



3.5.

Management of Rolling Stock Maintenance (Excluding Public Safety Vehicles)

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Auditor General of the Ville de Montréal

Management of Rolling Stock Maintenance (Excluding Public Safety Vehicles)

Background

The delivery of a multitude of services to citizens by the business units (clients of the Service du matériel roulant et des ateliers (SMRA)) depends on the availability of a vehicle fleet in good working condition. Managing the maintenance of the Ville de Montréal's (the City's) 8,200 vehicles and equipment is spread out among 27 mechanical workshops whose operating budget is more than \$60M annually out of a total budget of approximately \$110M. In 2017, these activities were grouped under the SMRA. The operations are supported by the Gestion de la maintenance assistée par ordinateur (GMAO) system, which includes data on vehicles, planning and implementation of interventions. The City operates heavy vehicles (HVs) (17% of the fleet), which are subject to regulatory provisions governing HVs owners, operators and drivers. The regulation involves the business units for the circle check (CC) prior to the use of the HVs, and the SMRA for the application of the Preventative Maintenance Program inspections (PMP inspections) recognized by the Société de l'assurance automobile du Québec (SAAQ) and the repair of defects. The Service de l'approvisionnement (SA) is responsible for ensuring the availability of the parts and materials required for the maintenance activities of the SMRA's workshops.

Purpose of the Audit

To ensure that the management of vehicle and equipment maintenance is adequately planned, performed and followed up to enable the business units to deliver their services as planned, and that there is appropriate cost control.

Results

The management of the SMRA's rolling stock maintenance has several shortcomings, especially at the level of the comprehensiveness of the information on the vehicles, the consistency of preventative maintenance planning, which is behind schedule, and the documentation of interventions and associated costs. Planned interventions do not reflect all the operational requirements of the business units and are not adjusted according to the capacity of the workshops. The SMRA's operations are not aligned with those of the SA to ensure the timely availability of the products required for the interventions. The control mechanisms and management reports required to track implementation of the interventions and monitor compliance with the regulation are not available. The implementation of PMP inspections and corrective maintenance on the HVs, as well as the CCs performed by the drivers in the boroughs, contain failures to comply with the applicable regulation. The tracking of costs and the performance evaluation of the management of rolling stock maintenance are flawed due to a lack of reliable data, objectives and indicators. Annual accountability fails to mention the operational management of the workshops or the regulatory compliance of the HVs. Almost four years after the centralization of these activities, no follow-up has been done of the objectives to be achieved.

Main Findings

Roles and Responsibilities

- The City is not compliant with the regulatory provisions governing HV owners, operators and drivers regarding CCs, which are not systematically performed and properly documented by the drivers.

Data Sheets and Intervention History

- The data contained in the vehicles' data sheets is not exhaustive, nor is the intervention history, which is not properly documented in the GMAO system.

Inventory and Availability of Parts and Supplies

- There is no assurance of the timely availability of parts for repair and maintenance work by the workshops because of a lack of alignment between the SMRA and the SA, leading to reactive procurement.

Planning of Maintenance Activities

- Procedures and work methods are not in place to promote consistent and effective maintenance management across all workshops.
- Interventions for the same type of vehicle are not programmed consistently or according to the manufacturers' recommendations, and the corresponding maintenance records are not systematically kept.
- Planning of the interventions does not take into consideration the workshops' capacity and is not aligned with the operational needs of the business units.

Implementation of Maintenance Activities

- No coordination mechanisms exist between the SMRA and the business units for the requisition of vehicles and for monitoring their out-of-service periods in the workshops.
- Follow-up of preventative maintenance and compliance of PMP inspections is inadequate. Preventative maintenance is delayed, while not all PMP inspections comply with the regulatory provisions.

Data, Management Analyses and Accountability

- The data on interventions and related costs lack completeness and reliability, while objectives and indicators are not established, thus preventing the performance evaluation of and accountability for the maintenance management.
- The intended objectives of the centralization of the SMRA's activities have not been subject to any accountability.

In addition to these results, we have made various recommendations to the business units, which are presented in the following pages. These business units were given the opportunity to agree to the recommendations.

List of Acronyms

BVG	Bureau du vérificateur général	PMP inspections	Preventative Maintenance Program inspections
CC	circle check	SA	Service de l'approvisionnement
GMAO	Gestion de la maintenance assistée par ordinateur	SAAQ	Société de l'assurance automobile du Québec
GVWR	gross vehicle weight rating	SIMON	Système intégré Montréal
HV	heavy vehicle	SMRA	Société de l'assurance automobile du Québec
kg	kilogram	SPOID	Section planification opérationnelle et intégrité des données
km	kilometre	VCR	vehicle condition report
MEDA	motorized equipment distribution agent	WO	work order
MIR	Maintenance, Inspection, Repair		
ODHV Act	<i>Act respecting owners, operators and drivers of heavy vehicles</i>		



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1. Background

The Ville de Montréal (the “City”) owns a fleet of nearly 8,200¹ vehicles and equipment, grouped into 7 categories² and 305 different classes. For example, “Category A – Light automobiles” comprises several classes, including four-door sub-compact cars (class 134), while “Category C – Heavy trucks” comprises sewer cleaning trucks (class 309) and dump trucks (class 293).

The performance and availability of the vehicle fleet operated by the City are important factors for the delivery of many services to citizens, including snow removal, roadworks, and infrastructure, building, and park maintenance, to name just a few.

As an owner, the City is responsible for periodically maintaining all the vehicles and equipment to ensure their good working condition during their useful lifetime and limiting breakdowns that require repairs or out-of-service periods.

In addition, as an owner and operator of heavy vehicles³ (HVs) that represent approximately 17% (1,357) of the vehicle fleet, the City is obliged to comply with various legal provisions:

- the *Act respecting owners, operators and drivers of heavy vehicles*⁴ (ODHV Act);
- the *Highway Safety Code* (chapter C-24.2);
- the *Regulation respecting safety standards for road vehicles* (C-24.2, r. 32).

¹ As of January 25, 2021.

² See Appendix 5.2. “Picture of the fleet of vehicles and equipment by category, at January 25, 2021.”

³ HV: a road vehicle whose GVWR is 4,500 kilograms (kg) or more, a combination of road vehicles whose total GVWR is 4 500 kg or more, a bus, minibus or tow truck, as well as a vehicle that transports dangerous substances as described in section 622 of the *Highway Safety Code*.

⁴ “This Act establishes special rules applicable to owners, operators and drivers of heavy vehicles with a view to increasing the safety of road users on roads open to public vehicular traffic and to preserving the integrity of those roads.”

The right to put into circulation or to operate an HV is a privilege granted to vehicle owners and operators,⁵ entered in the register of the Commission des transports du Québec (the Commission). This privilege comes with obligations to comply with regulatory provisions, which, in the case of the City, are to:

- ensure that circle checks (CCs)⁶ are done by drivers before using HVs;
- maintain HVs in good mechanical condition and comply with the maintenance standards and the frequency and verification procedures established by the Preventative Maintenance Program inspections (PMP inspections) of the Société de l'assurance automobile du Québec (SAAQ);
- repair defects identified;
- comply with the maintenance programs;
- preserve the documents needed for the vehicle record;
- submit its vehicles to periodic PMP inspections.

To meet the requirements of the ODHV Act, the SAAQ developed the Conduct Review Policy for Heavy Vehicle Owners and Operators. Failure to comply with the obligations contained in this policy can lead to the downgrading of the safety rating⁷ of HV owners and operators. Ultimately, an “unsatisfactory” safety rating can result in a ban on putting an HV into circulation or operation. Following several critical incidents of overloading HVs, the City was summoned by the Commission, in November 2019, to evaluate whether the shortcomings that it was accused of affected its right to put HVs into circulation or operation. The City’s safety rating was maintained at “satisfactory.”

In addition to the repair of vehicle defects as needed, maintaining the vehicles in good working condition requires implementing a Maintenance Program for all vehicles and a regulated PMP Inspection Program for HVs that are subject to the Highway Safety Code. These programs help identify potential vehicle failures and maintain the vehicles in good working condition. The City is an agent authorized by the SAAQ to act on its behalf to carry out the maintenance program of its own HV fleet.

The City also uses seasonal vehicles and equipment (e.g., sidewalk plows, street sweepers, detachable snowblowers) to meet specific needs during target periods. To ensure the boroughs’ seasonal operations, these vehicles and equipment must be ready and functional prior to the start of the season’s activities. Some of these vehicles are used year-round, in both summer and winter but for different

⁵ Owners of HVs are the persons whose names appear on the vehicles’ registration certificates issued in Québec and those who hold a right to this vehicle under the *Highway Safety Code*. Operators of HVs are persons who control the operation of an HV.

⁶ The CC consists of a visual and auditory verification of certain accessible elements of an HV, which enables the driver to ensure that the vehicle is safe before using it. The main objective of the CC is to improve the safety of all road users.

⁷ The SAAQ prepares a file on all HV owners and operators. It identifies those whose behaviour is exemplary and those whose behaviour presents a risk and submits its proposal for changing safety ratings accordingly to the Commission. The three possible ratings are: “satisfactory,” “conditional” and “unsatisfactory.”

operations, thus requiring seasonal conversion. For example, the open-box bed of a dump truck is replaced with a spreader, and the snow modules of multifunctional equipment are removed and replaced with summer modules, such as mowers.

To support its vehicle maintenance management, the City operates a Gestion de la maintenance assistée par ordinateur (GMAO) system, titled Maintenance, Inspection, Repair (MIR),⁸ which centralizes the information needed to manage vehicle servicing, such as the vehicle identification information, technical information, warranties, maintenance programs and intervention histories.

1.1. Stakeholders Involved and Responsibilities

Within the City, the management of rolling stock maintenance involves the Service du matériel roulant et des ateliers (SMRA), the Service de l'approvisionnement (SA), and the business units and boroughs that use these vehicles and equipment (clients).

Service du matériel roulant et des ateliers

The City's *By-law concerning departments*⁹ states that the SMRA is "responsible for the purchase and rental of rolling stock and the service offer to repair and maintain heavy and light vehicles and to repair and manufacture general goods and equipment."¹⁰

Prior to January 1, 2017, the rolling stock for the nine boroughs of the former Ville de Montréal¹¹ and central departments was managed by the SMRA, while the 10 former suburban municipalities¹² provided autonomous local management. Beginning on January 1, 2017, city council assumed jurisdiction,¹³ under section 85.5 of the *Charter of Ville de Montréal*, of the powers related to the rolling stock (e.g., purchase, rental, maintenance and management of the rolling stock, except for short-term rentals) for an initial period of two years, and then up to the end of 2021. City council must decide again on extending this jurisdiction beyond 2021.

⁸ MIR is a commercial software developed to manage the maintenance of a vehicle fleet. This software contains data on the maintenance and use of the City's active vehicles, as well as the regular record of mileage and maintenance costs.

⁹ *By-law concerning departments 14-012*, section 1, paragraph 18 (adopted March 24, 2014 by city council).

¹⁰ The SMRA produces various goods and equipment for the City's business units, for example the manufacture and repair of urban furniture, signage and water system parts, as well as the interior design of specialized vehicles.

¹¹ Ahuntsic-Cartierville, Côte-des-Neiges-Notre-Dame-de-Grâce, Mercier-Hochelaga-Maisonneuve, Plateau-Mont-Royal, Rivière-des-Prairies-Pointe-aux-Trembles, Rosemont-La Petite-Patrie, Sud-Ouest, Villeray-Saint-Michel-Parc-Extension, and Ville-Marie.

¹² Anjou, L'Île-Bizard-Sainte-Geneviève, LaSalle, Montréal-Nord, Outremont, Pierrefond-Roxboro, Saint-Laurent, Saint-Léonard, and Verdun.

¹³ City council resolution (CM16 1267), November 22, 2016.

Under this new organizational model, the SMRA became responsible for the rolling stock of the City's entire vehicle fleet, which concern the following functions:

- Vehicle and equipment purchase, maintenance and management;
- Management of all mechanical workshops on its territory;
- Operator training;
- Fuel management.

The SMRA has become a major player in the management of the vehicle fleet. Its mission is:

[TRANSLATION] (...) [to ensure] the availability and reliability of the vehicles and various specialized products and services, adapted to the needs of the boroughs and units, in an environmentally responsible way and in a safe workplace.¹⁴

Various units of the SMRA contribute to providing vehicle maintenance and repair services, including the:

- Direction des ateliers mécaniques et de proximité, which is responsible for the maintenance and repair activities performed in the 27 mechanical workshops spread out among the five divisions (east, west, north, south and public safety), as well as those activities performed externally;
- Section planification opérationnelle et intégrité des données (SPOID) within the Division planification et soutien aux opérations, which is responsible for supporting the operations of the various branches of the SMRA, including controlling the integrity of the vehicle fleet data (e.g., vehicles put into service, management of active vehicles, planning support, and retirement). Among the SPOID analysts, five are dedicated to directly supporting the operations of the 27 mechanical workshops.

