

Legislative
Assembly
of Ontario



Assemblée
législative
de l'Ontario

STANDING COMMITTEE ON PUBLIC ACCOUNTS

MAINTENANCE OF THE PROVINCIAL HIGHWAY SYSTEM

(Section 3.14, 2004 Annual Report of the Provincial Auditor)

1st Session, 38th Parliament
54 Elizabeth II

Legislative
Assembly
of Ontario



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législative
de l'Ontario

Bruce Crozier, MPP,
Deputy Speaker of the Legislative Assembly.

Sir,

Your Standing Committee on Public Accounts has the honour to present its Report and commends it to the House.

Norman Sterling, MPP,
Chair.

Queen's Park
August 2005

STANDING COMMITTEE ON PUBLIC ACCOUNTS

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PREAMBLE

The Auditor General reported on the Ministry of Transportation's maintenance system for provincial highways in Section 3.14 of the *2004 Annual Report*. The Standing Committee on Public Accounts (the Committee) held hearings on this audit report on March 31, 2005 with representation from the Ministry of Transportation (the Ministry). The Committee endorsed the Auditor General's* findings and recommended that the Ministry implement the recommendations in S. 3.14.

The Committee would like to thank the Deputy Minister and Ministry officials for their attendance at these hearings. Also, the Committee acknowledges the assistance provided during the hearings by the Office of the Auditor General (the Auditor), the Clerk of the Committee, and the Research Officer from the Ontario Legislative Library's Research and Information Services Branch.

This Committee's report format includes introductory information in each section, based directly on the Auditor's report, followed by an overview of the hearings with Committee recommendations.

Ministry Response to Committee's Report

The Committee requests that the Ministry of Transportation provide the Committee Clerk with a comprehensive written response to this report within *120 calendar days* of the tabling with the Speaker, Legislative Assembly of Ontario. If the Committee is of the opinion that additional time is required for the response to a particular recommendation, it will be noted in that section. Finally, it would be appreciated if the Ministry would keep the Committee's Clerk informed of its progress in this regard.

1. BACKGROUND

The Ministry of Transportation (MTO) is responsible for building and maintaining the province's highway system and transportation-related structures such as bridges and equipment storage facilities. The current value (replacement cost less deterioration) of the provincial highway system was approximately \$39 billion as of June 2004.

The Ministry's highway programs include maintenance, minor capital projects, and major capital projects. Maintenance spending is dependent on various factors, primarily weather and accidents. In the 2003/04 fiscal year, expenditures were \$241 million on highway maintenance and \$1 billion on the highway capital program.

* Auditor General, formerly the Provincial Auditor.

2. AUDIT OBJECTIVES AND CONCLUSIONS

The audit objectives were to assess the adequacy of the Ministry's procedures for ensuring that:

- the province's highway assets were maintained safely, cost effectively, and in accordance with legislation and policies; and
- its performance in managing the provincial highway system was properly measured and reported.

The audit was completed in April 2004. Highlights of recently completed internal audit work on the Ministry's administration of major capital projects were also included in the report.

2.1. Overall Conclusions

Although the Ministry had systems and procedures in place to ensure that contractors are qualified and that services are acquired competitively, the Ministry did not have adequate procedures to ensure that highway assets are cost effectively maintained. Several examples of deficiencies were noted in relation to measuring and evaluating the performance of contractors on maintenance projects, prioritizing capital projects to ensure that those with the highest benefit/cost ratio were performed first, and ensuring that bridges are inspected at least once every two years, and that municipalities meet their inspection requirements.

The Ministry's assessment of the condition of bridges and road pavement indicates that approximately 32% of provincial bridges and about 45% of highway pavements will require major rehabilitation or replacement within the next five years. Past funding levels will not be sufficient to address these costs.

The Auditor concluded that the Ministry was not adequately reporting on its performance and noted several useful indicators of performance that ought to be measured and reported. At the time of the audit, the Ministry was implementing an Asset Management Business Framework, which is intended to address gaps in performance information for decision-making and reporting by 2007. In a related report, prepared by MTO's Internal Audit Services Branch on the management of highway construction projects, weaknesses in project design, construction monitoring, pavement-quality testing, and warranty administration were noted. These weaknesses collectively reduce the Ministry's control over the quality of highway construction projects.

DETAILED AUDIT OBSERVATIONS

3. MANAGING MAINTENANCE

The Ministry outsourced most provincial highway and bridge maintenance to the private sector between 1996 and 2000. However, MTO has retained responsibility for the quality and timeliness of maintenance operations under the auspices of area maintenance contracts (AMCs), and managed outsourcing contracts (MOCs). These contract models may be described as all-inclusive in the first instance, and separate contracts for each activity in MOCs.

Data provided by the Ministry indicate that the total cost/km on highway maintenance for the period 1996/1997 to 2003/04 has generally increased, with some variations. The Auditor noted that the Ministry used appropriate controls over contracting and payments processes, while confronting increasing costs. MTO does not identify the source of major year-to-year increases in maintenance costs, which would highlight areas in which management should focus its cost control efforts.

Maintenance contracts contain detailed specifications and performance standards for the services provided by contractors. Ministry maintenance co-ordinators verify compliance with each contract such as snow ploughing, and sanctions are applied in the event that contractors do not fulfill their obligations. Sanctions include financial penalties, and in cases of repeated and serious violations, the termination of the contract.

