

**ÉVALUATION OF WINTER MAINTENANCE RESULTS BY IMPLEMENTATION  
AND MEASUREMENT OF A PERFORMANCE INDICATOR : THE EXPERIENCE  
OF THE MINISTÈRE DES TRANSPORTS DU QUÉBEC**

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## Summary

All road administrations responsible for management of a road network are faced with the same challenge every year – to assure winter users of a safe and reliable system. This is an essential and priority mission, which contributes directly to economic development by maintaining mobility and safety on the road network during passenger and freight transportation activities.

The Ministère des Transports du Québec, in the past few years, has undertaken several performance improvement steps, by implementing ISO in operational units and prioritizing production and implementation of technological developments for constant improvement of its winter maintenance effectiveness.

Based on the annual operating budget of around \$180 million currently dedicated to this purpose, one of the new concerns of senior management at the Ministère des Transports du Québec is measuring the performance of the “Snow removal and de-icing” product and service delivered to users. Out of a concern for sending a clear message to all of the Department’s managers that this concern is a priority, a specific result was also formulated in the Department’s strategic plan and is one of the 18 results targeted for 2001-2004.

The Ministère des Transports du Québec, in the past three years, has therefore embarked on a vast process of development and implementation of a winter maintenance performance indicator. This is the “Rate of compliance with winter maintenance requirements” performance indicator compiled for all contractors (nearly 400) who perform contracted maintenance of sections of the Québec road network on behalf of Transports Québec.

A winter maintenance performance measurement tool has therefore been developed and implemented within all of operational units in Québec. This is an innovative, results-based management approach, which is intended to measure the performance achieved and improve the service offered to our clientele through the resulting analysis and the implementation of an improvement process.

On the strength of the experience of the past three years, we have been able to fine-tune our winter performance measurement system and develop complementary tools allowing us to ensure the reliability of the data.

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## 1.0 Introduction

All road administrations responsible for management of a road network are faced with the same challenge every year – to assure winter users of a safe and reliable system.

The Ministère des Transports du Québec annually awards nearly 800 contracts for snow removal and de-icing on 80% (25,400 km) of the roads under its responsibility and performs maintenance on the remaining 20% (6300 km) with its own workforce. The average consumption of the past three years (2001 to 2003 winter season) is around 780,000 metric tonnes of melting agents (referring here only to the quantities of de-icing salt). An operating budget of around \$180 million is dedicated to this purpose annually and accounts for more than half, or 75% of the total budget allocated to perform all road maintenance activities.

Based on the preponderant issues in terms of highway safety and maintenance of winter user mobility on the road network, the Ministère des Transports du Québec undertook several strategic reflection and repositioning exercises on this matter, which led to the implementation, throughout all of the Department's territorial units, of different continuous improvement approaches in winter maintenance. We need only consider the recent road weather developments of the past four years and the implementation of new technologies to support the winter maintenance decision-making process.

At the same time, performance measurement regarding the delivery of goods and services to the public became a major government issue following the adoption of the new Public Administration Act in May 2000. This Act called for the implementation of new approaches through implementation of results-based management.

The Ministère des Transports du Québec, in the past three years, has therefore embarked on a vast process of development and implementation of a winter maintenance performance indicator. This is the "Rate of compliance with winter maintenance requirements" measurement.

We will present the main factors that have led to the development and implementation of a winter maintenance performance indicator. On the strength of this experience, we will also present the challenges encountered and the conditions for successful implementation of performance measurement throughout all of a road administration's units.

## 2.0 A new government results-based management framework

The new Public Administration Act was the triggering factor that led the Ministère des Transports du Québec to implement a results-based management framework, rooted in the principle of transparency, with the ultimate purpose of delivering quality services to the public. Serving the public well is not a new idea for the Government of Québec. The Public Administration Act reaffirms this priority attached by the government administration to the quality of services by defining compulsory mechanisms for transparent accountability to the public.

- **Principle of accountability**

The new Act recognizes a role for parliamentarians in government action and their contribution to the improvement of public services by promoting the accountability of the government administration in the National Assembly.

- **A result-based management framework**

This new Act generalizes results-based management for the entire government administration. Planning at all levels will be based on known objectives and precise targets, supported by performance indicators that allow measurement of the results.

Since April 1, 2001, the multiyear strategic plan is the primary management tool in which each department or agency sets out the objectives and the target results for the period covered. Moreover, since April 1, 2002, the annual management report presents the results obtained in relation to the forecast objectives.

## 3.0 A strategic plan that includes a targeted result for winter maintenance

In accordance with its assigned mission,

*“The mission of the Ministère des transports is to ensure the movement of people and goods throughout Québec on safe, effective transportation systems that contribute to the economic, social and sustainable development for Québec.”*

Under the Public Administration Act, the Ministère des Transports du Québec adopted a new strategic plan for 2001-2004, whereby it formalizes three major orientations. Orientation 2 specifically associated with highway safety draws our attention here, given that the targeted winter maintenance result is attached to it.