The SMRA's operating budget for the years 2018, 2019 and 2020 was \$109M, \$112M and \$106M, respectively. The portion allocated to the Direction des ateliers mécaniques et de proximité was approximately \$66M, \$69M and \$64M, or more than 60% of its total budget, for the same years for maintenance and repair activities.

¹⁴ Source: City's Intranet. Mission and priority actions of the SMRA for the year 2020.

Service de l'approvisionnement

The Division opération logistique, within the SA, is responsible for managing inventories and for providing access to and distributing the goods required by the City's business units to deliver their services to citizens. Across the 24 service points,¹⁵ a team of stock-keepers, commonly called motorized equipment distribution agents (MEDAs), manage the inventories, provide over-the-counter services and purchase the parts and equipment needed for the activities of the SMRA's workshops.

Business Units (clients of the Service du matériel roulant et des ateliers)

As vehicle fleet users, the business units must ensure the safe and responsible operation of the vehicles to limit abnormal breakdowns and out-of-service periods. Specifically, in the case of HVs that are subject to the ODHV Act, the business units must ensure that their drivers perform a CC before using the vehicles and report any defect to the SMRA so that repairs can be made within the prescribed timelines.

2. Purpose and Scope of the Audit

Under the provisions of the *Cities and Towns Act (CTA)*, we completed a performance audit mission on the "*Management of Rolling Stock Maintenance.*" We performed this mission in accordance with the *Canadian Standard on Assurance Engagement (CSAE) 3001*, described in the *CPA Canada Handbook - Certification*.

The purpose of this audit was to ensure that vehicle and equipment maintenance activities were properly planned, performed and followed up so that business units were able to deliver their services as scheduled, and that there was appropriate control of costs.

The role of the Auditor General of the Ville de Montréal is to provide a conclusion regarding the objectives of the audit. To do so, we collected a sufficient amount of relevant evidence on which to base our conclusion and to obtain a reasonable level of assurance. Our assessment is based on criteria we have deemed valid for the purposes of this audit. They are presented in Appendix 5.1.

The Auditor General of the Ville de Montréal applies *Canadian Standard on Quality Control (CSQC) 1* from the *CPA Canada Handbook - Certification* and, accordingly, maintains a comprehensive system of quality control, including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements. In addition, it complies with the independence and other ethical requirements of the *Code of ethics of chartered professional accountants*, which are founded on fundamental principles

¹⁵ The 24 service points serving the SMRA include 10 stores and 14 warehouses. Among the targeted workshops, those of Montréal-Nord and Saint-Laurent have a parts store where stock movements are controlled by a MEDA. Plateau-Mont-Royal and Sud-Ouest workshops have a storage location, called a warehouse, where mechanics can freely obtain supplies and where inventory is restocked regularly by a MEDA.

of integrity, professional competence and due diligence, confidentiality and professional conduct.

Our audit focused on the period from January 1, 2018, to May 31, 2020. However, for some aspects, we also considered earlier and later data. These consisted mainly of work done between May 2020 and February 2021. We also took into consideration information that was sent to us up to April 2021. In addition, we excluded the vehicles of the Service de police de la Ville de Montréal and those of the Service de sécurité incendie de Montréal from the scope of our audit.

This audit focused on the following business units:

- Service du matériel roulant et des ateliers;¹⁶
- Service de l'approvisionnement;
- Montréal-Nord borough;
- Plateau-Mont-Royal borough;
- Saint-Laurent borough;
- Sud-Ouest borough.

Upon completing our audit, we submitted a draft audit report to the relevant managers in each of the audited business units for discussion purposes. The final report was then forwarded to the management of each of the business units involved to obtain an action plan and timeline for implementing the recommendations concerning them, as well as to the Direction générale. A copy of the final report was also sent to the acting deputy director-general of the Services institutionnels, the deputy director-general of the Service aux citoyens, the director of the Service de concertation des arrondissements and, for information purposes, to the directors of the boroughs not directly audited to enable them to implement the recommendations where the situation warrants it.

3. Audit Results

To improve the City's performance and offer citizens the best services possible at the best price, the SMRA must have the required number of vehicles available, in good condition and complying with the regulation on HVs, at the time planned for the operations.

Vehicles are subject to unforeseen breakdowns. But by implementing timely preventative maintenance and inspection programs, it is possible to take action and correct the source of potential vehicle failures and, consequently, reduce the number of chance breakdowns that could compromise the City's operations. This

¹⁶ Of the 27 mechanical workshops under the Direction des ateliers mécaniques et de proximité, according to the organizational chart dated October 2020, we concentrated our audit on those of Montréal-Nord, Plateau-Mont-Royal, Saint-Laurent and Sud-Ouest.

requires proper planning and organization of the work, as well as coordination with the procurement functions so that the required products are available at the time scheduled for the work. To achieve this, stakeholders must rely on all the information and tools, such as the vehicles' technical specifications, applicable warranties and maintenance records that ensure adequate, effective and consistent management of the planned interventions. The repair history is another useful information tool to consider in promoting efficient and effective interventions.

3.1. Maintenance Planning

The performance and availability of the rolling stock operated by the City requires having relevant data to support the work (e.g., preventative maintenance, corrections and inspections) and aligning all the work required on the vehicles with the stakeholders concerned (the SMRA, the SA and the business units).

3.1.1. Inventory and Data Sheets

Vehicle Inventory

To ensure proper management of the City's entire fleet, it is vital that all active vehicles be integrated into the MIR software. The audit performed by the Bureau du vérificateur général (BVG) in 2020¹⁷ found that the inventory of vehicles and equipment in the various databases used by the SMRA, including Invflot,¹⁸ MIR and Temp Diff,¹⁹ was inconsistent across the systems and did not match the inventory actually in the field. This was still the case at the time of our audit.

Vehicle Data Sheets

Supporting vehicle maintenance management requires that the data on the vehicles' identification, technical references and applicable warranties be available in their respective files in the MIR system. This information, usually entered when a vehicle is put into service after its purchase, is accessible to users (at the workshops) to consult throughout the vehicle's useful life.

¹⁷ Audit report of the BVG on the "Management of Rolling Stock," dated March 5, 2020.

¹⁸ Invflot is a database that includes the inventory of the City's active and inactive vehicles, including the serial number, make, model and date of receipt of a vehicle by the SMRA, as well as the date it was put into service.

¹⁹ Temp Diff is a software that allows mechanics to enter the time worked on servicing each vehicle. Once the entered data is validated by the workshop manager, it is transferred into the corresponding work order (WO) in the MIR system.

Information regarding vehicle identification

The identifying information associated with a vehicle includes the make and model, serial number and gross vehicle weight rating (GVWR). In the case of the workshops targeted by this audit, this basic information was largely present in the vehicle files:

- The vehicle identification number was available for 96% of the vehicles;
- The date of entry into service was available for 96% of the vehicles;
- The make and model were entered for 99% of the vehicles.

Nevertheless, the GVWR was only present for 45.6% of vehicles, which does not ensure that the regulatory inspections are performed on all HVs.

Information regarding vehicle technical references

Technical information refers to the vehicle's various groups of components. For example, in the case of brakes, this can be information on the brand and model of the components used, sizes of the discs, drums and lining. In the case of the engine, it might include the serial number or quantity and type of oil required for an oil change.

Technical specifications are the basic information required to service a vehicle in the workshop. This data must be available to facilitate work done by the mechanics and procurement of the required parts and equipment. In the absence of technical specifications, those involved must refer to the manufacturer's manual, search the Internet or contact the manufacturer directly for each intervention on the vehicle. The stakeholders we met pointed out major shortcomings in the comprehensiveness of the data on vehicle parts and various components in MIR, which represents a source of inefficiency in maintenance management in the workshops on several levels.

A review of the vehicle files examined during our audit corroborated this inconsistency and incompleteness raised by the stakeholders we met.

To compensate for the absence of technical data, two of the mechanical workshops we targeted (Montréal-Nord and Saint-Laurent) put in place parallel inventory systems for the main parts and components required to maintain their vehicles. While the objective is commendable, such systems constitute a proliferation of non-integrated data sources. It would be more efficient if this information were centralized and easily accessible.

In summary, the information on the SMRA's vehicles is neither exhaustive nor easily accessible. Sound industry practice is for the GMAO system to be supplied with a complete source of data (e.g., identifying data, technical specifications, maintenance points) obtained from the manufacturer. These measures should be implemented to remedy the situation, promote efficient maintenance management and facilitate alignment with the SA.

Information regarding vehicle warranties

Information about warranties can be entered in a vehicle's file so that workshops can refer to it in the event of a repair or replacement of components, and to file claims where applicable. There are several types of warranties, including basic warranties²⁰ and warranties on groups of components,²¹ which come with the vehicle, extended warranties²² and warranties on parts replaced during work done in the workshop (e.g., three-year warranty on XYZ brand alternator).

We set out to evaluate the completeness of the information on warranties associated with the vehicles and parts. From the data in MIR, it was impossible to identify the types of warranties. We chose instead an overall analysis of the presence of data on the warranties available per vehicle.

Information on warranties in MIR is not comprehensive because data has only been entered for 516 of SMRA's 3,497 vehicles in service (14.8%) since 2015 (see Table 1). Since the centralization on January 1, 2017, information on basic warranties and warranties on groups of components was recorded for only 193 of the 2,116 new vehicles put into service (9%).

TABLE 1

Percentage of Vehicles Put into Service Between 2015 and 2020 Whose Warranty Data was Available in the Maintenance, Inspection, Repair System

Year put into service	Vehicles put in service	Number of vehicles with warranty data by type of warranty				
		Both types of warranties	Warranty on the group of components	Basic warranty	Total	
					Vehicles	%
2015	678	58	5	115	178	26.3%
2016	703	58		87	145	20.6%
2017	692	70	1	108	179	25.9%
2018	607	3		10	13	2.1%
2019	536				0	0.0%
2020	281			1	1	0.4%
Total	3,497	189	6	321	516	14.8%

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

²⁰ Basic warranties: correspond to general coverage of a vehicle (e.g., 3 years or 60,000 kilometres (km), whichever occurs first).

²¹ Warranties on groups of components: these warranties take precedence over the general warranty since coverage is for the vehicle's separate components. These warranties differ for each group of components (e.g., bodywork, 5 years, unlimited mileage based on whichever occurs first; engine, 40,000 km).

²² Extended warranties: in addition to warranties on groups of components, an organization may decide to defray additional costs to extend the warranty on one or several components (e.g., powertrain).

As with technical data, a vehicle's warranty manual can be accessed from the SMRA's public directory. This is not the case, however, for all vehicles.

In addition, while a GMAO system allows notification when a vehicle or component is still under warranty, this function is not fully used by the SMRA.

Extended warranties are not part of the City's practices. In exceptional cases, they may be acquired for certain types of equipment, but they are not reflected in MIR.

All these limitations result in increased effort required for workers in the workshops to track, identify and determine whether warranties are still in effect at the time a given vehicle is serviced. This situation carries the risk that claims will not be filed and, consequently, that repair costs that might have been covered under the various warranties are assumed entirely by the City.

There are no warranties on parts in MIR. Consequently, when servicing a vehicle, the workshop staff must make a request to the SA to search for the specific part in the purchase history to determine whether it is under warranty and, if need be, contact the supplier to make a claim. The number of warranty claims on parts depends, therefore, on the memory of each stakeholder when the failure of a specific part is detected. Given the size of the vehicle fleet and the number of interventions performed daily, the persons in charge of the workshops affirm that claims on warranties for parts are not done systematically.

The fact that the information required to manage warranties that apply to vehicles is incomplete and not easily accessible, coupled with a voluntary verification process that is not user-friendly to determine which parts are under warranty, carries the risk that claims will not be filed by the workshops, resulting in a potential monetary impact on the City.

Picture of warranty claims

Using MIR, we set out to draw a picture of the warranty claims for the period from January 1, 2018, to December 31, 2020. The report that was generated did not include any data. No warranty claim was documented for basic, extended or parts warranties. It should be noted, however, that although there was no documentation on warranties in the MIR software and the number of claims could not be estimated, several repairs were performed under warranty without necessarily being documented. Nevertheless, all stakeholders stated that this represented a shortfall for the City that could not be estimated.

