ✦ Highways are inspected regularly to determine if intervention is needed and to report accurate data to the Highway Hotline.
- ✦ Highways in the province are prioritized for snow removal and ice treatment. This prioritization is based on highway classification and the average annual daily traffic (AADT).

Level of Service 1

The highest level of winter maintenance is provided to the Principal Highway Network and all other highways having greater than 1,500 AADT. Principal Highways are those that serve as commuter routes, major inter-provincial and international travel routes, as well as connecting centres with 3,000 or greater population.

Travel Way Treated: Main travel lanes are cleared such that the surface is predominantly visible.

Timing:

- ✦ For snow removal: Snow removal is initiated after 3 cm of snow has accumulated. Snow should be plowed from the driving lanes within 6 hours of the end of the storm. Additional time may be required in extreme circumstances.
- ✦ For ice removal: Treated or assessed for treatment within 6 hours of the end of the storm.

Level of Service 2

A secondary level of winter maintenance is provided to Regional highways with an AADT between 300 and 1,500.

Travel Way Treated: Main travel lanes are cleared such that the surface is predominantly visible.

Timing:

- ✦ For snow removal: Snow should be plowed from the driving lanes within 12 hours of the end of the storm.
- ✦ For ice removal: Treated or assessed for treatment within 12 hours of the end of the storm.

Level of Service 3

All other Regional highways receive a third level of winter maintenance.

Travel Way Treated: Main travel lanes are cleared such that the surface will have intermittent bare wheel paths. Snow pack is acceptable on gravel surfaces.

Timing:

- ✦ For snow removal: Commences as soon as resources are available without jeopardizing service on Level 1 or Level 2 highways and should be plowed within 24 hours of the end of the storm.
- ✦ For ice removal: Treated or assessed for treatment within 24 hours of the end of the storm.

Clean-up of shoulders, interchanges, and intersections will be completed after all highways are passable and storm conditions have concluded. These operations are carried out during daylight hours only, unless an emergency exists.

Road Maintenance During a Storm

- ✦ Snow and ice removal equipment is mobilized before, during and after storms. Winter equipment operators are available 24 hours, 7 days a week.
- ✦ In very severe storms, equipment is pulled off of the road for the safety of the operators and any motorists that may be on the highway. Environment Canada defines 'zero visibility' as when you can see less than 200 metres. Under this condition, highway maintenance equipment will not begin work on the road until visibility improves. Equipment already on the road may be removed when visibility continues to deteriorate to 100 metres.

Treating Ice and Snow

- ✦ The Department uses granular road salt for treating ice conditions on provincial highways. The road salt we purchase has to have a minimum 95% sodium chloride composition. Sodium chloride is the same as table salt. Road salt supplied to the department has been mined directly from potash deposits or processed from potash tailings.
- ✦ The Department also uses small quantities of calcium chloride and magnesium chloride to treat ice. These products are mixed in with winter sand to help the sand stick to the snow and ice. Road salt is also mixed in with the winter sand. Winter sand is spread in areas where extra traction is required such as intersections, turning lanes and on steep hills.

