

Chapter 4

Highways—Conducting Winter Maintenance on Provincial Highways

1.0 MAIN POINTS

Saskatchewan's road network is the largest in Canada on a per capita basis, consisting of approximately 26,500 kilometres of provincial highways. The Ministry of Highways is responsible for maintaining provincial highways in Saskatchewan.

Winter maintenance entails keeping provincial highways clear of snow and ice. Snow or ice covered roads create dangerous driving conditions for all highway drivers and increases the risks of sliding into the ditch or of collisions.

We assessed the Ministry of Highways' processes to conduct winter maintenance on provincial highways. At January 2023, we found the Ministry had effective processes, except in the following areas where it needs to:

- Sufficiently track whether winter maintenance equipment operators meet work scheduling safety requirements, which is a period of 10 consecutive hours of rest in every 24-hour period, or waive the mandatory rest period.

Equipment operators who waive mandatory 10-hour rest periods may become fatigued, increasing the risk of causing collisions. Tracking is imperative for the safety of the operators and others on provincial highways.

- Clarify terminology on the Highway Hotline to allow for consistent and informed decisions about winter driving conditions on highways.

Unclear terminology could result in drivers misinterpreting information on the Highway Hotline, which could cause them to decide to travel on a highway when it may not be safe to do so.

- Set a timeframe for reporting instances when not meeting service level expectations (e.g., not clearing snow within six hours of a snowstorm ending). Also, require managers to review these reports.

Without timely reporting of exceptions to levels of service, the Ministry cannot make timely adjustments to help ensure it meets its expectations for levels of service in the future. This means provincial highways may not be cleared of snow as quickly as they should be.

Effective processes for prioritizing snow and ice removal from provincial highways decreases dangerous road and driving conditions.



2.0 INTRODUCTION

The Ministry of Highways is responsible for maintaining provincial highways in Saskatchewan under Section 9 of *The Highways and Transportation Act, 1997*. Section 3 of the Act states that the Minister of Highways is responsible for highways, public improvements, transportation, and transportation systems, including managing transportation systems to promote safety and efficiency. This includes winter snow and ice control on provincial highways.

Transportation is critical to Saskatchewan’s economic success.¹ Saskatchewan’s road network is the largest in Canada on a per capita basis, consisting of approximately 26,500 kilometres of provincial highways, including over 16,000 kilometres of asphalt and granular pavement, over 4,000 kilometres of thin-membrane surface highways, almost 6,000 kilometres of gravel highways, and almost 280 kilometres of ice roads.²

The number and severity of storms varies each year affecting the number of staff and other costs (e.g., fuel, equipment maintenance) required to perform winter maintenance. The Ministry operates more than 300 snowplows throughout the province during the winter months, usually from November to April. It uses snow and ice removal equipment before, during, and after storms. Equipment operators are available 24/7. It also has contracts with a small number of service providers primarily for clearing roads in northern Saskatchewan.

Figure 1 highlights budgeted and actual costs for winter maintenance at the Ministry from 2017–18 to 2022–23. The Ministry has spent in excess of \$40 million on winter maintenance in each of the last five years. In each of the last five years, the Ministry also required a virement and/or a special warrant in excess of \$10 million to meet its budget shortfall for winter maintenance.³ In 2022–23, the Minister of Finance approved a virement of \$30 million for winter maintenance costs.⁴ The Ministry uses virements to move money from one part of its expense budget to another (e.g., infrastructure and equipment capital funding used to cover winter maintenance costs instead).

Figure 1—Budget and Actual Winter Maintenance Cost Analysis at January 2023

Fiscal Year	Budget	Actual	Budget Shortfall	Budget Shortfall Percentage
	(in millions)			
2017–18	\$29.3	\$39.9	\$10.6	36%
2018–19	\$29.3	\$42.7	\$13.4	46%
2019–20	\$29.5	\$47.8	\$18.3	62%
2020–21	\$29.5	\$50.6	\$21.1	72%
2021–22	\$29.7	\$58.9	\$29.2	98%
2022–23	\$37.2	Not Available	Not Available	Not Available

Source: Adapted from Ministry of Highways records.

¹ Ministry of Highways, *Business Plan 2022–23*, p. 1.

² Ministry of Highways, *Annual Report for 2021–22*, p. 4.

³ The Government uses special warrants to provide the Ministry with more funding than originally approved in its budget.

⁴ A virement has no effect on the spending limit of the Ministry; however, it allows for the movement of money among programs within the Ministry to meet changing conditions and priorities.

2.1 Risk of Ineffective Road Clearing During Winter

Severe snowstorms close highways due to dangerous road and driving conditions, and can strand drivers, who are then at an increased risk of harm due to collisions or an inability to obtain safe and warm lodging. Closed highways also limit the capacity to transport goods, services, and people throughout the province.