3.1.1.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers ensure control of the completeness and accuracy of the identifying, technical and warranty data of the City's entire fleet of vehicles and equipment in the Gestion de la maintenance assistée par ordinateur system, to promote efficient workshop interventions, management of applicable warranties, and alignment with the Service de l'approvisionnement.

3.1.2. Programming Maintenance and Inspections

Maintenance and inspection programs for the rolling stock require planning adapted to the vehicle types. They must be programmed in MIR prior to the vehicles being put into service, in accordance with the frequencies suggested by the manufacturers and the inspections required under the ODHV Act for HVs, within a PMP inspections.

These programs integrate 153 tasks to be performed, called maintenance points, based on the vehicle type and use.²³ The frequency of maintenance points recommended by the manufacturers can be adapted to take into account the specific needs of the City regarding the type of use of the vehicles for its operations, such as adapted farm tractors used for snow removal and salt spreading. The parameters that trigger the different maintenance points are:

- The number of days reached;
- The vehicle's odometer (km travelled);
- The vehicle's number of mechanical hours (engine hours);
- The amount of fuel used by the vehicle;
- A specific day on the annual calendar.

Preventative Maintenance Program

Programming preventative maintenance

The expectation is that the programmed maintenance points will be similar for vehicles of the same class and, at a minimum, reflect the manufacturers' recommendations, and that maintenance reports detailing the tasks to be performed for each of the programmed points will be available to the mechanical workshops to ensure compliance and consistency in performing the preventative maintenance.

Yet the SMRA has no mechanism to ensure that all vehicles and equipment are programmed for preventative maintenance and no consistent triggers for the same type of vehicle (e.g., identical make and model). This situation fails to ensure control of maintenance planning for the City's vehicles and equipment.

In addition, the maintenance points for similar vehicles (of the same class) are not programmed consistently (see Table 2). For example, in the case of *class 293 – Dump trucks*, there are an average of 2.2 programmed maintenance points per vehicle at Plateau–Mont–Royal workshop compared with 6 at the Montréal–Nord workshop. As well, in the case of essential snow removal equipment, *class 825 – Loader with snowblower*, there are an average of 2.6 maintenance points per vehicle at Sud–Ouest workshop and more than double that number (5.5) at the Montréal–Nord workshop.

²³ For example, code 1 for an oil change, engine filter change and lubrication, code 2 for inspection by the SAAQ, and code 83 for an annual tune-up.

TABLE 2

Average of Programmed Maintenance Points by Vehicle Class for the Targeted Workshops

Vehicle class examined	Average number of maintenance points for the targeted workshops					
	Number of vehicles	Montréal-Nord	Plateau-Mont-Royal	Saint-Laurent	Sud-Ouest	Total
Class 140 – Electric compact car	27	1.7	1.1	1.0	2.0	1.4
Class 212 – Pickup truck with crew cab	60	2.9	4.3	3.7	4.4	3.8
Class 293 – Dump truck	15	6.0	2.2	3.7	4.0	3.6
Class 513 – track tractor	48	3.3	3.0	4.5	4.5	4.0
Class 825 – Loader with snowblower	21	5.5	5.2	5.0	2.6	4.6

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

A comparative analysis of 21 class 825 snowblowers showed the disparity in programmed maintenance points (see Table 3). We also found that no snowblower had been programmed for all 19 maintenance points associated with this vehicle class.

TABLE 3

Comparative Maintenance Points of Class 825 Vehicles – Loader with Snowblower

Maintenance point	Number of snowblowers tracked by maintenance point, per targeted workshop			
	Montréal-Nord	Plateau-Mont-Royal	Saint-Laurent	Sud-Ouest
Number of vehicles	4	6	6	5
Number of different maintenance points	12	16	12	4
1 Oil and engine filter change and lubrication			4	
2 Lubrication only			4	
3 Inspection at 10 hours		1		
4 Inspection at 100 hours	1	1	2	
5 Inspection at 1,000 hours	1	1	2	
6 Inspection at 2,000 hours	1	1	2	
7 Inspection at 300 hours	1	1	2	
8 Inspection at 50 hours	1	1	2	
9 Inspection at 500 hours	1	1	2	
10 Inspection at 5,000 hours	1	1	2	
11 Inspection at 6,500 hours	1	1	2	
12 Annual inspection (seasonal)	4	5	4	5
13 Intermediate inspection	3	4		2
14 Post-storm inspection	4	5		5
15 Inspection at the first 12 hours only		1		
16 Inspection at the first 25 hours only		1		

Maintenance point	Number of snowblowers tracked by maintenance point, per targeted workshop			
	Montréal-Nord	Plateau-Mont-Royal	Saint-Laurent	Sud-Ouest
17 Inspection at the first 50 hours only		1		
18 Regular inspection (without oil or filter change)	3	5		1
19 Annual tune-up			2	
Vehicles with all maintenance points	0	0	0	0

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

In addition, a comparative analysis of 11 snowblowers of the same make and model²⁴ showed that the types of maintenance were not programmed consistently within the SMRA. The main discrepancies identified were as follows:

- The snowblowers acquired in 2020 were inspected at the first 12, 25 and 50 hours of use, whereas those purchased in 2019 were not;
- Those acquired in 2012 and 2013 were not inspected after established blocks of user time, as were those purchased in 2019 and 2020;
- Additional maintenance points, such as “post-storm inspection,” were only programmed for snowblowers acquired before 2020.

While greater effort was made to orient the maintenance programs with the manufacturers’ recommendations for snowblowers acquired since 2019, it should be noted that the manuals we examined carried a warning that non-compliance with maintenance procedures could affect the warranty.

In short, the difference between programmed maintenance points for the same equipment and the deviation found from the manufacturer’s recommendations fail to provide assurance of consistent and compliant management of the entire vehicle fleet. Programmed maintenance of the vehicles should at least reflect the minimum frequencies recommended by the manufacturers.

A similar comparison of the maintenance points for two other classes of vehicles (140 – *Electric compact car* and 293 – *Dump truck*) could not be done as part of this audit because the SMRA did not have the manufacturers’ manuals required to verify whether the programmed points corresponded to their recommendations. A manufacturer’s maintenance manual is among the reference tools that should normally be available to those involved in managing vehicle maintenance.

²⁴ Larue snowblower, model D65, purchased in 2012, 2013, 2019 and 2020.

Maintenance records

Each of the programmed maintenance points includes various tasks that must be performed. For example, the “inspection at 50 hours” maintenance point requires an oil change, filter replacement and inspection for leaks. These tasks must be described in detail in a maintenance record so that mechanics can perform them in a consistent and compliant way in all workshops.

For the vehicle classes examined (140, 293 and 825), the findings regarding the presence and correspondence of planned tasks in the maintenance records were as follows:

- Class 140 – *Electric compact car*: The maintenance record available to the workshops was a generic record for light vehicles that did not indicate tasks specific to electric cars;
- Class 293 – *Dump truck*: No maintenance record was produced by the SMRA for the programmed points for these vehicles;
- Class 825 – *Loader with snowblower*: records were only available for certain maintenance points and did not systematically contain all the tasks recommended by the manufacturer.

The absence of maintenance records or records where tasks do not reflect the manufacturer’s requirements result in maintenance not being performed on similar vehicles in a consistent and compliant way between workshops. As well, given that not all the manufacturers’ maintenance manuals are available to the workshops as an alternative reference source, managing proper preventative maintenance for such a diversified vehicle fleet is made more complex.

Parameters that trigger preventative maintenance points

In the case of the parameters that trigger programmed preventative maintenance points, the SMRA was unable to show that the frequencies recommended by the manufacturers were being followed or that they were consistently programmed for the same type of vehicle in all workshops.

This aspect of planning, which falls under the remit of the SPOID analysts, seems to be inconsistent, resulting in maintenance that is not standardized across all workshops.

Given the discrepancy between the inventory of the City’s vehicles in the Invflot and MIR systems, there is also a risk that vehicles that do not appear in MIR are not programmed for preventative maintenance.

PMP Inspections

As the owner and operator of HVs, the City obtained recognition for its Preventative Maintenance Program, which consists of planned PMP inspections based on the minimum standards of the regulation, to serve as a substitute for the periodic mechanical verifications required by the SAAQ. To be compliant, these PMP inspections must be performed a minimum of twice annually (or every six months) for HVs travelling less than 20,000 km/year and at least four times annually (or every three months) for vehicles travelling more than 20,000 km/year.

To assess whether the programmed PMP inspections for two maintenance points on HVs had been performed, we analyzed a data extraction for HVs in service between January 1, 2018, and February 28, 2020, for the four targeted workshops.

TABLE 4

Comparative Inventory of Active Heavy Vehicles (Gross Vehicle Weight Rating > 4,500 Kilograms) During the Period of January 1, 2018, to February 28, 2020, that had Programmed PMP Inspections

Targeted workshops	Heavy vehicles (potential based on criteria) in Invflot	Heavy vehicles with PMP inspections in MIR	Difference
Montréal-Nord	50	47	3
Plateau-Mont-Royal	71	70	1
Saint-Laurent	91	83	8
Sud-Ouest	64	64	0
Total	276	264	12

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

In the case of the 276 HVs identified in Invflot, 264 HVs had programmed PMP inspections in MIR for the given period. The stated difference (12) can be explained by vehicle data entry errors (e.g., misidentified vehicle weight (5) or category (7)). Thus, all the HVs in the four targeted workshops for the given period had, in fact, been properly programmed for PMP inspections.

Nevertheless, the differences identified (12/276, representing 4.3%) fail to provide assurance that all the data was properly entered. Given these discrepancies and those identified between the Invflot and MIR systems, other differences may exist, which fails to provide assurance that all the City's HVs undergo PMP inspections as required by the ODHV Act.

Regarding compliance with the frequency of PMP inspections, the SMRA was unable to show that their parameters for triggering these inspections were properly programmed, i.e., at a frequency of two or four times annually based on the yearly mileage travelled by the HVs.

Given the minimum frequency requirements of PMP inspections, the expectation is that these frequencies will be consistent for all HVs. Under the circumstances, in addition to ensuring that PMP inspections are planned and performed on all HVs, the SMRA must also ensure that they comply with the legal provisions regarding their minimum frequencies.

Because of the regulatory provisions, a tracking mechanism to ensure that all the City's HVs undergo a PMP inspection is necessary and would have made this verification possible, but it was not put in place by the SMRA. We believe that management reports that help monitor the planning and implementation of PMP inspections should be established.

In summary, the shortcomings identified in the planning of maintenance and inspections have a significant impact on the proper functioning and compliance of vehicles. This can result in premature breakdowns and reduce the ability of business units to provide services. Conversely, maintenance and inspections performed more often than necessary increase expenditures without adding any real value for the City. To ensure that vehicles are in good working condition and to maximize their availability, measures must be put in place so that all vehicles undergo appropriate preventative maintenance in a timely manner. Furthermore, HVs must undergo PMP inspections based on the frequencies required by the regulation.

3.1.2.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers put in place mechanisms to ensure that its entire fleet of vehicles is subject to a Preventative Maintenance Program at an appropriate frequency, based on maintenance records that minimally meet the manufacturer's requirements, to ensure consistent management of vehicles by the workshops.

3.1.2.B. Recommendation

We recommend that the Service du matériel roulant et des ateliers put in place mechanisms to ensure that all heavy vehicles are subject to Preventative Maintenance Program inspections and that the planned frequencies meet the applicable legal provisions.

3.1.3. Maintenance Schedule and Capacity Management

Maintenance Schedule

Vehicle maintenance management involves several types of intervention, including preventative maintenance and inspections that are planned and must be entered ahead of time in a work schedule. Unforeseen repairs required as a result of vehicle or equipment breakdowns are added to these.

Planning preventative maintenance and PMP inspection programs is the responsibility of the SPOID team of analysts. The persons in charge of the workshops (e.g., workshop managers or foremen), for their part, plan and coordinate vehicle servicing at the workshops on a daily or weekly basis, depending on the schedules established by SPOID and on unforeseen breakdowns that require corrective actions.

The SPOID analysts send lists of vehicles due for preventative maintenance or PMP inspections to the boroughs and the workshops that serve them. These lists are generated from the MIR system, based on parameters that trigger the planned maintenance and inspection points for these vehicles.

The preparatory work on seasonal vehicles and the conversion of all-season vehicles, however, are not integrated into this planning. Instead, they appear in a parallel file, which results in a proliferation of schedules and non-integrated follow-up for the same workshop. Seasonal interventions are in addition to preventative maintenance and must, therefore, be integrated and planned in the same schedule to promote the coordinated management of all interventions at a given workshop and facilitate their prioritization and follow-up.