To make the connection to the winter maintenance performance indicator, here is an excerpt from the 2001-2004 strategic plan:

### Orientation 2

*“Safer transportation in collaboration with all private and public agencies involved.”*

### Targeted result

*“Contribute to reducing the number of fatalities to 650 and serious injuries to 4750 by 2005 on Québec roads, particularly through effective maintenance adapted to winter traffic density.”*

A performance indicator defined as “Average rate of compliance with winter maintenance requirements” was then developed and implemented in all of the Department’s territorial units to measure the compliance of the results and services provided with the specifications identified in the winter maintenance contract documents.

## 4.0 Scope of the performance indicator

The Ministère des Transports du Québec annually awards a total of 800 contracts for snow removal and de-icing on nearly 80% of the roads under its responsibility (25,400 km out of 31,993 weighted km <sup>\*1</sup>). Half of these 800 contracts (about 400 contracts) are performed by private companies and the other half by municipalities wishing to match certain Ministère des transports road sections with maintenance of their own network.

Given the major monetary issues involved in reliable in-situ performance measurement by persons who are not party to the process in the territorial units, it was initially agreed to prioritize implementation of a performance indicator to measure the rate of compliance with the requirements for work performed on contract, especially for private contractors (70% for the total network). Measurement of performance for work performed in-house (20% of the network, or 6300 km) and roads maintained on contract by municipalities (10% of the network, or 3150 km) would be prioritized in a second stage.

**Table No. 1 – Distribution of winter maintenance workload**

	% budget	% of weighted km	Number of routes/contracts
Contracts	63	66	382
In-house	26	22	124
Municipalities	11	12	364

<sup>1</sup> Weighted length: fictitious length resulting from the weighting of the actual physical length by the number of additional lanes to obtain a length equivalent to a network with two adjacent lanes.

## 5.0 The bases of the performance indicator

Based on the internal guidelines already in force, the managers responsible for monitoring performance of contracted winter maintenance work are responsible for formalizing an annual report on the contractor's performance. The development of the indicator evaluation grid was therefore based on the nine (9) quality criteria defined in the internal guidelines.

**Table 2 – Evaluation of supplier performance (V-2964)**

Criteria and proposed indicators	
Snow removal service contract	
Criteria	Indicators
1) Quality of services rendered	<ul style="list-style-type: none"> <li>▪ Compliance with service levels</li> <li>▪ Delay in responding</li> </ul>
2) Quality of resources	<ul style="list-style-type: none"> <li>▪ Equipment and personnel</li> </ul>
3) Quality of communications and cooperation	<ul style="list-style-type: none"> <li>▪ Condition of roads: reports to the Service Centre</li> <li>▪ Partnership between contractors and the Ministère des transports</li> </ul>
4) Compliance with deadlines	<ul style="list-style-type: none"> <li>▪ Compliance with contract deadlines (garage, equipment, reserves of materials, storage site, etc.)</li> </ul>
5) Consumption of materials	<ul style="list-style-type: none"> <li>▪ Quantity used</li> <li>▪ Quality of melting agents/abrasives</li> </ul>
6) Respect for public and private property	<ul style="list-style-type: none"> <li>▪ Damage to safety equipment, utilities, mailboxes, residence windows, etc.</li> </ul>
7) Compliance with laws, regulations and by-laws	<ul style="list-style-type: none"> <li>▪ Highway Safety Code</li> </ul>
8) Founded complaints from the public	<ul style="list-style-type: none"> <li>▪ Number</li> <li>▪ Importance</li> <li>▪ Impact</li> </ul>
9) Other (specify)	

An exhaustive correlation exercise between these criteria and all of the contract requirements of the winter maintenance contracts was carried out. Each requirement was grouped under each of the nine criteria and weighted to obtain a total of 100 points. This exercise thus made it possible to specify these quality criteria and rely on an evaluation grid for measurement of our winter maintenance performance indicator.

## 6.0 The winter maintenance performance indicator evaluation grid

The evaluation grid for the indicator thus defined makes it possible to establish a direct link with the measurement of compliance with all of the contractual requirements. Together the nine quality criteria cover a total of 20 contractual requirements, which are evaluated according to the following parameters:

**Table 3 – “Compliance with requirements” evaluation parameters**

First parameter	Meets the requirements.
Second parameter	Have issued a request for adjustment or preventive intervention.
Third parameter	Have issued more than one request for adjustment or preventive intervention.
Fourth parameter	Have issued a notice of warning or reprimand.
Fifth parameter	Have issued more than one notice of warning or reprimand.

The aforesaid parameters make it possible to measure whether or not the contractual requirements are achieved and have been defined to leave no room for interpretation on the part of the person responsible for evaluation in the territory. A training guide to support measurement of this indicator has been produced and distributed to all the players concerned. A copy of the indicator evaluation grid is appended in Schedule 1.