Snow or ice covered roads create extremely dangerous driving conditions for all highway drivers and increase the risks of sliding into the ditch or for collisions, especially with snowplows or graders. A collision with a snowplow or grader can cause the same types of injuries or death typically seen after any large truck collision. Due to the number and severity of storms during the 2021–22 winter season, collisions between vehicles and snowplows or graders were more than the four previous years combined (2021–22: 19 incidents, 2017–18 to 2020–21: 16 incidents total).⁵

Based on snowfall totals gathered from weather data collected at 23 locations in the province from 1981 to 2010, Saskatchewan has 53 days of snowfall annually on average with at least 0.2 centimetres; the province averages 122 centimetres of new snowfall each year. These averages range from a low in Saskatoon of 28 days and 73 centimetres in one year to highs of 84 days in Cree Lake and 209 centimetres in Collins Bay, both located in northern Saskatchewan.⁶

It takes much longer to stop on ice-covered and snow-packed roads. At 80 kilometres per hour on dry roads, it takes 69 metres for a passenger vehicle (e.g., a car) to come to a full stop.⁷ Distances double on slushy surfaces, triple in soft or loose snow, and are as much as four times longer for packed snow. Ice covered roads can require up to 12 times the normal stopping distance, or close to a full kilometre, at 80 kilometres per hour.⁸

Effective processes for prioritizing snow and ice removal from provincial highways decreases the risk of collisions due to dangerous road and driving conditions. Furthermore, the closure of provincial highways also results in economic consequences, as ground transportation of goods and services is limited when provincial highways are closed.

3.0 AUDIT CONCLUSION

We concluded, for the 15-month period ending January 31, 2023, that the Ministry of Highways had effective processes, except in the following areas, to conduct winter maintenance on provincial highways in Saskatchewan.

The Ministry needs to:

- **Sufficiently track whether winter maintenance equipment operators meet work scheduling safety requirements or waive the mandatory 10-hour rest period**
- **Clarify terminology on the Highway Hotline**

⁵ Ministry of Highways, *Annual Report for 2021–22*, p. 8.

⁶ www.currentresults.com/Weather/Canada/Saskatchewan/snowfall-annual-average.php (31 March 2023).

⁷ eclipsedriving.com.au/blog/car-stopping-distances (6 April 2023).

⁸ Government of Saskatchewan, *Factsheet Winter Maintenance*, www.saskatchewan.ca/residents/transportation/highways/highway-safety/winter-safety (1 December 2022).



- **Set a timeframe for reporting instances when not meeting service level expectations and require managers to review these reports**

Figure 2—Audit Objective, Criteria, and Approach

Audit Objective: Assess the effectiveness of the Ministry of Highways' processes to conduct winter maintenance on provincial highways in Saskatchewan for the 15-month period ending January 31, 2023.

Winter maintenance involves keeping provincial highways clear of snow and ice in winter. Provincial highways include asphalt and granular pavement, thin-membrane surface highways, gravel highways, and ice roads.

The audit did not include processes to conduct winter maintenance on the Regina Bypass since the Ministry hired a third-party company to maintain it for 30 years beginning November 1, 2019.

Audit Criteria:

Processes to:

- 1. Maintain reliable information on highway conditions during the winter and inform the public**
 - Gather accurate and timely data on weather and current road conditions across Saskatchewan
 - Update Highway Hotline with relevant and reliable information frequently
- 2. Develop a risk-informed highway winter maintenance plan**
 - Establish specific winter maintenance service objectives and key performance indicators
 - Determine maintenance strategies to prioritize winter maintenance
 - Evaluate maintenance strategies against available resources (e.g., consider requirement for service providers)
 - Determine key safety protocols (e.g., maximum number of working hours) for conducting winter maintenance
- 3. Complete highway winter maintenance**
 - Communicate to staff winter maintenance procedures and safety protocols consistent with standards
 - Conduct winter maintenance activities in accordance with established strategies and protocols
 - Adjust prioritized winter maintenance activities as necessary (e.g., during large snow events)
 - Track winter maintenance activities
- 4. Monitor highway winter maintenance performed**
 - Analyze progress of activities conducted (e.g., compared to service objectives) to inform future winter maintenance plans
 - Periodically report on winter maintenance (e.g., timeliness of clearing highways) to senior management and the public

Audit Approach:

To conduct this audit, we followed the standards for assurance engagements published in the *CPA Canada Handbook—Assurance* (CSAE 3001). To evaluate the Ministry's processes, we used the above criteria based on our related work, reviews of literature including reports of other auditors, and consultations with management. Ministry management agreed with the above criteria.