Although there is some communication regarding maintenance planning, shortcomings were identified based on the capacity of the workshops and the alignment of the planning with clients' needs.

Adjusted Planning based on Workshop Capacity

While our audit did not involve an in-depth evaluation of the capacity of the workshops, a discrepancy was observed between the number of vehicles per workshop relative to the resources (in number and expertise) and spaces available (see Table 5). The ratio between these elements clearly shows a greater workload for Plateau-Mont-Royal and Sud-Ouest workshops.

TABLE 5

Comparative Number of Vehicles and Resources by Targeted Workshop

Vehicles and capacity	Picture by targeted workshop			
	Montréal-Nord	Plateau-Mont-Royal	Saint-Laurent	Sud-Ouest
Number of vehicles^[a]	199	295	307	281
Persons in charge of the workshop	1	1	2	1
Resources	12	8	18	6
Mechanics	9	8	13	6
Welders	1	-	3	-
Body repairpersons	1	-	-	-
Mechanical assistants	1	-	2	-
Workstations	15	3	15	3
Ratio vehicle / resource	17	37	17	47
Ratio vehicle / workstation	13	98	20	94

[a] Inventory at January 25, 2021.

Source: Data compiled by the BVG based on information provided by the Service du matériel roulant et des ateliers.

That said, the SMRA has not integrate this factor in their maintenance management. The SMRA is not currently able to define the capacity of the workshops, which would allow the workload to be adjusted between them.

Planning that does not allocate work based on capacity can lead to the overloading of some workshops and, consequently, to recourse to outside services, while other workshops are not at full capacity. One of the anticipated benefits of centralization was supposed to be the ability to spread the workload across all workshops. To date, this has not been achieved.

Planning Aligned with the Needs of the Business Units

The boroughs' current operations are predictable for a given season, but day-to-day operations are adjusted a week in advance and changed based on the weather forecast and the availability of human resources. Thus, the boroughs determine their rolling stock needs depending on their planned operations, which allows them to adjust the SMRA's maintenance schedule accordingly (e.g., time and frequency).

Specific examples of good alignment practices worth noting are:

- The involvement of the boroughs in planning the preparation of seasonal vehicles;
- During the snow loading period, where the support of the SMRA is required in the event of a service disruption caused by a mechanical failure, the workshops' work schedule is adjusted to match 24-hour service of the boroughs (Direction des travaux publics).

The SMRA's planning of maintenance and inspections, however, does not consider all the vehicles and equipment required for boroughs operations, to ensure their availability in sufficient numbers at the appropriate time. In fact, aligning the activities of the workshops and the needs of the targeted boroughs was raised as a major issue that affects the delivery of services.

3.1.3.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers, in collaboration with the business units, establish integrated planning of all interventions to reflect the operational requirements of the business units and the capacity of the workshops, so as to ensure the timely availability of vehicles and equipment to maintain the delivery of services to citizens.

3.2. Organization of Work in the Workshop

To manage vehicle maintenance consistently and effectively, workshops must be properly set up, well outfitted and functional. Adequate equipment, qualified staff in sufficient numbers, and adapted procedures and work methods all contribute to the efficient management of a workshop.

Work Methods

Formal procedures or work methods provide a framework for mechanics' interventions that ensure a consistent vision and technical approach to meet the standards expected by the City. While this consistency among the workshops was one of the goals of centralization, it has still not been achieved at the SMRA.

As a result, differences persist between the workshops, for example:

- Seasonal vehicles: Some workshops clean and inspect the vehicles before storing them at the end of the season to identify the components that need to be repaired and estimate the time required to do the work, plan for it and ensure the availability of the parts needed to repair the defects identified. Other workshops directly store the vehicles at the end of the season and then carry out work (e.g., inspection, procurement of parts and repairs) on one vehicle at a time. This second alternative increases wear and tear on some vehicle components (e.g., accumulated salt causing the corrosion of the vehicle), which could have been avoided by an end-of-season inspection and can result in longer downtime because of delays in procuring parts required to repair the defects identified;
- Replacement of parts on a vehicle: Some workshops use original parts while others use similar brand parts, which can have a major impact on vehicle maintenance costs;
- PMP inspections: The SAAQ recommends that a complete inspection of a vehicle be done before making repairs. This recommendation is not always followed by the workshops.

The absence of formal procedures and work methods leads to discrepancies in practices, in efficiency and in consistency of maintenance management across all mechanical workshops, which can also have an impact on costs.

Standard Time

The standard amount of time required to perform the work is a given that enables the persons in charge of the workshops to adequately plan activities, effectively schedule interventions by mechanics, follow these up, and inform clients of the estimated time the vehicles will be out-of-service. This parameter also serves as a baseline to measure performance in the workshop, uncover variations and remedy these with appropriate measures, such as coaching, training or optimizing work procedures.

This kind of baseline parameter, however, has not been established within the SMRA because of a history of unreliable or incomplete data, which makes it impossible to estimate the time required to do the work and follow it up by type of activity. Some variation can be expected in the time spent performing the same intervention on similar vehicles; however, a comparison of the time spent on inspecting snowblowers (see Table 6) revealed a major variation. Faced with such data, the SMRA is unable to establish a standard time for its interventions, such as the off-season inspection of snowblowers. The result is an inability to forecast the return of vehicles into service for clients or measure the performance of its activities and take the necessary corrective action.

TABLE 6

Comparison of Time Spent on the Off-Season Inspection of Snowblowers from January 1, 2018, to February 28, 2020

Time spent on the inspection (hours)	Occurrences	Percentage of occurrences
0.5	1	5%
2	4	48%
2.5	6	
3	1	33%
4	1	
5	1	
6	2	
9	2	
16.5	1	14%
36.5	1	
45	1	
Total	21	100%

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

3.2.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers take the measures necessary to establish procedures, work methods and standard times to promote consistency and efficiency in vehicle maintenance management across all workshops.

3.3. Circle Checks of Heavy Vehicles

In accordance with the *Highway Safety Code*, operators of HVs must make sure a CC is performed prior to its use by a driver. The City must also ensure the presence of a register of CC reports²⁵ on board the HV at all times so the driver can note any defect observed on the road or attest to the performance of a CC during a roadside check. Failure to meet these requirements results in:

- The driver is liable to fines (in breach of the regulation);
- The City seeing its safety rating downgraded in its HV owner/operator file held by the Commission des transports du Québec.²⁶

These responsibilities lie with the business units and drivers who use HVs as part of their operations. During the CC, drivers must document the CC and indicate any defects observed,²⁷ such as:

- Major defects: Whether identified during the CC or during use of a vehicle (in traffic), the vehicle must be withdrawn from service and its defects immediately reported to the SMRA workshop and borough foreman. The vehicle is then prohibited from circulating until the necessary repairs have been made;
- Minor defects: These do not prevent the safe use of the vehicle and must be reported at the end of a shift so that the SMRA workshop can take the necessary measures to ensure repairs are done within 48 hours, failing which the vehicle must be withdrawn from service.

²⁵ The CC report is a document that informs the operator of the result of a circle check (CC) and, if applicable, of defects found. It also attests to the validity of the CC.

²⁶ Downgrading of the safety rating issued by the Commission des transports du Québec carries the risk of loss of the right to put HVs in circulation and operate them.

²⁷ Documenting CCs involves information that must be filled out by the driver, such as the place of the inspection, vehicle number, mileage, date and time of the inspection, name and signature of the person who performed the CC, and the conclusion of the inspection.

Completion and Documentation of Circle Checks

After evaluating whether the CCs were properly documented in accordance with the regulation, we looked at 1,373 CCs for 48 vehicles chosen at random based on their availability in the targeted public works and mechanical workshops yards.²⁸ Proportionally, 42% (or 574/1,373) of the CC reports examined were not filled out in accordance with the regulation (e.g., missing date or odometer reading, absent conclusion of an inspection (see Table 7)). It is nonetheless possible that the vehicles were safe and free of minor or major defects. In the case of one of the 48 vehicles observed, there was no CC register in the vehicle. Both situations are cases of non-compliance with the regulation. The driver must always be able to demonstrate to a highway controller that a CC was done before using the vehicle.

TABLE 7

Completion and Documentation of Circle Checks

Elements examined on the CC reports	Targeted boroughs									
	Montréal-Nord		Plateau-Mont-Royal		Saint-Laurent		Sud-Ouest		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Sample of heavy vehicles	11		10		16		11		48	
Absent CC register	-	-	1	10%	-	-	-	-	1	2%
CC report examined	237		302		460		374		1,373	
CC report with discrepancies ^[a]	188	79%	71	24%	186	40%	129	34%	574	42%
CC report with defects	31	13%	25	8%	52	11%	41	11%	149	11%
CC report not submitted ^[b]	4	13%	3	12%	15	29%	14	34%	36	24%

^[a] CC report with discrepancies corresponds to inadequately documented reports for such elements as the vehicle number, mileage, date and time of the inspection, conclusion of the inspection, or name and signature of the person who performed the CC.

^[b] CC report not submitted corresponds to reports with defects, a copy of which was not submitted by the driver to the person in charge at the borough.

²⁸ Available vehicles at the Saint-Laurent workshop on November 16, 2020, Plateau-Mont-Royal workshop on November 17, 2020, Sud-Ouest workshop on November 19, 2020, and Montréal-Nord workshop on November 20, 2020.

Among the CC reports we examined, there were cases where the mileage difference between two reports was clearly higher than the daily average of use. Also, some vehicles sampled were out-of-service in the garage because of a defect without a CC report having been documented by the driver. These observations suggest that vehicles are in use without CCs having been performed by the drivers.

The observations in the CC reports were also compiled and compared with a data extraction from the fuel management system (Coencorp) to determine whether HVs were in circulation²⁹ without a CC having been documented the same day. Of the 1,191 cases of refuelling, no CC was performed the same day for 56% of the vehicles involved (see Table 8). This represents a major non-compliance with the regulation, which states that a driver cannot drive a vehicle and an operator cannot allow a vehicle to be driven if the CC has not been performed within the regulatory timeframe.

TABLE 8
Percentage of Refuelling for Which a Circle Check Was Performed on a Corresponding Heavy Vehicle by a Targeted Borough

Refuelling	Targeted boroughs									
	Montréal-Nord		Plateau-Mont-Royal		Saint-Laurent		Sud-Ouest		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
CC performed	98	34%	110	68%	139	38%	182	49%	529	44%
CC not performed	192	66%	52	32%	226	62%	192	51%	662	56%
Total	290	100%	162	100%	365	100%	374	100%	1,191	100%

²⁹ Vehicles that were refuelled are considered to have been used by the business units.

Reporting Defects to the Service du matériel roulant et des ateliers

Beyond the safety aspect, defects observed during CCs that limit the use of vehicles have a major effect on the smooth running and maintenance of a borough's operations. This is one of the reasons that efficient communication and follow-up mechanisms must exist between the borough and the workshop serving it.

When a defect is found, the vehicle's driver must forward a copy of the CC report to a person designated by the borough (e.g., a foreman), detailing the defects observed on a vehicle condition report (VCR) form, and send a copy to the workshop and another to their superior. In 36 of the 149 CC reports (or 24%) identifying defects (see Table 7), the copy that should have been sent to the person in charge at the borough remained in the vehicle register – evidence that defects that should have been reported so that the borough and workshop could take care of them were not, in breach of established procedures.

As for the VCRs, they were not always filled out and sent to the workshops by the operators, and, when they were, they were not kept by the workshops. Therefore, it was impossible for us to evaluate whether all the defects that were observed were first reported to the workshop and then taken care of.

Because of the shortcomings identified in completing and documenting CCs and reporting defects, the City currently risks the downgrading of its safety rating issued by the Commission des transports du Québec. This could ultimately result in the loss of the right to put its HVs into circulation and operate them and have an impact on carrying out the City's operations (e.g., snow removal, selective collection, road maintenance).

3.3.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers, in collaboration with the business units, establish control mechanisms aimed at ensuring that the circle checks are systematically performed and properly documented, and that defects are reported to the Service du matériel roulant et des ateliers before heavy vehicles are used, so that they comply with the regulation.

3.4. Implementation and Follow-up of Maintenance

In its supporting role to the City’s operations, the SMRA is responsible for ensuring that vehicles are available, functional and compliant with the applicable regulation. This is achieved through the implementation of Preventative Maintenance and PMP Inspection programs.