- ⊕ In the last few years, the department has begun to purchase road salt spreading trucks which also have liquid tanks on them that are filled with a solution that is about 25% magnesium chloride. As the road salt is placed from the side of the truck, it is lightly coated with the magnesium chloride solution. This allows the salt to attack the ice quicker. These liquid tanks are on 20% of our winter maintenance fleet and are used at locations across the province.
- ⊕ To melt ice, salt needs to turn from solid granular particles into brine. The brine is what attacks the ice. The ability for salt to melt ice, in any situation, depends a lot on the climate where it is applied. Differences in air temperature, humidity, type of pavement, thickness of the ice or snow, wind conditions, traffic volumes, the amount of salt used and the timeliness of the application will produce different results.
- ⊕ In cold conditions a lot more salt is needed to melt ice. At temperatures below -6 degrees Celsius, road salt loses its effectiveness. For example at -1 degree Celsius 1 kg of salt will melt 46.3 kg of ice, but will melt only 3.2 kg of ice at -23 degrees Celsius.
- ⊕ Air temperature, and humidity, dictates the dew point of the air and whether or not ice will form on the pavement. Humidity can fluctuate and will be influenced by proximity to open water and the wind. Sheltered roadways, with forest along the roadside respond quite differently than the open prairie.
- ⊕ The sun plays a role in brine formation. Salt requires heat to change from a solid into liquid brine. On sunny days brine will set up quicker. On new pavements brine will set up quicker than on older grey pavements because they draw in the radiant heat of the sun faster due to the darker color.
- ⊕ The type of precipitation that falls has a large impact on the build up of ice on the road. Snow, sleet and hail are all forms of precipitation that are already frozen when they hit the pavement. As long as the pavement is below zero, it will not melt but will refreeze on to the surface of the road as ice. Freezing rain on the other hand falls as a supercooled liquid, and instantly bounds to the pavement as ice as soon as it touches it. This creates ice covered roads, very rapidly, and can often be hard for the motorist to see, often referred to as black ice.
- ⊕ Traffic can help, or hinder the condition of the road surface in the winter. If salt has been applied to the road, traffic helps by adding heat from tire friction which the granular salt uses to melt into liquid brine. Traffic also helps to break up ice and packed snow where brine is present underneath, moving the ice and snow out of the wheel paths. Where salt has not yet been applied, and snow is falling, or there is high humidity in the air, the warmth from the traffic tires can cause the snow to melt or the humidity to condense and freeze to the pavement as ice. This is why intersections seem to “ice up” even though it has not been snowing. The extra heat from the tires when stopping and accelerating a vehicle will condense humidity in the air which forms ice on the pavement.

The Role of Salt in Ice Removal*

- 1 Salt is spread on surface.
- 2 Salt melts through snow/ice forming brine.
- 3 Brine breaks bond with road surface and remaining snow/ice floats on brine.
- 4 Vehicle traffic breaks through the surface, reducing snow/ice to plowable slush and moving it to sides of road.



* The Salt Institute

- ✦ Living in Saskatchewan, wind conditions are always a component of winter storms. Winds can hamper snow clearing operations by creating snow drifts and reduced visibility causing many extra hours to clear the drifts. When treating ice with salt, wind can cause snow to blow across the highway and stick to the areas where melting has started. This can cause build ups of snow, and dilute the salt so that it's no longer effective. In cold temperatures, salt may sit as granular particles on the roadway because it is too cold for it to form brine; this makes it susceptible to the wind which can blow the salt off of the highway.
- ✦ Winter maintenance operators have to keep all these potential problems in mind when keeping our highways clear. Treating ice and snow on highways successfully is a very complex job. Years of experience getting to know the roads, and traffic patterns, on their beat help the operators to know how to respond to different types of weather and storm conditions. They learn how to predict where and when ice will form, and how much salt to put down to achieve the best results.

Winter Driving Safety

- ✦ Find out about driving conditions before leaving your home. Delay or cancel your trip if travel is not recommended. Make sure your vehicle is in good winter driving condition. Take a few more minutes to completely scrape ice off all your windows and mirrors, and brush off the snow from your driving lights, tail lights, windows and mirrors. Take some time to warm up your car so the windows do not fog up and impair your vision. Take extra time to get to your destination. Carry a winter car kit in your vehicle. If conditions worsen while you are driving, consider turning back or making a stop to wait it out. Inform those anticipating your arrival of your departure, driving time and the route you will be taking.
- ✦ Remember that it takes a lot further to stop on ice covered and snow packed roads than normal. Slush surfaces take twice as far, soft or loose snow takes three times as far, and packed snow takes four times as far. Ice covered roads can require up to 12 times further to stop your vehicle. Remember bridges and overpasses can be slippery when the rest of the roadway is not.