We examined the Ministry's policies and procedures relating to conducting winter maintenance on provincial highways in Saskatchewan. We interviewed key staff responsible for managing winter maintenance activities in Saskatchewan. We assessed the Ministry's processes for updating the Highway Hotline, training employees, conducting winter maintenance, and prioritizing ice and snow removal on provincial highways. We compared key policies and procedures with other jurisdictions across Canada. In addition, we tested samples of employee qualifications, Highway Hotline updates, daily winter maintenance activities conducted, exception reports, and reports to senior management and the public on winter maintenance activities.

4.0 KEY FINDINGS AND RECOMMENDATIONS

4.1 Highway Hotline Updated Consistently

The Ministry of Highways consistently provides accurate and timely updates on the current status of Saskatchewan's highways, as well as current weather forecasts to the public via its Highway Hotline.⁹

⁹ The Highway Hotline is the Ministry's website and application used to inform the public about current road conditions.

Saskatchewan has about 26,500 kilometres of provincial highways.¹⁰ The Ministry uses the Highway Hotline to provide information to the public on highway conditions, road closures, construction zones, and ferries and border crossings. There were over 14 million visits to the Highway Hotline in 2021–22.¹¹

The Ministry divides the province into three regions (i.e., north, central, and south) and 76 sections for purposes of winter maintenance. Each section consists of an average of 375 kilometres of provincial highway and is staffed by a minimum of three employees. The Ministry prepares a winter maintenance manual for each region every year, which outlines key service standards (e.g., when to remove snow). Each region's manual contains the Ministry's policies for winter maintenance, as well as information specific to each region (e.g., maps).

Equipment (e.g., snowplow) operators for each of these sections periodically submit the status of each highway's condition during the day. Operators phone, email, or fax reports directly to Highway Hotline staff who then update the website in real time with updated road conditions.

The Ministry requires operators to update the status of a highway segment a minimum of four times daily for both non-commuter roads (at 7:30 a.m., 10 a.m., 3 p.m., 6 p.m.) and for commuter roads (at 6 a.m., 10 a.m., 4 p.m., 6 p.m.).¹² The Ministry expects operators to provide supplemental updates to the Highway Hotline if road conditions change (e.g., during a snowstorm).

We tested updates to the Highway Hotline for 30 different winter days and found the Ministry consistently and accurately updated road conditions each day in accordance with established expectations (i.e., at least four times a day). For example, for one day tested, we found the Ministry updated the status of the highway segment 23 different times. Staff completed these updates to the Highway Hotline in a timely and accurate manner.

In addition, the Ministry uses reputable third parties such as Environment Canada and The Weather Network to provide Highway Hotline users with real time weather forecasts across the province. Our testing found the Highway Hotline consistently used the most recent weather forecasts and information.

Providing accurate and timely information on road conditions and current weather forecasts on the Highway Hotline allows the public to make safe and informed decisions when travelling on provincial highways.

4.2 Update Terminology on Highway Hotline for Clarity

The information and terminology on the online Highway Hotline is generally consistent with other Canadian jurisdictions; however, our analysis found some areas where the Ministry of Highways could improve terminology to help staff consistently assess and drivers interpret what is conveyed about the highway condition.

¹⁰ Ministry of Highways, *Annual Report for 2021–22*, p. 4.

¹¹ *Ibid.*, p. 11.

¹² The Ministry prioritizes updates for heavily driven highway sections—commuter roads (e.g., Saskatoon East, Lumsden, Southey)—early each morning so drivers know current road conditions when travelling to and from large population centres.



The Ministry uses key terminology for road conditions on the Highway Hotline. See **Figure 3** for definitions of key terminology. The Ministry uses both primary (e.g., winter conditions exist) and secondary (e.g., drifting snow) road conditions to inform the public on current road conditions. Primary road conditions are what the majority of the driving surface is like on the highway. Secondary road conditions are what other condition(s) exist on the highway. Operators also use these primary and secondary conditions to make their daily assessments of road conditions for the Highway Hotline.

Figure 3—Saskatchewan Winter Road Condition Terminology

Primary Road Condition	Definition
Report Not Available	Unable to report
Seasonal Driving	No specific problems; however, there could be occasional conditions
Winter Conditions Exist	If conditions other than seasonal driving are reported, it automatically shows winter conditions exist. This may include icy, slippery sections or swirling snow.
Travel Not Recommended	Visibility is less than 250 metres (poor); and/or the surface is icy; and/or the highway is doubtful; and/or the highway may be blocked.
Closed	Highway is impassable as it has been closed for operational reasons or weather
Secondary Road Condition	Definition
Snow Packed	This condition exists mainly on gravel roads where the entire driving surface is covered with packed snow
Swirling Snow	A condition created by traffic in loose snow that reduces visibility
Wet/Freezing	Highway is wet and subject to freezing as temperature drops
Drifting Snow	Ground drifting caused by winds which may affect surface conditions on the highway, such as sticking snow or may reduce visibility

Source: *Highway Hotline: Winter Road Terminology*. Ministry of Highways (22 March 2023).