3.4.1. Preventative Maintenance

In the absence of mechanisms to evaluate the completion rate of planned maintenance, a picture of the backlog of maintenance points at December 4, 2020,³⁰ was drawn using data from the MIR system. In 39% of cases, vehicles’ planned maintenance was behind schedule (see Table 9). A similar look at vehicles by category revealed that all categories experienced delays in the vehicle maintenance points, ranging from 27% for “Category E – Heavy tool vehicles” to 64% for “Category D – Light tool vehicles,” including 29% for “Category C – Heavy trucks,” which include HVs that are subject to the ODHV Act.

TABLE 9

Percentage of the Vehicle Fleet of the Targeted Workshops Having One or More Late Maintenance Points at December 4, 2020

Elements found	Targeted workshops				Total
	Montréal-Nord	Plateau-Mont-Royal	Saint-Laurent	Sud-Ouest	
Vehicles and equipments (A)	172	244	284	222	922
Vehicles having one or more late maintenance points (B)	52	114	68	124	358
Late maintenance points (C)	81	195	119	223	618
Percentage of the vehicle fleet having one or more late maintenance points (B/A)	30%	47%	24%	56%	39%

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

³⁰ Data extractions from the MIR system provided by the SMRA.

The relatively high number of vehicles whose maintenance is overdue is an indicator of pressure on the workshops. This finding, added to the shortcomings previously identified in the planning of maintenance points, fails to provide assurance that the preventative maintenance of the City's vehicles is being adequately managed by the workshops. Preventative maintenance that has not been performed can result in breakdowns that require corrective actions, higher additional maintenance costs and service interruptions for clients.

3.4.1.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers take the necessary measures to ensure implementation of the Preventative Maintenance Programs by the mechanical workshops on the City's entire vehicle fleet, so as to foster the availability and proper operation of the vehicles and equipment required for delivery of the services provided by the business units.

3.4.2. PMP Inspections of Heavy Vehicles

Thanks to the SAAQ's recognition of the City's PMP inspections, the City can perform its own HV mechanical verifications based on the minimum frequencies established in the *Regulation respecting safety standards for road vehicles*.

Implementation and Frequency of PMP Inspections

Since no mechanism is available to monitor the implementation of planned PMP inspections, the SMRA is unable to evaluate compliance with the planned schedule. The findings presented in this section, therefore, are not supported by evidence of compliance from the SMRA but rather on data extractions from MIR and their analysis by the BVG.

The comparative analysis (see Table 10) of the number of PMP inspections performed in two complete years (2018 and 2019) compared with the number that would have been required based on the yearly mileage of the HVs during the same years highlights cases of non-compliance.

TABLE 10

Comparison of the Frequency of PMP Inspections Implemented Based on the Mileage Covered by the Heavy Vehicles of the Targeted Workshops for the Years 2018 and 2019

Targeted workshops	Frequency of PMP inspections required based on mileage covered							
	3-month frequency (heavy vehicles covering more than 20,000 kilometres/year)				6-month frequency (heavy vehicles covering less than 20,000 kilometres/year)			
	Number of HVs	PMP inspections required	PMP inspections performed	PMP inspections not performed	Number of HVs	PMP inspections required	PMP inspections performed	PMP inspections not performed
Montréal-Nord	2	16	6	10	42	168	153	15
Plateau-Mont-Royal	3	24	20	4	60	240	241	-1
Saint-Laurent	9	72	52	20	62	248	239	9
Sud-Ouest	3	24	14	10	48	192	183	9
Total	17	136	92	44	212	848	816	32
			68%	32%			96%	4%

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

In general, planned and performed PMP inspections failed to comply with the legal provisions based on the km travelled during the targeted period:

- 44 PMP inspections (or 32%) of HVs that travelled over 20,000 km/year were not performed at the required three-month frequency;
- 32 PMP inspections (or 4%) of HVs travelling under 20,000 km/year were not performed at the required six-month frequency;
- 1 extra PMP inspection was performed during this period.

These findings raise questions about whether the frequencies of PMP inspections are periodically adjusted based on the mileage travelled and whether controls or mechanisms are in place to ensure their compliance.

These results may stem from inadequate planning by the SPOID (e.g., triggers of maintenance points not adjusted based on mileage) or inadequate management by the workshops (e.g., completion delays and backlogs).

A similar picture (see Table 11) for a wider period, from January 1, 2018, to February 28, 2020, found that PMP inspections were not systematically performed in a timely fashion by the targeted workshops.

TABLE 11

Compliance with the Frequency of PMP Inspections of Heavy Vehicles for the Targeted Workshops from January 1, 2018, to February 28, 2020

Compliance with the frequency of PMP inspections	Targeted workshops									
	Montréal-Nord		Plateau-Mont-Royal		Saint-Laurent		Sud-Ouest		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Early	42	28%	44	19%	86	30%	38	20%	210	24%
On time	52	34%	138	59%	105	36%	93	48%	388	45%
Late	57	38%	52	22%	100	34%	61	32%	270	31%
Total	151	100%	234	100%	291	100%	192	100%	868	100%

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

In general, 31% of PMP inspections were performed late for the targeted workshops, and 69% of PMP inspections were performed early or on time. These results raise questions about the coordination of inspections.

Documentation of PMP Inspections

Given that all the pictures drawn up from data in the MIR system may include entry errors or possibly incomplete data, examining PMP inspection records (paper documents filled out by the mechanics) was deemed necessary to validate previous observations and evaluate other requirements of the regulation, including that:

- Owners must keep a two-year history of information and documents related to the maintenance and inspection of each HV;³¹
- HVs for which repairs of observed defects were not done in the prescribed timeline must be withdrawn from service.

³¹ The *Regulation respecting safety standards for road vehicles* establishes the rules for maintaining a vehicle record and preserving the documents that it must contain, including the mandatory time the targeted documents and information must be preserved.

At the SMRA, results of PMP inspections performed by mechanics are recorded in the MIR system by the persons in charge of the workshops. Although digital information about PMP inspections is entered in MIR, in the event of having to appear before the Commission des transports du Québec, it is the documentary evidence of PMP inspections and maintenance done on HVs by mechanics (signatures) that is required to attest to the City's compliance with the regulation. The absence of such documents would not allow the City from demonstrating adequate management of the maintenance and inspection of an HV, should that HV be involved in a major accident.

In 37 of the HVs sampled in our evaluation of CCs, we assessed compliance with the regulation for the following aspects, based on the PMP inspection files³² completed by the mechanics (between 3 and 5 files per HV):

- PMP inspection files documented and preserved as required (e.g., HV number, date of the inspection, mechanic's signature, mileage on the odometer, element verified with the comment "compliant" or "non-complaint," and measurements of the break lining or camshaft rotation for HVs whose GVWR is $\geq 7,258$ kilograms (kg));
- PMP inspections performed at the required frequencies³³;
- Repair work done on the defects observed within the prescribed time.

A review of the analyses performed on the 160 PMP inspection files for the 37 HVs representing 14% of the HV fleet of the targeted workshops (see Table 12) shows non-compliance in several respects.

³² The reports examined involved PMP inspections conducted during the period from January 2018 to November 2020.

³³ The regulation requires that an HV for which the PMP inspection is overdue, or repairs have not been done within the prescribed timeline, must be withdrawn from service.

TABLE 12

Compliance of PMP Inspections of Heavy Vehicles for the Targeted Workshops

Elements examined	Results for the targeted workshops									
	Montréal-Nord		Plateau-Mont-Royal		Saint-Laurent		Sud-Ouest		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
HVs examined	11		9		7		10		37	
HVs with shortcomings in the elements checked from one PMP inspection to another ^[a]	11	100%	7	78%	7	100%	10	100%	35	95%
PMP inspection reports	49		37		31		43		160	
PMP inspection reports signed and dated ^[b]	41	84%	35	95%	20	65%	35	81%	131	82%
PMP inspection reports – mileage missing/incorrect	18	37%	19	51%	4	13%	20	47%	61	38%
Frequency of PMP inspections^[c]	29		27		18		25		99	
Proper frequency	24	83%	23	85%	18	100%	22	88%	87	88%
Late handling	3	10%	4	15%	0	0%	3	12%	10	10%
Early handling	2	7%	0		0		0		2	2%

^[a] Result of the comparison of PMP inspection reports for the same HV.

^[b] Based on the regulatory requirements, the date and signature of the mechanic who performed the inspection must appear in the PMP inspection report (section 211 of the *Regulation respecting safety standards for road vehicles*).

^[c] The evaluation of compliance with the frequency of PMP inspections was based solely on 99 of the 160 reports examined. The first reports examined (37) served as a reference (0 time) for evaluating the frequency of the subsequent inspections. Other cases did not allow us to determine whether the PMP inspection frequency was adequate (e.g., date or mileage not indicated).

There was 100% compliance with vehicle identification (not presented in Table 12) in the forms completed by the mechanics, as well as the recorded presence in the forms of break lining measurements. This best practice reduces the risk of forgetting to measure these elements for vehicles with a GVWR $\geq 7,258$ kg.

Regarding disparities in elements checked from one inspection to another, mechanics use the same PMP inspection forms programmed in MIR when a vehicle is put into service by the SPOID; however, they do not fill them out the same way. The fact that 95% of the PMP inspection forms do not contain elements that should be checked in a recurring way for a given HV, and that components are evaluated as being compliant when they might not be present on the inspected HV, raises questions about the quality of the PMP inspections performed. Add to this the fact that 4.4% of the PMP inspection forms (7 of 160) examined listed only defects observed during the inspection and failed to mention any compliant element. This practice is contrary to the regulation, which requires that the compliance or non-compliance of each element be entered on the form.

It is pertinent to mention at this stage that the SAAQ makes available a generic PMP inspection form, which contains inspection elements for every type of HV. Using an inspection form specific to a vehicle, however, has the advantage of limiting the inspection elements to only those components that correspond to that HV. In the case of the SMRA, the PMP inspection forms made available to the workshops were designed by type of vehicle and specific sub-categories. However, in general, they do not contain all the elements to be inspected on the vehicle; in other words, the forms include inspection elements that may apply to only some HVs in a category (e.g., certain HVs have pneumatic suspension while others have hydraulic suspension). The PMP inspection forms created by the SMRA have also not been updated for several years. However, when a PMP inspection form is not appropriate for a particular HV, the workshops have the option to use the SAAQ's generic file.

Even if the inspections were performed correctly, vigilance is recommended to ensure that PMP inspections are properly documented, and appropriate control is necessary to avoid that they are put in doubt due to irregularities in the forms.

Compliance Sticker on Heavy Vehicles

The City is an agent of the SAAQ. As such, each workshop is responsible for affixing a compliance sticker attesting that the HVs are safe once a PMP inspection has been completed and repairs have been made to the defects observed. We looked for the presence of a compliance sticker on a sample of 51 HVs in service at the time of our audit, representing 19% of the HV fleet in the targeted workshops. We found non-compliance in 20% of the cases (see Table 13), involving one HV whose sticker was not affixed and nine other HVs whose stickers had expired or were not punched to indicate the period of validity of the PMP inspections performed.

TABLE 13

Compliance of Stickers on Heavy Vehicles for the Targeted Workshops

Elements examined	Targeted workshops									
	Montréal-Nord		Plateau-Mont-Royal		Saint-Laurent		Sud-Ouest		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Inventory of HVs^[a]	47		70		83		64		264	
HVs examined	10	21%	9	13%	21	25%	11	17%	51	19%
Sticker missing	1	10%	-	0%	-	0%	-	0%	1	2%
Sticker present	9	90%	9	100%	21	100%	11	100%	50	98%
• Compliant sticker	9	100%	8	89%	15	71%	9	82%	41	82%
• Non-compliant sticker	0	0%	1	11%	6	29%	2	18%	9	18%

[a] Inventory of active HVs (data from the SMRA) during the period audited, i.e., January 1, 2018, to February 28, 2020.

In summary, the shortcomings found in the management of PMP inspections for HVs (completion, frequency and documentation) have a significant impact on compliance with the regulation and maintaining the HVs in good working condition. Add to these other findings of non-compliance in which HVs without “the right to circulate” are nevertheless being used for operations (an element addressed in section 3.4.3.).

These cases of non-compliance of PMP inspections are subject to fines. But the more serious consequences for the City would be the downgrading of its HV owner/operator safety rating³⁴ and the loss of recognition of the City as an agent of the SAAQ, which would hinder the delivery of services to citizens.

³⁴ Downgrading of the safety rating issued by the Commission des transports du Québec carries the risk of losing the right to put HVs into circulation and operate them.

3.4.2.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers put in place mechanisms aimed at ensuring that the performance and documentation of Preventative Maintenance Program inspections and repairs of defects observed meet the regulatory requirements, so that the City can maintain the recognition of its Preventative Maintenance Program inspections and its privilege to operate heavy vehicles.