Watch out for the Snow Removal Equipment

- ⊕ Beware of the Snow Zone: Blading snow off the road creates a “mini blizzard” next to and behind the snowplow, especially in windy conditions. When you encounter a snowplow on the highway, slow down and drive with caution. Remember, snowplows operate at slower speeds when pushing snow and spreading salt and sand. If following a snowplow wait until they pull over, which they do about every 10 km, to allow safe passing. Every winter, snowplow operators are hit by motorists that don't see them, or see them too late.

Highway Closures in the Winter

- ⊕ The department may temporarily close any section of highway(s) during, or as a result of, winter storm conditions which result in any or all of the following:
 - Limited Visibility and Obstructions on the Roadway
 - Limited Visibility and Hazardous Surface Conditions
 - Obstructions on the Roadway
 - Hazardous Surface Conditions
- ⊕ Closures due to limited visibility will normally not result in a temporary highway closure. Closures are to be made when there is limited visibility which, in conjunction with another dangerous condition, endangers the safety of the motoring public.
- ⊕ In the event of reduced visibilities, the department will not erect or operate barricades for the purpose of closing a provincial highway.

Road Salt and the Environment

- ⊕ To ensure the impacts of road salt use on the environment are minimized, the department has developed a Road Salt Management Plan, which was published in April 2005. This was done in conjunction with the requirements of Environment Canada. It lays out the goals, and implementation targets for all areas of winter maintenance which involve the storage, handling and application of road salts. The Road Salt Management Plan incorporates the best practices set out by Environment Canada and the multi-stakeholder working group, with representation from the department, in the “Code of Practice for the Environmental Management of Road Salts”.
- ⊕ Application rates of salt and winter sand on highways are dependant on the snow and ice conditions on the pavement. Statistics compiled by Environment Canada show that Saskatchewan Highways and Transportation uses about 1% of the total consumption of road salts in Canada.