We completed a review of other Canadian provinces with similar road conditions and weather patterns (e.g., Alberta, Manitoba) and found the information and terminology on the Highway Hotline is generally consistent with other jurisdictions.

The Ministry also consistently updated secondary road conditions to provide additional information on weather conditions impacting highways. Providing secondary road condition information to the public, such as drifting snow or swirling snow, exceeded information reported in other Canadian jurisdictions.

Our comparison with other Canadian jurisdictions noted a few areas where the Ministry can make improvements. For example, the Ministry could:

- Make it clear that travel not recommended means roads are unsuitable for non-essential driving, similar to Alberta’s definition
- Define what is meant by ‘highway is doubtful’ when using this term in the travel not recommended definition in **Figure 3**
- Clearly document what an occasional condition means in the definition for seasonal driving in **Figure 3**

Unclear terminology could lead to operators making inconsistent assessments of road condition. Also, it could result in drivers misinterpreting information on the Highway Hotline,

which could cause them to decide to travel on a highway when it may not be safe to do so and, as a result, could affect safety.

1. We recommend the Ministry of Highways update the Highway Hotline to provide clear and concise road condition terminology for winter driving.

4.3 Winter Levels of Service Established

The Ministry of Highways identified and documented its Winter Levels of Service, which determine winter maintenance activities. It also appropriately documented that extreme weather events are the primary risk associated with it not meeting its level of service.

The Ministry uses three levels of service for winter snow removal in the province. These levels of service determine what activities Ministry staff (e.g., equipment operators) will complete and when. The number of vehicles per day (VPD) traveling on provincial highways determines the level of service as noted in **Figure 4**. The more vehicles that use the highway, the faster the Ministry will treat ice on the highway and remove snow.

Figure 4—Ministry of Highways Winter Levels of Service

Service Level	Standard
<p>Level 1: Roads are part of the National Highway System (NHS), and all other highways with VPD > 1,500</p>	<p>Remove snow on driving lanes within 6 hours of the cessation of a storm.</p> <ul style="list-style-type: none"> • The guideline to initiate snowplowing on Level 1 highways is when 3 cm of snow accumulates on the driving lanes. Once initiated, snowplowing continues until cessation of the storm event or until the Ministry determines that resources cannot keep up with storm conditions. • Clear all traveled lanes such that the surface is predominantly visible. <p>Apply or assess Level 1 highways for ice control within 6 hours of the cessation of a storm.^A</p>
<p>Level 2: Roads are all highways, excluding the NHS, with VPD between 300 and 1,500</p>	<p>Remove snow within 12 hours of the cessation of a storm.</p> <ul style="list-style-type: none"> • Similar to Level 1, the guideline to initiate snowplowing on Level 2 highways is when 3 cm of snow accumulates in the driving lanes and, once initiated, snowplowing will continue until cessation of the storm event or until the Ministry determines that resources cannot keep up with the storm conditions. • Snowplowing should commence on Level 2 highways when resources are available without jeopardizing service on Level 1 highways. • Clear all traveled lanes such that the surface is predominantly visible. <p>Apply or assess Level 2 highways for ice control within 12 hours of the cessation of a storm.</p>
<p>Level 3: Roads are all highways, excluding the NHS, with less than 300 VPD</p>	<p>Remove snow within 24 hours of the cessation of a storm event.</p> <ul style="list-style-type: none"> • Snowplowing should commence when resources are available without jeopardizing service on Level 1 and Level 2 highways. • Clear traveled lanes such that the surface may have intermittent bare wheel paths. <p>Apply or assess Level 3 highways for ice control within 24 hours of the cessation of a storm.</p>

Source: Adapted from www.saskatchewan.ca/residents/transportation/highways/highway-safety/winter-safety (22 March 2023).

^A Ice control is operators applying sand and/or chemical de-icer on a driving surface to add traction and aid in the removal of snow and ice.

We compared Saskatchewan's levels of service to other Canadian jurisdictions and found the Ministry's standards reasonable and appropriate. The Ministry tracks VPD to determine levels for each highway. It tracks VPD annually for significant highways (e.g., Trans-



Canada Highway), and at least once every three years for all other provincial highways.¹³ Our testing found the Ministry updated all VPD in accordance with its policy to keep current and relevant measurements of vehicle traffic on Saskatchewan highways. This enabled the Ministry to keep each highway's service level standard appropriate and up-to-date.