3.4.3. Corrective Maintenance (Repairs)

In addition to planned interventions (e.g., preventative maintenance, PMP inspections), the daily activities of the workshops include corrective maintenance (e.g., unforeseen breakdowns). The prompt repair of defects observed on vehicles in service is especially crucial for the business units' delivery of services. In looking at this maintenance aspect of the City's vehicle fleet, we focused specifically on the defects observed on the HVs by the targeted workshops.

The *Highway Safety Code* states that HVs with minor defects not repaired within 48 hours are prohibited from circulating, in the same way as those with major defects. We looked at each of the defects identified in the CC reports examined, as well as those identified in the PMP inspections, to see whether the repairs had been done by the workshops before the vehicles were put back into service.

Repair of Defects Observed on Heavy Vehicles during Circle Checks

Of the 80 defects observed by drivers and documented in the CC reports for the 35 HVs examined, 61 were minor and 19 were major. Table 14 presents the results of our analysis.

TABLE 14

Repair of Defects Observed During Circle Checks

Elements examined	Targeted workshops									
	Montréal-Nord		Plateau-Mont-Royal		Saint-Laurent		Sud-Ouest		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
CC report with defects	31		25		29		41		126	
Vehicles with defects	9		6		10		10		35	
Defects observed	18	58%	10	40%	19	66%	33	80%	80	63%
Defects without evidence of repairs	6	33%	1	10%	10	53%	20	61%	37	46%
Defects not repaired	6	26%	-	0%	-	0%	-	0%	6	6%
Defects repaired	6	33%	9	90%	9	47%	13	39%	37	46%
Vehicles without the right to circulate	8	89%	2	33%	7	70%	8	80%	25	71%

The regulation stipulates that all documents attesting to the repair of defects identified during CCs must be preserved for a period of at least 12 months. In the case of 37 defects (46%), however, no evidence of repairs could be traced back by the workshops in their intervention history. Some might have been repaired without a work order (WO) being documented, which appears to be a common practice for all the targeted workshops. Nevertheless, even in these cases, the City was not compliant. In the case of 6 other defects observed, the same problem occurred each time on the same vehicle without the Montréal-Nord workshop correcting the situation.

Repair of Defects Observed on Heavy Vehicles during PMP Inspections

In the case of repairs of defects observed during PMP inspections performed within the prescribed timelines, we found further non-compliances in addition to those previously identified, involving the absence of evidence of repairs to 16% (37 of 227) of the defects observed.

TABLE 15

Repair of Defects Observed During PMP Inspections

Elements examined	Targeted workshops									
	Montréal-Nord		Plateau-Mont-Royal		Saint-Laurent		Sud-Ouest		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
HVs examined	11		8		7		9		35	
PMP inspections evaluated with defects	12		8		8		11		39	
Defects observed	68		65		43		51		227	
Defects without evidence of repair	17	25%	2	3%	13	30%	5	10%	37	16%
Defects repaired	51	75%	63	97%	30	70%	46	90%	190	84%
Vehicles without the right to circulate	8	67%	0	0%	1	13%	1	9%	10	26%

Vehicles Prohibited from Circulating

Failure to repair the observed defects (minor, major) within the prescribed timelines results in the vehicle being withdrawn from service.

Among the HVs examined (see Table 14) for compliance of the CCs, 71% (25 of 35) were used for the boroughs' operations although one or several defects found had not been repaired within the prescribed timelines, or there was no evidence attesting to a repair having been made.

In the case of the HVs (35) examined (see Table 15) for compliant PMP inspections, 10 (or 26%) had circulated although their defects had not been repaired, or there was no evidence of repairs shown, which would have required the vehicle to be withdrawn from service under the regulation.

These combined elements corroborated the statements of the persons from the boroughs and workshops that we audited asserting that, despite the vehicles being prohibited from circulating and physical means being used to prevent their operation (e.g., out-of-service card, lock on the driver's wheel), the vehicles were nevertheless used by the operators. Such situations are normal occurrences for some boroughs and represent major non-compliances.

We previously found shortcomings in completing CCs and reporting defects observed, which suggests that the vehicle non-compliance is more significant than observed.

The review of the defects observed, dates of completion of the work and dates of use of the vehicles targeted show that, on multiple occasions, vehicles were in service although they did not have the right to circulate, including some vehicles with major defects. For example:

- Major defects observed in one of the HVs in Sud-Ouest borough on January 12, 2020, were only repaired on January 17, 2020, although the vehicle was in service between these two dates;
- Minor defects observed on November 19, 2018, were only repaired on December 3, 2018, although the HV, belonging to the Montréal-Nord borough, was refuelled nine times in the meantime.

Using an HV that should not be in service because of a defect can result in the loss of the driving licence or a fine for the driver, as well as the loss of the agent status granted by the SAAQ and the downgrading of the HV owner/operator safety rating for the City.

3.4.3.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers, in collaboration with the business units, establish control mechanisms to ensure that only heavy vehicles with the right to circulate are used for their operations, so that the City can comply with the applicable legal provisions and thus maintain its privilege to operate heavy vehicles to ensure the continuity of its delivery of services to citizens.

3.5. Alignment and Coordination with the Client

In the case of planned vehicle servicing, the understanding is that the borough must be informed ahead of time to ensure that its operations are not compromised. It is also understood that documented communication and follow-up mechanisms should be established to keep track of the vehicles that are out-of-service in the workshops or at an external service provider so the borough can resume its operations at the time the vehicle is scheduled to be put back into service.

Vehicle Requisition

In scheduling maintenance and planned inspections, discussions between the workshops and boroughs are required to determine when the vehicles will be made available. No consistently established mechanism exists, however, between the targeted boroughs and workshops for the requisition of vehicles.

A review of weekly notifications for maintenance and planned inspections transmitted to the boroughs by the SPOID identified recurring cases of recalls of vehicles that are late in preventative maintenance or PMP inspection. This situation is irritating for the workshops because the vehicles are not systematically made available by the boroughs, which affects completion of the planned servicing.

From the boroughs' standpoint, the availability of vehicles is an issue in maintaining the delivery of services to citizens, especially because of a lack of replacement vehicles in the event of a failure, and the limited number of vehicles in high demand (street sweepers and sewer vehicles). This explains why the boroughs do not always free up the vehicles as planned by the SPOID.

However, maintaining vehicles in service that have been recalled for maintenance carries the risk of premature wear and tear and unjustified maintenance costs because of a failure to perform preventative maintenance in a timely fashion. This can result in the vehicle being out-of-service for a longer period once it finally makes it to the workshop because of the need to catch up on the maintenance backlog. It should also be pointed out that maintaining HVs in service that have been requisitioned for PMP inspections can result in non-compliance with the regulation governing these vehicles, carrying risks for the City.

In short, this problem again highlights shortcomings in the SMRA's planning of interventions. Vehicle requisition mechanisms need to be put in place and applied, alongside the other mechanisms previously recommended for coordinated planning between the workshops and business units, and for implementation and follow-up of vehicle maintenance operations.

3.5.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers, in collaboration with the business units, establish coordination mechanisms regarding the requisition of vehicles and apply them consistently, so as to allow required maintenance and inspection work to be done in a timely manner to ensure the continued sound operation of the vehicle fleet.

Follow-Up of Out-of-Service Vehicles

Because an out-of-service vehicle has an impact on the delivery of services, workshops must monitor and document the progress of the work under way (internal or external) and communicate this to the boroughs.

We found an almost total lack of documented follow-up mechanisms for sharing with clients the status of out-of-service vehicles in the workshops or with an external supplier. No formal follow-up mechanism exists within the SMRA to address this.

The audited boroughs affirmed having to actively seek out information on the status of their vehicles. They were unaware of the time that the vehicles would be out-of-service and the follow-up of these is not systematically established within the workshops.

In the case of the boroughs, uncertainty about the amount of time that the vehicles would be out-of-service was an irritant that had an impact on their activities, especially since they have no spare vehicles. As a result, they rent vehicles externally, borrow a vehicle from a neighboring borough or postpone planned activities due to the lack of available vehicles to maintain their operations.

We also identified a lack of systematic quality control of work performed externally. Vehicles put directly back into service might have defects or repairs that were not properly addressed and that could have an impact on the operations of the boroughs and result in additional costs to the City.

3.5.B. Recommendation

We recommend that the Service du matériel roulant et des ateliers, in collaboration with the business units, establish a formal and consistent monitoring mechanism on the progress of all interventions and work being done on out-of-service vehicles and equipment in the workshop, as well as the planned timelines for being put back into service, to enable the boroughs to make informed decisions on the alternatives required to maintain their operations.

3.6. Procurement of Parts and Equipment

Efficient vehicle maintenance management depends on several factors, including the timely availability of replacement parts, which requires aligning needs with the procurement functions for which the SA is responsible.

Needs planning must be coordinated between the workshop and the SA to ensure that the required material resources are available in sufficient quantity and at the right time. Failing this, workshops have to resort to procurement, which potentially prolongs the amount of time that a vehicle is out-of-service.

Needs Planning for Parts and Materials

In the case of planned interventions, the expectation is that the needs for parts and materials will have been communicated with sufficient notice by the workshops to the SA to give the workshops flexibility in managing the work and putting the vehicles back in service as soon as possible so that the boroughs can resume operations. The MEDA's responsibility is to ensure that the stocks needed are available at the required time. Turning to emergency external purchases should only occur on an occasional basis, for parts required for unforeseen repairs that are not available in stock.

Yet the SMRA's maintenance and PMP inspection planning is not communicated to the SA to ensure that the needs for the required parts and materials are met. The absence of any alignment has in fact been identified as a major issue that has a strategic and operational impact:

- Strategically, purchase agreements for products or external services made by the SA must in principle reflect the needs of the SMRA, based on consumption analyses from intervention histories. The present situation is not optimal. These analyses, which help guide purchasing strategies, are not common practice because of a lack of clarity on the intervention history (absence of product codes) and on the consumption forecasts arising out of the SMRA's orientations (e.g., vehicle purchase and retirement, and outsourcing of a type of intervention);
- Operationally, the interaction between the workshops and the MEDAs is based on immediate needs the same day that an intervention is being performed on a vehicle and not with a view to planning, even if the intervention was already scheduled. This has a direct impact on the length of time a vehicle is out-of-service and on the delivery of services by the boroughs.

What's more, the SA is not necessarily informed about the SMRA's decisions regarding the management of the vehicle fleet. This can result in inadequate procurement, an inventory of parts and materials that is not aligned with the fleet of active vehicles and, consequently, additional costs for the City.

In summary, shortcomings in alignment between the SMRA and the SA could compromise the timely availability of stocks required for interventions on the vehicles, leading to reactive procurement.

As part of the deployment of its business model,³⁵ the SA has several processes under way to ensure alignment with the SMRA (e.g., consumption forecasts and recurrences) and better input into procurement planning,³⁶ calls for tenders and inventory management. These processes, which are aimed at correcting the shortcomings found, require that a series of measures be implemented beforehand by the SMRA to resolve the other weaknesses identified, especially regarding the inventory of vehicles, integrated planning of interventions and data quality, which is addressed in section 3.7.

³⁵ From the standpoint of moving the purchasing function towards a logistics chain, the main orientations of the SA's new business model (2020) are developing and consolidating procurement expertise and implementing a service approach centered on satisfying internal partners.

³⁶ The SMRA is currently collaborating with the SA on a pilot project (Ville-Marie mechanical store) to identify the parts and equipment needed to maintain a sample of vehicles and thereby adequately support the procurement process. To achieve this, and without having complete data in MIR, the stakeholders are referring to the manufacturers' manuals.

Inventory Management and Availability of Parts

Identification of parts and materials

Most of the products consumed by the City's business units are coded in the Système intégré Montréal (SIMON),³⁷ which enables the SA to compile a history of their consumption. Other products are associated with ranges or categories of products; for example, the purchase of various types of oil (e.g., engine, transmission) is associated with the category "Oil" and not with codes specific to a type of oil. In this case, the consumption trail of a specific item is lost.

No standards have been established for coding the parts purchased for vehicles and consumed by the SMRA. Consequently, each product purchased is associated with a range or category of products and not a unique number, which makes the information about consumption difficult for the SA to use.

Warehouse and in-store inventory

To ensure an optimal level of parts in inventory, parameters (minimum and maximum levels) must be established based on a history of consumption, frequency of operations, and critical status of the vehicles.

Given the shortcomings observed in needs planning and the coding of parts, inventory parameters, while well established, are not optimal and need to be adjusted. This imbalance can be reflected in the field by levels that are too high or too low for certain products and less-than-optimal use of space, something that is already limited in warehouses. Another consequence is that the persons in charge of the workshops turn to the MEDA to determine stock levels for anticipated needs, especially in recurring situations of inventory shortages or the opposite. While this might be justified, it can lead to non-optimal management within the stores and warehouses that serve the SMRA.