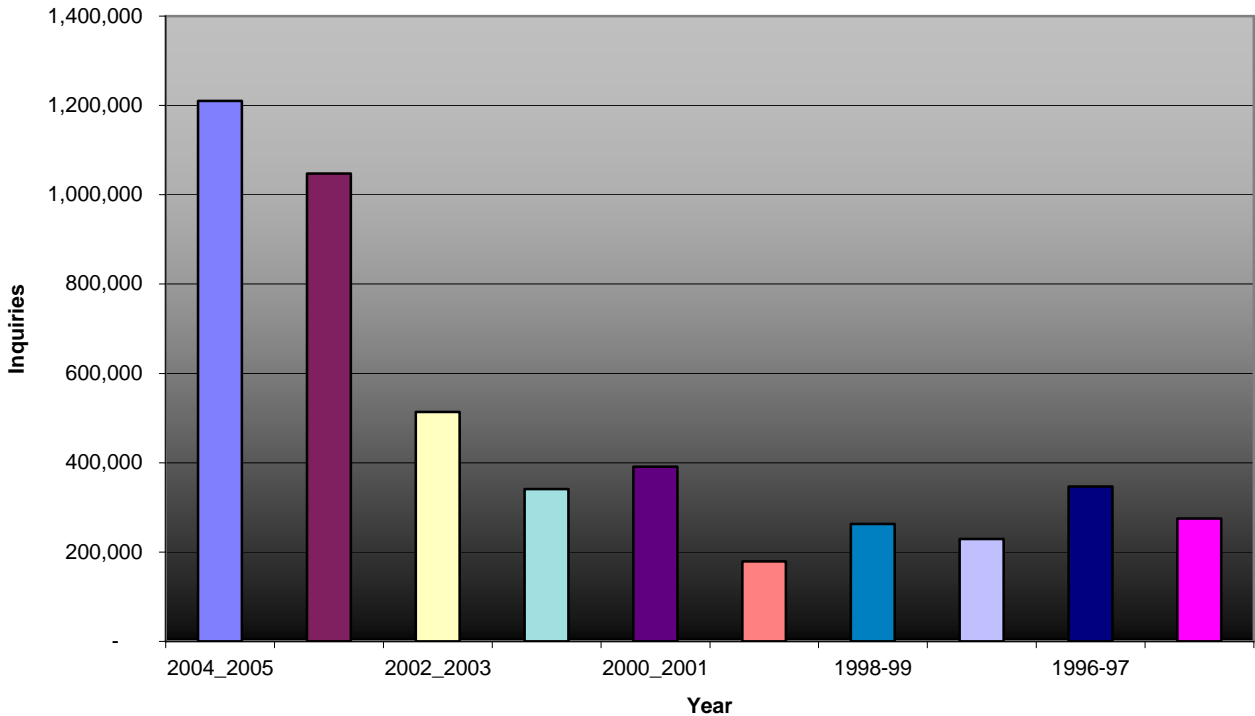
Highway Hotline

- ⊕ The department operates a Highway Hotline service, to provide the public with road conditions and highway driving information, as it relates to the safe travel of the highway users throughout the province.
- ⊕ During the winter this service is provided on a 24 hour, 7 day a week basis. Motorists can call in and listen to recorded telephone voice announcements, or they can access the information on the department website. Conditions are updated a minimum of three times daily at 8 a.m., 10 a.m. and 3 p.m. During severe weather conditions, updates are provided continually as conditions change. The logistics of providing information on road conditions is very demanding, due to unpredictable weather and the size of

the provincial roadway network. If you encounter severe conditions which we are not reporting you may report these conditions to any Saskatchewan Highways and Transportation office or notify the Highway Hotline at: 306-787-4986 - Southern Region; 306-933-5655 - Central Region; 306-953-3576 - Northern Region.

- ✦ The motoring public have demonstrated the value of this service by accessing the Hotline by Internet and phone more than 1 million times last year.

Total Inquiries per Year



Please call the Highway Hotline to check conditions before you travel.



www.highways.gov.sk.ca

SaskTel Cellular Network: *ROAD

Saskatchewan toll-free: 1-888-335-7623

Regina and area: 787-7623

Saskatoon and area: 933-8333

Hotline Terminology	
Good Winter Driving	No specific problems but there could be the occasional slippery section or snow drifts.
Icy	The entire driving surface is covered with ice.
Slush	A build up of slush on the driving surface as a result of moderate or heavy snow fall when pavement temperatures are at or near the freezing point creating driving conditions that may cause an unsuspecting driver to lose control of a vehicle.
Icy or slippery sections	A minor situation identified due to intermittent rain, frost, sticking snow or ice patches (includes light pavement frost).
Wet/freezing	Highway is wet, subject to freezing as temperatures drop.
Pavement Frost	Build up of frost that reduces braking power of vehicles.
Drifting snow	Ground drifting caused by winds which may affect surface conditions on the highway, such as sticking snow or may reduce visibility.
Swirling Snow	A condition created by traffic in loose snow that reduces visibility.
Loose Snow	Less than 8 cm of loose snow covers the driving surface that may cause some driving difficulties.
Heavy Snow	More than 8 cm of loose snow covers the driving surface. Traffic encounters problems when meeting or passing.
Snow Packed	This condition exists mainly on gravel roads where the entire driving surface is covered with packed snow.
Snow Drifts	Small snow dunes exist on the driving surface at intermittent intervals.
Travel Not Recommended	This means that visibility is less than 200 metres; and/or the surface is icy; and/or the highway is doubtful; and/or the highway may be blocked.
Closed	Highway is impassable (or has been closed for operational reasons).
Fog	Reported only when visibility is reduced.
Visibility Zero	You can see less than 200 metres. Under this condition highway maintenance equipment will not begin work on the road until visibility improves. Equipment already on the road may be removed if visibility continues to deteriorate to 100 metres or less.
Visibility Reduced	You can see less than 800 metres.
Visibility Good	You can see more than 800 metres.