Documented and measurable levels of service allow the Ministry to determine resources needed to meet these levels of service and guide staff in prioritizing what winter maintenance activities they conduct and when.

4.4 Winter Maintenance Strategies and Manuals Reasonable

The Ministry of Highways established winter maintenance manuals, which document its Winter Levels of Service and other key winter maintenance activities (e.g., ice removal) expected annually. However, management has not comprehensively reviewed and conducted a jurisdictional scan of winter maintenance strategies and standards since 2005.

The Ministry provides a winter maintenance manual annually to each of its three regions (i.e., north, central, and south) in the province. The manuals include key winter maintenance service standards and guidance on key winter maintenance activities (e.g., snow and ice removal strategies). For example, the manuals provide strategies for the effective removal of packed and drifting snow, snow-blocked stretches of highways, ice treatment for freezing rain, and the handling of pavement frost.

The Ministry has not established a frequency for review and approval of its winter maintenance manuals and Winter Levels of Service to identify whether they require any adjustments due to changes in industry, good practice, or actual recent winter maintenance activities within the province. Our testing found these standards, and Winter Levels of Service in the manuals, had not changed significantly within the last 8 to 10 years. That said, as noted in **Section 4.3**, we found the Winter Levels of Service are reasonable and align with other Canadian jurisdictions.

Our review of other Canadian jurisdictions found winter maintenance strategies and technologies (i.e., snowplows, salt and sand usage) remained relatively stagnant over the last 20 years. As a result, the Ministry does not need frequent updates to its documents. However, undertaking and documenting its review of key strategies (e.g., applying salt or sand to ice) and winter maintenance service standards on a periodic basis (e.g., once every five years) is important to show that the Ministry confirms existing standards and strategies continue to meet current good practice.

For example, the Ministry currently does not have a separate Winter Level of Service for ice roads (ice roads are currently Level 3). Although the VPD traffic on these roads would be low, these roads are essential for communities serviced by them in the winter, making access and safe travel on these roads important. Furthermore, the Ministry is currently piloting an Automatic Vehicle Location (AVL) project that provides monitoring capabilities using GPS for each snowplow with the technology installed. The manuals will require

¹³ Vehicle per day (VPD) data is collected using either portable or permanent counters. Portable counters record 48-hour samples of traffic on that highway and permanent counters record traffic year-round on the highway. Every year, portable count samples are collected on about 1/3 of the provincial highway network, so, on average, each highway section receives updated counts every three years.

updates when the Ministry implements this pilot project across the Ministry's fleet of winter maintenance equipment (e.g., snowplows).

We suggest a periodic review process would allow the Ministry to show it formally confirmed that current winter maintenance strategies and service standards are reasonable and appropriate.

4.5 Annual Winter Maintenance Activities Appropriately Scheduled

The Ministry of Highways outlines planned winter maintenance activities each year in its winter maintenance manuals. Individual regions and sections create staffing schedules to align winter maintenance activities with established strategies.

The Ministry's winter maintenance manuals outline that its planned winter maintenance activities are snow removal and treating ice on highways within its Winter Levels of Service (e.g., within six hours of snowstorm ending for a Level 1 highway). The Ministry uses third-party service providers, borrows internal staff from nearby sections, or has employees work overtime as needed to consistently meet its Winter Levels of Service.

Figure 5 highlights the total number of staff and equipment used by the Ministry broken down by region to highlight resources used when conducting winter maintenance across the province.

Figure 5—Staff and Equipment Totals Per Region as of March 29, 2023

Resource	Northern Region	Central Region	Southern Region	Total
Staff	143	160	163	466
Snowplows	76	124	118	318
Graders ^A	63	28	27	118

Source: Adapted from Ministry of Highways records.

^A The northern region requires additional graders since it has a larger proportion of gravel roads in comparison to the central and southern regions.

Our testing of winter maintenance schedules found the Ministry had appropriate processes to determine the minimum number of operators and supervisors required to meet its Winter Levels of Service for each individual region and section. We tested eight different section schedules and found each section completed a staffing schedule as expected. We found each section scheduled the minimum number of staff to meet the section's required level of service.

We also tested 10 daily activities recorded by operators and found the section met its minimum equipment requirements (e.g., snowplows, trucks) for the day tested. For example, for the Rosthern segment (204.2 kms Level 1 highway), we found the Ministry requires six staff, four snowplows, and one grader. Our testing of daily activity indicated the segment met the required number of staff and equipment.

We tested one major storm and found the Ministry reassigned staff to help it meet its Winter Levels of Service. We found the Ministry had more operators working on the day of the storm and in the following two days which aligns with the Ministry's strategies to address these weather events.