Furthermore, in the case of the warehouses, the SA has no knowledge of the stocks being kept there, and stocktaking is not optimal. This can lead to inappropriate purchases and poor stock maintenance and, ultimately, to the obsolescence of the products not used. In fact, it is common practice for warehouses to use the servicing of a vehicle to stock up on parts by purchasing lots to build up a reserve in anticipation of eventual needs and allocating the purchase price of the entire lot to the one vehicle rather than stocking based on planned needs and allocating the price of a single part to the vehicle needing the repair.

In the case of the stores, there is an access control problem resulting from intrusions after service hours. It is common practice for workshops that have stores to use this inventory for their operations. Since this type of consumption is not systematically documented, this affects the quality of data on the SA inventory and on vehicle maintenance costs. These types of situations illustrate the absence of alignment in the planning of operations between the workshop and the store.

³⁷ SIMON is an integrated system that allows the City's users to assume supply, financial management and human resource management activities.

In the absence of any coordination between the needs for parts and materials for interventions planned by the SMRA and the logistical operations of the SA, standardizing the operating hours³⁸ of the mechanical workshops and stores might seem like a mitigation measure. But according to SA management, this would clearly require more resources, which, in addition to being costly, would not solve the basic problem of non-aligned planning.

It is essential that maintenance work be planned by the SMRA and shared with the SA, which, in turn, must be able to ensure product availability.

Given that a supply shortage could have several consequences, including an idle labour force, disrupted work cycle in the workshops, longer out-of-service time for vehicles and, ultimately, an impact on the quality of the delivery of services to citizens, it is required that the parts and quantities kept in inventory be determined based on consumption analyses and forecasts. For these reasons, the SA and SMRA must be aligned to ensure the efficient management of rolling stock maintenance.

3.6.A. Recommendation

We recommend that the Service de l’approvisionnement, in collaboration with the Service du matériel roulant et des ateliers, establish consumption analyses and plan the distribution of the parts and materials required by the workshops, to ensure adequate and efficient management of the inventory needed to maintain the City’s fleet of vehicles.

3.6.B. Recommendation

We recommend that the Service de l’approvisionnement, in collaboration with the Service du matériel roulant et des ateliers, determine the parts and materials to be kept in inventory, as well as the minimum and maximum level or other required parameters reflecting the needs for planned work and the critical needs of the active fleet, to ensure the smooth operations of the workshops and the availability of vehicles for the delivery of services by the business units.

³⁸ Hours of operation: 3 of 10 stores offer a supply service 7 days a week. Three stores ensure a supply service Monday to Friday, while the other stores are open Monday to Thursday. In comparison, the mechanical workshops operate days and evenings from Monday to Friday, and even 24 hours, 7 days a week during snow loading periods.

3.7. Management and Cost Monitoring Information

3.7.1. Intervention History

Documenting Interventions

Adequate compilation of maintenance and repair work provides a history of the costs associated with each vehicle, which consist of expenditures for the work performed in the workshops (e.g., labour, parts, equipment and supplies), and the costs incurred for work done externally.

In the case of the SMRA, interventions and costs are compiled in the WO in MIR and supported by the following two systems:

- Temp Diff, in which the hours worked on a vehicle are entered by the mechanics and associated with an intervention code;
- Gest Pièces, in which the costs of the parts and equipment used to perform the work in the workshops are derived from the purchases recorded by the SA in SIMON.

An intervention history is useful on different levels:

- Operationally: to be able to consult details of past interventions (e.g., diagnostics, details of the work performed, parts replaced or installed) to determine more efficiently the work to be done on a vehicle;
- Strategically: SMRA managers can use the intervention history in the GMAO for purposes of analysis (e.g., repeated breakdowns, failure rate, maintenance cost by type of vehicle) and decision-making to ensure optimal management of the vehicle fleet (e.g., outsourcing a type of maintenance, replacing a type of vehicle).

To produce reliable analyses, the maintenance history in a GMAO system must be complete, i.e., all interventions must be entered and structured, and the different types of maintenance and repair work must have pre-established codes that are used in a similar way across all workshops.

History of structured interventions

We found the existence of codes for this element related to maintenance points (maintenance and PMP inspection), as well as pre-established repair codes. These codes are used by the mechanics to document their interventions in the Temp Diff system and, once validated by the person in charge of the workshop, they are carried over into the WO of the MIR system.

The existing intervention codes were established several years ago, however, and need updating to reflect the new types of work performed on new technologies (e.g., components of electric vehicles) and for the new systems integrated with the vehicles (e.g., antipollution system). In the absence of pre-established codes for all interventions (e.g., inspections, maintenance and repairs), some tasks are

documented under a code related to similar work (approximate coding) or under generic codes. Consequently, the history is distorted by poorly codified interventions.

History of completed interventions

We found major shortcomings in the completeness of the intervention history, including the following:

- Corrective maintenance (repairs) is not systematically documented in the MIR system (e.g., in the case of the Montréal-Nord workshop, only those repairs that required replacement parts or more than two hours of labour were documented). This shortcoming was corroborated by the absence of a WO associated with certain repairs of defects observed during CCs on HVs;
- Interventions were not systematically assigned to the corresponding intervention codes (e.g., in the case of a series of repairs done externally, involving several codes, the billed cost was documented under a single code in the WO);
- Documentation of parts installed on vehicles in the WO was inconsistent, and the detailed descriptions of these parts were missing (e.g., reference number, make, model, category). This limits the availability of useful information for supply decisions and for consumption analyses;
- Documentation of interventions in the Temp Diff system is inconsistent or insufficiently detailed (e.g., nature of the task performed on the suspension, such as inspection, repair, replacement). This means a lack of quality information to rely on during subsequent work;
- The intervention history is incomplete for some workshops since centralization in 2017 (e.g., the Montréal-Nord workshop has only had access to the Temp Diff system since November 2020).

It also appears that the labour hours charged to vehicles are not always representative of the work performed (e.g., non-productive hours or hours associated with other vehicles), which results in inaccurate costs.

Without being able to evaluate the extent of the problem, the various specific cases we identified show that the history of work done on vehicles is not representative (MIR). This could have an impact on management analyses (e.g., identification of recurring breakdowns) and on managing the vehicle in the workshop (e.g., misunderstanding the reasons for the recurrences and the nature of the vehicle's breakdowns).

As a result, the City has incomplete data on the maintenance costs (e.g., labour, parts and equipment) needed to produce reliable management indicators and informed decision-making regarding the management of its fleet (e.g., maintenance, replacement).

3.7.1.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers put in place measures aimed at providing a complete, structured and reliable history of all the work performed on the City's vehicles and equipment, including work done under warranty, to foster continuity in the management and follow-up of interventions and to ensure availability of the data required for informed decision-making regarding the management of its fleet of vehicles.

3.7.2. Monitoring Costs

Compiling the costs associated with the maintenance of each vehicle is necessary to ensure informed decision-making regarding management of the vehicle fleet.

The operational budget of a mechanical workshop must be established based on the vehicle fleet serviced (e.g., category, age and number of assets) and the costs required to maintain it. Justifying the replacement of a vehicle is based on various criteria, including maintenance and repair costs. These costs are both a deciding factor and complementary to the other criteria, such as the age and level of use of a vehicle.

Labour Hours Spent on Interventions

We previously found in the intervention history that it is common practice for some repairs to be done without a WO being documented in MIR. Our examination of the defects observed during the CCs³⁹ confirmed that 45% of these 80 defects on HVs were repaired without a WO being created. This has an impact on the completeness and reliability of the costs involved in maintaining and repairing the vehicle.

In addition, several workshops did not have access to the SMRA's applications, such as Temp Diff and Gest Pièces. While management of the SMRA's rolling stock was centralized in 2017, Temp Diff was implemented gradually at the Saint-Laurent workshop from 2019 to spring 2020, while the Montréal-Nord automotive workshop has only had access to Temp Diff since mid-November 2020. This was also the case for other workshops at the time of our audit.⁴⁰ Consequently, for the periods when these apps were inactive, no data of the labour hours were available for the vehicles in the affected workshops. In the case of the Montréal-Nord workshop, the history (labour hours) spans almost 4 years of operations on more than 200 vehicles,

³⁹ The CC reports examined for each of the HVs sampled covered the period from January 1, 2017, to November 19, 2020. The defects identified covered a period from March 2018 to November 2020.

⁴⁰ At January 1, 2021, problems accessing Temp Diff and Gest Pièces were still ongoing for several SMRA workshops.

including HVs. Late access to these applications has had a direct impact on the history of both the interventions and the maintenance costs.

Inaccurate, incomplete, or absent data on one of the components of direct costs, such as labour, deprives the SMRA of reliable analyses and, consequently, of informed decision-making about the management of the vehicle fleet.

Hourly Labour Rates

The costs associated with labour consist of the number of hours worked multiplied by a set hourly rate. This rate takes into consideration all the expenses associated with maintenance management (e.g., employees' salaries, fringe benefits, costs to operate the automotive workshop). It is recommended that this rate be set for a definite period to avoid unjustified fluctuations and that it be updated annually to reflect inflation. Use of an arbitrary variable hourly rate or ignorance of the true hourly rate can skew the data and affect the analyses and decision-making arising from them.

In the case of the SMRA, the current hourly rate was set at \$97/hr for all the workshops. This rate, in effect for at least five years, has not been updated. Since the centralization in 2017, business units are no longer billed for services rendered.

To evaluate the consistency of the labour costs billed for the vehicles, we drew a picture of the hourly rates associated with the hours spent on interventions performed by WO by all the workshops for a period of 12 months (from October 2018 to September 2019).

TABLE 16

Range of Hourly Labour Rates Associated with Work Orders from October 2018 to September 2019

Range of hourly labour rates	Number of rates in the range	Occurrences		Labour hours	
		Number	%	Number	%
\$0	1	11,294	9%	14,014	7%
Between \$0.25 and \$94	32	11,683	9%	24,078	11%
\$97	1	105,271	80%	169,030	79%
Between \$97.50 and \$1,164	73	2,494	2%	6,731	3%
Total	107	130,742	100%	213,853	100%

Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

The use of 107 different hourly rates, ranging from \$0 to \$1,164, when there is an established rate of \$97/hr, which is applied in 80% of cases, does not provide assurance that labour costs assigned to vehicles are representative of reality.

The use of inappropriate hourly rates has an impact on the analyses and decision-making arising from these, such as the outsourcing of some work. The SMRA must ensure that the established hourly labour rate corresponds to the true costs incurred, that it is used for all workshops in their interventions, and that it is updated annually.

Parts and Equipment Installed on Vehicles

Regarding the costs of the parts and equipment installed on vehicles, the expectation is that they would be reflected in the MIR to enable the SMRA to have reliable data on this component of the costs required to maintain its fleet in good working condition.

The comparison (see Table 17) of the data from the MIR for the parts and equipment installed on the vehicles with the data entered in the SIMON system⁴¹ for the years 2018 and 2019 shows that the value of the expenditures recorded in SIMON is 181% greater than what is recorded in MIR for the targeted workshops. This could be partly explained by an incomplete intervention history in MIR.

⁴¹ Data retrieved from accounting items “Parts and Accessories” (56507) and “Maintenance and Repair – Vehicles” (55403).

TABLE 17

Cost Comparison of Parts and Equipment Available in the Maintenance, Inspection, Repair (MIR) and the Système intégré Montréal for the Years 2018 and 2019

Data source	Cost of parts and equipment for the targeted workshops		
	2018	2019	Total
SIMON	\$4,317,097	\$4,573,309	\$8,890,406
MIR ^[a]	\$1,571,180	\$1,588,776	\$3,159,956
Difference	\$2,745,917 + 175%	\$2,984,533 + 188%	\$5,730,450 + 181%

^[a] Source: Data compiled by the BVG based on data extractions provided by the Service du matériel roulant et des ateliers.

As well, the parts used for vehicle maintenance work are not systematically and adequately documented in the MIR system (e.g., restocking of the inventory in the warehouses charged in full to a single vehicle).

Also, as previously mentioned, poor warranty management means that the City is not assured that its vehicles are being maintained in such a way as to optimize costs.

The inconsistencies and shortcomings found do not provide assurance that the costs of the parts and equipment in the MIR system reflect the true costs for each vehicle or for the entire fleet of vehicles.