The parameters are defined as follows:

- ◆ Meets the requirements: all the requirements are met without any request for adjustment or written notice.
- ◆ Have issued a request for adjustment or preventive intervention: communication to the contractor to make an improvement regarding one or more of the requirements of the contract. This request must be made in the form of an oral communication, of which a record is kept, or a written notice addressed to the contractor.
- ◆ Have issued a notice of warning or reprimand: a notice of warning or a notice of reprimand is written correspondence, prescribed in the contract, to note any breach of the contractual requirements that may or may not have an impact on user safety.
- ◆ Not applicable: the use of the “not applicable” parameter allows better adaptation of the evaluation to the special conditions of the period, the contract or the climate. When this parameter is selected, the weight of this component is distributed among the other requirements.



## 7.0 Advantages of the evaluation grid developed to measure the performance indicator

Given the size of the clientele concerned in Québec, nearly sixty different respondents from the territorial units, the grid developed to evaluate the performance indicator is simple to use and adapted to current winter maintenance contract supervision practices. It also allows formalization of a representative evaluation of the contractor's average service delivery throughout the winter season, by uniformly weighting the result obtained over three predefined evaluation periods.

Here is an overview of the dates for each of the three periods that have been defined to compile the performance indicator data.

**Table 4 – Period defined for measurement of compliance with contractual requirements**

Compliance period	Target date	% contribution to the average compliance rate
1	Beginning of the contract to December 1	33%
2	From December 1 to February 1	33%
3	From February 1 to April 1	33%

This grid offers a second advantage for the managers in the territory – support in the performance of a fair and transparent evaluation of the contractor. For this purpose, an indicator results interpretation table has been developed to standardize interpretation of the indicator results.

For example, a compliance rate greater than 70% defines “satisfactory” performance for the contractor covered by this evaluation. Four (4) categories have been developed to qualify this “satisfactory” performance by the development of specific descriptions for each of the four categories.

**Table 5 – Interpretation of the results of the average rate of compliance with winter maintenance requirements**

	% rate of compliance	Description
SATISFACTORY	≥ 95	Meets the requirements perfectly
	90 < 95	Meets the requirements very well
	80 < 90	Meets the requirements generally well
	70 < 80	Meets most of the requirements
UNSATISFACTORY	< 70	Does not meet the requirements

## 8.0 A performance indicator to facilitate monitoring of management

Thus, for each of the 400 awarded winter maintenance contracts in force at the Ministère des Transports du Québec, we are able to apply the data related to the average rate of compliance by contractor, by management unit, by territory and for the entire road administration. It should be noted that the average rate of compliance announced to the public through the Department's Annual Report concerns the average rate for all contracts and the full winter season defined by the three evaluation periods.

Here is a fictitious example to show the possible application of this indicator's data.

**Table 6 – Example of results for the winter maintenance performance indicator**

Service Centre	Contract	Total weighted lengths	First evaluation %	Second evaluation %	Third evaluation %	Annual result
3172	3172014527 / TRANSPORT ABC INC.	79.313	84.5	85.0	97.0	88.83
	3172014529 / TRANSPORT EDC INC.	85.676	86.0	89.0	72.0	82.33
	3172024502 / TRANSPORT S RAYMOND BOIVIN INC.	41.415	79.0	85.0	88.0	84.00
	3172034501 / 123456 QUEBEC INC	43.34	83.5	83.0	84.0	83.50
	3172034506 / PÂQUET TRANSPORT INC.	84.599	79.0	75.0	65.0	73.00
	3172034528 / DORION TRANSPORT INC.	53.8	76.3	84.5	86	82.27
		388.143	81.80	83.41	80.57	81.93
		<b>Weighted average for the Service Centre</b>				81.93

## 9.0 Four main findings resulting from the experience with implementation of a winter maintenance performance indicator

- ◆ Necessity of adopting a minimum debugging period for a full winter cycle before the results can be publicized:

It appears essential and necessary not to publicize the result obtained for the performance indicator in the first winter season. Experience has shown that the criteria and the weighting factors defined for them must be reviewed and adjusted based on exhaustive comparison with the performance evaluations produced by the conventional methods used before development of the performance indicator. It appears strongly advisable to adopt a period to manage the credibility of the performance indicator data with all operational users throughout the road administration's territory.

- ◆ Necessity of establishing a mobilization plan for all managers:

Within the context of implementation of the new results-based management concept brought about by measuring performance throughout all of a road administration's units, the appropriation of the tools developed requires the establishment of a vast mobilization plan for all of the organization's managers. The preponderant level of mobilization undoubtedly is that of the territory director, who must mobilize his management team and set up monitoring and feedback mechanisms on the performance indicator results thus obtained.

- ◆ Necessity of recognition of the performance indicator by the road administration authorities:

It appears essential and necessary to obtain formal recognition, by the road administration authorities, of the performance indicator to be established for the territorial units. We have had the opportunity to prove this importance through recognition within the first strategic plan geared to results-based management. This inclusion in the Department's strategic plan has certainly allowed the mobilization of all road administration units to deploy this new system for measuring the goods and services delivered in winter road maintenance.

- ◆ Advantages envisioned through establishment of an audit process as an additional means:
  - To confirm the quality of the index data through a representative who is not a party to the performance evaluation process;
  - To evaluate whether the audited unit has all the defined tools in place to measure the indicator uniformly and consistently.