In rare circumstances, the Ministry enters into third-party service contracts to address any shortfalls between actual resources available and resources required. As of January 31, 2023, the Ministry has six contracts with service providers to maintain roads in northern parts of Saskatchewan. For the two contracts we reviewed, we found the contracts included specific requirements to meet the Ministry's Winter Levels of Service. We tested eight weeks and found the Ministry actively monitored each service provider's work to ensure it aligned with its service standards.

Appropriately scheduling winter maintenance activities in advance of the winter season allows the Ministry to ensure it has sufficient resources in place to conduct winter maintenance.

4.6 Better Tracking of Daily Winter Maintenance Activities Needed

The Ministry of Highways does not have efficient ways to track daily winter maintenance activities including whether equipment operators comply with required rest periods or choose to waive their right to a minimum 10-hour rest period.

The Ministry currently utilizes an IT system to track daily winter maintenance activities (e.g., labour hours, machine hours, salt used). Supervisors enter winter maintenance activities approximately daily into the IT system from manual reports from all of their operators. We tested daily activities from manual work reports and timecards by comparing them to the Ministry's daily activity IT system and payroll system and found activities recorded in the IT systems did not always align with manual work reports and timecards.

We found:

- Five of 10 items' labour hours from the work report (50%) did not agree to the Ministry's daily activity IT system
- Two of 10 items' labour hours from the work report (20%) did not agree to timecards in the payroll system
- Two of seven items' salt and sand usage from the work report (30%) did not agree to the Ministry's daily activity IT system

Not properly recording daily winter maintenance activities increases the risk of reports to senior management containing inaccurate or incomplete information.

Although we identified differences in recorded daily winter maintenance activities, they were mostly minor (e.g., labour hours differed by three hours). Overall, the differences were likely data input errors.

The Ministry is in the pilot stage of implementing an Automatic Vehicle Location (AVL) system. The AVL system will provide real-time, accurate tracking of equipment location (i.e., GPS). As of February 2023, the Ministry installed the AVL system in approximately 300 of 318 snowplows in the Ministry's fleet.

We found the system tracked current and historical snowplow locations. Having real-time monitoring will help the Ministry more accurately track equipment location.

The Provincial Government and the union have a Letter of Understanding requiring a mandatory period of 10 consecutive hours of rest for each operator in every 24-hour period for employee safety. The Ministry considers this rest period when scheduling staff. However, the Ministry has a waiver for equipment operators when they choose to not take their required rest period.

The Ministry does not sufficiently monitor whether employees receive a minimum 10-hour rest period between shifts. When supervisors enter time in the IT system for their section, the system tracks all hours entered under the supervisor's name, instead of tracking the time worked of each individual operator. Therefore, reporting appears as though the supervisor worked the total hours that the entire crew worked for that day. Thus, the Ministry does not have the data by operator to be able to monitor work and rest requirements.

An employee may waive their rest period due to extreme weather conditions, which requires longer hours to clear roads or more staffing requirements during a severe weather event. The Ministry requires a supervisor to approve each rest-period waiver. By allowing staff to waive the required rest period, the Ministry can schedule staff to assist in meeting its Winter Levels of Service.

Our testing found the Ministry is not formally tracking which employees agreed to waive this rest period, so it is unaware of how many employees waived their rest periods. Furthermore, we found only two of seven employees tested documented their agreement to waive their rest period. The remaining five employees did not have a completed waiver indicating they agreed to waive their rest period. For these five, management indicated the employees and the supervisors reached a verbal agreement.

Not properly tracking or approving waiver agreements when employees choose to waive their 10-hour rest period increases the risk that the Ministry does not know whether equipment operators meet work scheduling safety requirements. Equipment operators who waive mandatory 10-hour rest periods may become fatigued. Fatigue increases the risk of causing collisions, and may make the Ministry liable for accidents caused by an operator who did not comply with rest periods.

2. We recommend the Ministry of Highways sufficiently track whether winter maintenance equipment operators meet work scheduling safety requirements (e.g., comply with rest periods) or waive mandatory 10-hour rest periods.

4.7 Timely and Accurate Exception Reporting Needed

The Ministry of Highways requires operators to record instances (i.e., exceptions) when they were unable to meet Winter Levels of Service. However, the Ministry does not have a timeframe set for completing exception reporting or require review of these reports.

The Ministry expects an operator to complete an exception report when an operator cannot meet the Winter Levels of Service. For example, a snowplow breaks down and the operator cannot remove snow within the standard expected timeframe. Staff report the number of Winter Levels of Service exceptions to senior management monthly. Senior management uses this reporting to keep apprised of activities, allowing them to make informed decisions



when planning and forecasting resources for the highway sections during the winter. For example, if a certain section sees significant exceptions occurring throughout the year, the Ministry can adjust resources to provide that section with additional resources to meet the Winter Levels of Service.