3.7.2.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers put in place mechanisms aimed at ensuring the completeness and quality of the data on interventions entered in the Gestion de la maintenance assistée par ordinateur system by the workshops, whether for hours worked, parts and supplies used, or the use of the established standard labour rate, to ensure the availability of the data required to follow up the management of rolling stock maintenance and informed decision-making regarding the management of its fleet of vehicles.

3.7.3. Management Reports

Vehicle maintenance management is based on analyses and indicators that help guide decision-making on the use of vehicles, the maintenance plan, and vehicle fleet management (e.g., purchase, replacement, discarding).

The SMRA has few tools or management reports to ensure the follow-up of maintenance costs or to identify the distribution of costs by activity (e.g., preventative maintenance, inspections and repairs). Given the quality issue of the data available in MIR (absent or incomplete), the reports produced are not used on a regular basis. The persons in charge that we met confirmed that they had little clarity about the management of the vehicle fleet maintenance, both at the workshop level and at the management level. In addition, there is a lack of reports that would enable follow-up of the implementation of Preventative Maintenance Programs and PMP inspections and the monitoring of compliance with the regulation governing HV. Monitoring tools and alignment with clients were also lacking.

As for performance indicators or dashboards on this sphere of activity that could touch on the productivity of the workshops or the rate of abnormal breakdowns, these have not been produced since January 2020. Although present for the years 2018 and 2019, these indicators (e.g., average time that vehicles were out-of-service and their maintenance and repair costs) were considered complex and unreliable and were therefore rarely used. The absence of appropriate management indicators prevents the persons in charge of the workshop to be proactive in identifying problems, which contributes to reactive management and failure to provide a comprehensive view of this sphere of activity. The SMRA plans to put in place new indicators that will allow better follow-up of its operations.

In short, the absence of performance indicators, quality controls, and results-oriented measures are the shortcomings that we found. Various tools need to be put in place, such as follow-up reports, analyses and management indicators, to help identify operational or management problems and to remedy them, where appropriate.

3.7.3.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers put in place performance indicators and prepare appropriate management reports to follow up and evaluate the maintenance activities of the rolling stock, to ensure informed decision-making regarding the management of its fleet of vehicles.

3.8. Accountability

Best practices would have the objectives of a department stated in each of the directions at the start of the year to set results-oriented targets, validate their progress during the year, and make the necessary adjustments. The SMRA defined its objectives for 2018, 2019 and 2020, some of which are managed by the mechanical workshops. These concern the availability of parts in eight workshops (including Plateau-Mont-Royal and Sud-Ouest), the organization of 20 workshops based on the 5S method,⁴² and the Clé Verte⁴³ environmental certification of 5 workshops.

No objective was established, however, to evaluate the performance of the workshops (e.g., availability of vehicles, implementation of planned interventions and management of maintenance costs).

The SMRA produced an accountability report for the Commission sur les finances et l'administration for the years 2018, 2019 and 2020. This report dealt primarily with budget trends and costs but failed to include any mention of the operational management of the workshops. Three MBNC indicators⁴⁴ (e.g., rate charged for one hour of maintenance or repair of municipal vehicles) were presented for comparison purposes with other Canadian cities, as well as new indicators put in place in 2019 (e.g., direct operating cost and rate of achievement of the weekly planning process).

However, this report omitted the follow-up of objectives and the various initiatives tied to the centralization, including those related to cost reductions of activities in the workshops and the increased offer of services (e.g., number of workshops and rejuvenation of the vehicles).

At the end of the two years of centralization, a report was produced by the SMRA, in September 2018, outlining the initiatives taken without presenting the level of progress or attainment of the objectives.

⁴² The 5S method, a well-known Japanese management philosophy, is one of the most popular methods for creating a functional, streamlined work environment. The 5Ss represent 5 practices: Sort, Set in Order, Shine, Standardize, and Sustain.

⁴³ The Clé Verte environmental program is a voluntary Québec environmental certification program for automotive service shops (e.g., cars and light- or heavy-duty trucks). The program is based on six criteria: residual hazardous materials management, residual non-hazardous materials management, post-consumer waste management, facility and procedure management, service area and parking space maintenance, and employee awareness. Various compliance elements must be demonstrated for each of these criteria.

⁴⁴ The Municipal Benchmarking Network Canada (MBNC) reviews nearly 500 performance indicators and statistical data and compares, among other things, the efficiency of the services rendered to the citizens of the 17 member cities. The MBNC's benchmarking process enables a relevant comparison of Montréal with three other cities, Calgary, Toronto and Winnipeg.

Given the scope of the expenditures attributable to the Direction des ateliers mécaniques, which represents about 60% of the SMRA's budget (more than \$100M), and the importance of the shortcomings observed, there is reason to question the completeness of the accountability report.

3.8.A. Recommendation

We recommend that the Service du matériel roulant et des ateliers put in place periodic accountability mechanisms on the management of rolling stock maintenance, based on objectives that will have been defined in measurable terms and on complete and reliable data, to enable informed decision-making by the authorities..

4. Conclusion

The purpose of centralizing activities related to the rolling stock was to improve the efficacy of the management of the Ville de Montréal's (the "City's") fleet of vehicles and equipment. The objectives of this centralization were to reduce the obsolescence of the fleet and increase its reliability and availability to improve the delivery of services and reduce maintenance and repair costs.

The challenge for the Service du matériel roulant et des ateliers (SMRA), operationally, is to ensure the proper operation and availability of a fleet of more than 8,200 vehicles, for a municipal body composed of 19 boroughs and several central departments tasked with delivering a multitude of services to citizens. In terms of compliance, 17% of the fleet of heavy vehicles (HVs) is subject to legal provisions related to both their use and maintenance.

Managing the maintenance of the City's rolling stock relies on the Gestion de la maintenance assistée par ordinateur (GMAO) system, where the information about the vehicle fleet is stored. We found that this data was not exhaustive for the entire vehicle fleet, which does not ensure efficient management of the mechanical workshops, the supply of products needed for interventions, or warranty claims.

Our audit showed that vehicles and equipment were not programmed for preventative maintenance uniformly and in accordance with the manufacturers' recommendations. Regarding HVs that are subject to the *Act respecting owners, operators and drivers of heavy vehicles* (ODHV Act), the SMRA was unable to demonstrate that the Preventative Maintenance Program inspections (PMP inspections) were scheduled at the required frequencies. While the schedule of these interventions was drawn up and communicated, it failed to take into consideration the capacity of the workshops and was not aligned with the needs of the business units to ensure that the rolling stock was available for their operations.

The absence of procedures or work methods leads to inconsistent practices between the workshops. No parameter had been established at the SMRA as a baseline to estimate the time required for the interventions.

Circle checks (CCs) were not performed systematically on the HVs prior to their use, and the defects observed were not systematically communicated to the SMRA. These situations constitute non-compliance with the legal provisions by the users of HVs (the business units and drivers).

Our audit revealed backlogs in the preventative maintenance, while PMP inspections on HVs were non-compliant in terms of frequency of execution and documentation. There is no evidence of repairs for a significant proportion of the defects highlighted during CCs and PMP inspections. Some HVs were in service although no evidence was shown that their defects had been repaired, adding to the cases of non-compliance that could have serious consequences for the City.

There is no coordination mechanisms between the SMRA and the business units regarding the requisition of vehicles for maintenance and PMP inspections. Add to that an almost total absence of follow-up mechanisms documented and shared with the business units regarding the status of out-of-service vehicles in the workshops and the resumption of operations.

Alignment with the Service de l'approvisionnement (SA) to ensure the timely availability of the parts needed for the work to be done in the mechanical workshops is not optimal and leads to procurement frequently in reactive mode. This situation results from the fact that needs for parts and materials for the planned interventions were not communicated to the SA by the workshops with sufficient notice, and that the SA was not necessarily informed of the decisions of the SMRA regarding the management of the vehicle fleet.

The history of work done on the vehicles was incomplete and not adequately documented, which affected the completeness and reliability of the data on the costs of the work. It is common practice for repairs to be done without a documented work order.

The SMRA has few tools or management reports to ensure the follow-up of maintenance costs. The absence of objectives and appropriate management indicators did not allow the persons in charge to evaluate the performance of their operations.

While an accounting is done annually by the SMRA, it made no mention of the operational management of the workshops and omitted the follow-up of the objectives related to the various initiatives arising out of the centralization, especially those regarding cost reductions for the activities in the mechanical workshops.

In short, the findings of our audit led us to conclude that the maintenance management activities related to vehicles and equipment are not adequately planned, performed and followed up, nor is there appropriate control exercised on costs.

Based on these findings, we recommended that the City:

- Ensure control of the completeness and accuracy of the data on the vehicles to support interventions;
- Put in place mechanisms to ensure that all vehicles are subjected to appropriate preventative maintenance programs, at proper intervals, as well as to PMP inspections, according to the legal provisions;
- Establish integrated planning of all interventions with the operational requirements of the business units and the capacity of its workshops;
- Develop procedures and work methods to encourage consistent and effective activities between workshops;
- Put in place control mechanisms so that CCs on HVs are systematically performed and documented as stated in the regulation and that the defects observed are reported to the SMRA;
- Ensure the implementation of preventative maintenance on the entire vehicle fleet;
- Put in place mechanisms so that the implementation of PMP inspections and the documentation of the interventions are done in compliance with the regulations that apply to owners and operators of HVs, and that only vehicles with the right to circulate are used for the operations of the business units;

- Ensure that all work done on the vehicles is properly entered in the GMAO system, so that there is a complete history and data on the associated costs;
- Develop and put in place consistent coordination and follow-up methods between the SMRA and the business units for the requisition and follow-up of out-of-service vehicles in the workshops;
- Establish product forecasts and consumption analyses required for the management of vehicle maintenance to ensure that they are available in a timely manner;
- Establish objectives and corresponding performance indicators to evaluate maintenance management and enable informed decision-making;
- Put in place regular accountability mechanisms on maintenance management and on the degree to which the expected benefits from the centralization of the activities related to the rolling stock are being realized.

Just as one expects that a car dealership will keep a history of the maintenance done on one's personal vehicle and will know what to inspect when maintaining the vehicle based on its age or use, business units must expect to receive similar service from the SMRA. The lack of a guarantee of such service could compromise the very ability of the business units to conduct their own activities. In addition, given the presence of HVs on city streets, compliance with the regulation regarding the maintenance and inspection of these vehicles is paramount to ensuring the adequate and safe delivery of services to citizens.

5. Appendices

5.1. Objectives and Evaluation Criteria

Objectives

To ensure that the management of vehicle and equipment maintenance activities is adequately planned, performed and followed up to ensure that business units can deliver their services as planned, and that appropriate control is exercised on costs.

Evaluation criteria

- The roles and responsibilities are clearly defined and communicated for the management of vehicle and equipment maintenance.
- Each vehicle has an updated data sheet and complete, structured and documented intervention history.
- Inventory management is performed in compliance with the City's directives and frameworks to ensure the availability of parts and supplies in a timely manner.
- Maintenance activities are adequately planned by the Service du matériel roulant et des ateliers.
- A follow-up of the maintenance activities is performed by the Service du matériel roulant et des ateliers to ensure compliance with regulations and planned timelines.
- Control mechanisms are in place to ensure the reliability of the data regarding maintenance costs, and these costs are analyzed for the purposes of timely management.
- Accountability mechanisms are in place to ensure informed and timely decision-making.

5.2. Picture of the Fleet of Vehicles and Equipment by Category at January 25, 2021

Vehicle category ^[a]	Exemples	Ateliers visés				Total City
		Montréal-Nord	Plateau-Mont-Royal	Saint-Laurent	Sud-Ouest	
A. Light automobiles	Compact car 6-cylinder multi segment	21	35	27	30	2,290
B. Light trucks	Van Crew-cab pickup	31	51	40	38	1,252
C. Heavy trucks	Dump truck Sewer cleaning truck	39	56	61	53	1,318
D. Light tool vehicles	Tractor	6	14	10	20	331
E. Heavy tool vehicles	Wheel loader Ice resurfacers	28	32	53	38	769
F. Other light equipment	Sidewalk salt spreader Snowmobile	60	78	95	72	1,768
G. Other heavy equipment	Theatre trailer Modular dump truck	14	29	21	30	427
Total		199	295	307	281	8,155
Heavy vehicles^[b]		41 21%	60 20%	67 22%	47 17%	1,357 17%

^[a] Source: Data from the SMRA, inventory at January 25, 2021, by category.

^[b] A heavy vehicle is a road vehicle whose gross vehicle weight rating (GVWR) is 4,500 kg or greater, a combination of road vehicles whose GVWR totals 4,500 kg or greater, a bus, minibus or tow trucks, or a vehicle that transports dangerous substances as described in 622 of the *Highway Safety Code*.