As noted in **Figure 6**, the Ministry reported 46 exceptions during our audit. This is an average of approximately five exceptions for each month that required winter maintenance activities to be completed. About 35% of these exceptions were Level 1 roads where staff did not meet Winter Level of Service expectations. This means staff should have cleared those highways within six hours of the winter storm ending, but did not.

Figure 6—Winter Maintenance Levels of Service Exceptions Reported Between November 1, 2021 and November 30, 2022

Level/Region	Exceptions Reported
Level 1	16
Level 2	9
Level 3	21
Total	46
Northern Region	29
Central Region	0
Southern Region	17
Total	46

Source: Adapted from Ministry of Highways records.

We found the Ministry did not have an established frequency for when staff submit exception reports. As a result, for three of nine exception reports tested, we found staff did not submit the report until at least a week after the event took place.¹⁴ For one exception report tested, staff did not submit the exception report until 79 days after the event took place. This means the reports to senior management did not include the exception until over two months later.

Without timely reporting of exceptions to levels of service, the Ministry cannot make timely adjustments to help ensure it meets its expectations for levels of service in the future.

3. We recommend the Ministry of Highways set a timeframe for reporting instances to management when not meeting service level expectations for highway winter maintenance.

Ministry management told us the area with an exception report submitted 79 days after the event only completed the report after another subsequent exception took place and required reporting. The Ministry is not adequately verifying staff report Winter Levels of Service exceptions.

For all nine exceptions tested, we found the District Operations Manager in charge of the area had not documented any review of these exception reports. Having a manager review exceptions confirms the accuracy of an exception report's content and allows the Ministry to adjust resources as needed to prevent future exceptions from occurring.

¹⁴ One week allows time for the operator to address the significant weather event and still have two consecutive days of rest before submitting the exception report.

Furthermore, managers actively monitor the winter maintenance activities their operators complete. By having managers review exception reports timely, this would serve as a completeness check that all exceptions that should be reported by operators are reported.

4. We recommend the Ministry of Highways require managers to review instances where staff did not meet service level expectations for highway winter maintenance.

4.8 Sufficient Monthly Reporting and Forecasting Conducted

The Ministry of Highways appropriately compares winter maintenance activities to service standards by preparing and providing monthly scorecard reports to the appropriate levels of management. It also tracks winter maintenance costs on a monthly basis and prepares monthly forecasts for management.

The Ministry prepares an appropriate Provincial Winter Level of Service scorecard report monthly. This report highlights winter maintenance expenditures for each region and the province as a whole for that month. It also outlines other key variables such as salt and sand usage, monthly Winter Levels of Service exception reports, and the average number of snow and ice days (e.g., days spent plowing) worked by operations staff. For example, from October 2022 to January 2023, Ministry crews cleared snow for an average of 31 days and treated ice on highways for an average of 22 days. Our testing of two scorecard reports found staff prepared them monthly and provided them to the appropriate levels of senior management to inform them of winter maintenance activities.

Each region in the province prepares a monthly forecast relating to expected winter maintenance costs. The Ministry compiles these regional forecasts into a Ministry-wide forecast each month and provides it to senior management. Our testing of two monthly forecasts found staff prepared the regional forecasts as expected and the Ministry compiled them into the Ministry-wide forecast. We found the Deputy Minister approved both of the forecasts tested.

In both fiscal 2021–22 and fiscal 2022–23, the monthly forecasting process identified the Ministry had a significant budget shortfall for winter maintenance costs. The Ministry appropriately requested, and ultimately received, a special warrant or virement to address the shortfall between budgeted and forecasted costs. See **Figure 1** for the actual and budget expenses for winter maintenance for the past five years.

Sufficient monthly reporting and forecasting allows senior management to identify when potential issues arise and address these timely.

4.9 Appropriate Safety Protocols Established

The Ministry of Highways established appropriate safe-operating procedures, hazard identification exercises and assessments, and frequent safety meetings to discuss any pertinent safety hazards or concerns.



The Ministry provides safe operating procedures to operators for:

- Winter maintenance activities
- Winter clean up (e.g., for highway intersections, residential and business areas and interchanges)
- Winter surveillance and reporting

Staff can easily access these key safety protocols and each region's winter maintenance manuals via the Ministry intranet. Also, management posts key safety protocols on shop walls for staff to review. Our comparison of Ministry safe operating procedures (e.g., Winter Clean Up Safe Operating Practice) to good practice in other Canadian jurisdictions found the Saskatchewan procedures were both sufficient and appropriate in aiding operators to conduct winter maintenance activities safely.

Each fall, district supervisors complete a hazard identification exercise with employees. Supervisors travel the highways with operators and identify any potential safety hazards, which may be difficult to observe when winter driving conditions exist (e.g., sharp shoulder, curve, low power line). They mark these hazards with blue flags. If staff identify any additional hazards during the winter season, they discuss these at morning safety meetings. We observed these discussions taking place during our attendance at a morning meeting.

Operations staff hold regular meetings to discuss key safety protocols and identify any potential new or emerging hazards. Meetings take place every Monday morning, as well as when a new employee comes in during the week. We found employees sign off on an attendance sheet as evidence of attending the meetings.

The Ministry also prepares a Salt Management Plan in accordance with Environment and Climate Change Canada guidelines. Our testing of the Ministry's 2018 Salt Management Plan found it considered and included all key aspects of the Environment and Climate Change Canada standard. For example, the Ministry documented its salt application rates consistent with the Transportation Association of Canada's salt management practices. The Ministry recommends using slightly less salt than is allowed by Environment and Climate Change Canada. This shows the Ministry is using good practice as using excess salt can have adverse impacts on the environment.

Established safety protocols and hazard identification exercises allow Ministry staff to conduct their duties in a safe and suitable manner. Regular meetings between operations staff provide an additional opportunity to discuss any new or emerging safety issues to keep both operators and highway drivers safe.

4.10 Adequate Training Provided to Winter Maintenance Staff

The Ministry of Highways requires appropriate qualifications and has adequate training programs to ensure equipment operators who conduct winter maintenance activities are sufficiently qualified and trained.

The Ministry provides training for new employees to ensure they are properly qualified to operate equipment. The Ministry also provides training to existing employees each time there are changes to processes or equipment. For example, the Ministry requires operators to have snowplow, wing, and sander training; tandem truck training; and a valid Class 1A licence before operating a snowplow. We tested 10 equipment operators' qualifications and found they all had sufficient and appropriate training and qualifications in each of these areas.

The Ministry's 2018 Salt Management Plan requires operators to take Salt SMART (Spreading, Maintenance, Application Rates, and Timing) training once every three years. Our testing of 10 employees found nine employees took the training. One employee did not require the training as the employee worked in an area that does not require salt (i.e., on gravel roads).

However, we found two employees had taken the training more than three years ago, and the Ministry did not have records when four of the employees had last taken the training, but knew it was before June 2020. The Ministry indicated these individuals would be re-enrolled in the course in the near future as a refresher on good practices associated with using salt. We note the Salt Management Plan was last updated in 2018 and our comparison of the Ministry's plan to Environment and Climate Change Canada guidelines noted no significant areas of concern.

Hiring and training appropriately qualified personnel is imperative to keeping both operators and highway drivers safe in the winter.

4.11 Complaints Addressed Quickly and Efficiently

The Ministry of Highways efficiently tracks and addresses public complaints in a timely manner.

The Ministry established a policy to address any public complaint within five days of receiving the complaint. It implemented a system to track complaints when received. The Ministry received approximately 780 winter maintenance-related complaints during our 15-month audit period.

Our testing of 15 winter maintenance-related complaints found the Ministry properly tracked, responded to, and ultimately addressed the issue associated with the complaint. For example, the Ministry received complaints about highway conditions and damage to personal vehicles. For all 15 complaints tested, the Ministry responded to the complaint within three days, exceeding its requirement to respond within five days.

Appropriately tracking, monitoring, and rectifying complaints allows the Ministry to quickly address any issues affecting the public.

4.12 Sufficient Reporting to the Public Provided

The Ministry of Highways reports sufficient and appropriate information to the public relating to its activities for conducting winter maintenance on highways in Saskatchewan.



Each year, in its annual report, the Ministry reports on the progress of key actions and actual activities. This includes winter maintenance-specific actions such as number of phone calls to the Highway Hotline, number of exceptions to Winter Levels of Service, and number of collisions with snowplows or graders during the year. For example, in 2021–22, the Ministry reported 27 Winter Levels of Service exceptions and 19 snowplow or grader incidents.¹⁵

In addition, the Ministry also provides periodic information to the public educating them on safety issues arising from winter maintenance activities on highways. For example, during 2022, the Ministry posted snowplow safety information online and conducted TV, radio, and social media ads outlining the “snow zone.” The snow zone occurs when blading snow off the road creates a mini blizzard next to and behind a snowplow, especially in windy conditions.

Educating the public about key safety measures when around snowplows helps to protect both snowplow operators and drivers. Informing the public of actual winter maintenance activities keeps the public informed and aware of activities conducted during the year.

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¹⁵ Ministry of Highways, *Annual Report for 2021–22*, pp. 8 and 11.