Committee Hearings

Contract Administration (Monitoring/Inspections)

The Auditor General noted the importance of managing maintenance contracts effectively.¹ In this regard, Ministry guidelines provide direction to coordinators to ensure consistent and unbiased monitoring, for example.² Contract administrators are required to undergo comprehensive training, with a commitment to refresher courses for contract monitors on required processes.³ The Ministry is continually improving on the management of its maintenance contractors through specific inspection guidelines.⁴

Competitive Tendering

The Committee addressed the competitiveness of the tendering process, although this was not an area of specific concern in the audit report.⁵ The Ministry indicated that the success of outsourcing is dependent upon competitiveness, and that the tendering and awards processes are monitored.

To attract competition, contracts have been of varying time frames to enable companies to amortize the cost of assets including equipment over the life of the contracts.⁶ Also, a cluster approach is used for maintenance contracts, which allows contractors to bid on one or more contracts in a group. According to MTO, typically several companies would apply on any given contract, thereby ensuring

a competitive environment.⁷ The Auditor indicated satisfaction that a competitive process has been followed.⁸

3.1. Inspecting Maintenance Work

The Auditor found that the Ministry's guidelines for maintenance coordinators are not specific enough to hold co-ordinators accountable for complying with inspection guidelines (e.g., time of day for conducting inspections, and the frequency of inspection). Also, inspection data is recorded in the co-ordinator's diary, rather than in a computer system; consequently:

- management cannot easily monitor inspection activities and ensure effective contract oversight; and
- the Ministry cannot organize and compare data from inspections, activity reports submitted by contractors, and complaints, accidents and claims, in order to assess the performance of coordinators and contractors.

According to the Auditor, better information would assist the Ministry in several areas; namely, incorporating risk in the inspection process, evaluating the performance of contractors, and assessing the quality of inspection work by co-ordinators.

Committee Hearings

Data for Contract Administration

The Auditor recommended the implementation of improvements for managing and analyzing data (e.g., inspections, violations, complaints and claims for damages by highway users). By February 2005 the Ministry was introducing new technology and systems for the management and analysis of data were being introduced.⁹ For example, the Ministry has conducted field trials of a global positioning system and Internet-enabled mobile electronic diaries to provide contract data on a timely basis.¹⁰

3.2. Measuring Contractor Performance

The inspections conducted by maintenance co-ordinators determine whether contract performance standards have been met; however, the information collected is not sufficient to help identify best practices or to reward performance that significantly exceeds standards. The Auditor suggested measures that may be used, for example, the time required to achieve bare pavement after a snowfall, the response time for removing debris, and overall appearance of an asset.

Based on the Auditor's 1999 report, the Ministry agreed that performance measures for contractors were necessary; however, this matter had not been addressed by 2004.

Committee Hearings

Consistency in Contract Output

The Committee noted that the quality of maintenance output has not been consistent from one contract to the next, for example, in snow clearance on highways. However, the Ministry has established performance standards for both area maintenance and managed outsourcing contracts (e.g., start-up time for salting following a storm, and snow removal).¹¹ In the case of achieving the “bare pavement” standard following a snow storm, in 2003-04 contractors achieved this standard 96% of the time, when the requirement was 90%.¹²

The overriding concern is driver safety on Ontario highways, which is dependent in part on consistency in the maintenance provided from one contract to the next on adjoining highway sections. As noted, variations in maintenance contracts have been evident.¹³

Committee Recommendation

Maintenance Standards

The Committee concluded that any inconsistencies in service delivery require immediate attention through performance measures, and the development of best practices.¹⁴ Ensuring a high level of safety on provincial highways is of paramount importance.¹⁵

The Committee therefore recommends that:

1. The Ministry of Transportation should report to the Standing Committee on Public Accounts on contractor compliance rates with performance measures by region, with explanations of any significant variances. The development of best practices for inclusion in new contracts should be based on performance data.

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

3.3. Managing the Sanctions Process

Ministry maintenance co-ordinators report violations. Superintendents assess the seriousness of the violations, and issue warning letters or levy penalties on contractors. The Auditor identified several concerns with the sanctions process:

- violations were not assessed and sanctions were not administered in a fair and consistent manner, for example, there were differences in sanctions for the same violation; and

- comprehensive records are not maintained for contract violations, consequently information is not available on each violation, such as the date of occurrence and the rationale for decisions.

The Auditor concluded that a proper computerized system would help management in monitoring the actions taken on violations, ensuring that contractor performance evaluations are both appropriate and consistent, and eliminating the need to have duplicate records at the field office and the head office.

The Auditor recommended that in order to manage maintenance contractors more effectively, the Ministry should:

- provide co-ordinators with more specific guidelines to assist them in performing inspections effectively;
- implement systems for managing and analyzing data regarding inspections, violations, complaints from and claims for damages by highway users, and service levels achieved;
- require staff to annually sign a code of conduct governing their relationship with the contractors that they manage; and
- take steps, such as reviews of regional procedures and records by head office, to ensure fairness and consistency throughout the province in the sanctions applied to contractors for violations.

The Ministry has guidelines to provide direction for consistent and unbiased monitoring. A review of the guidelines is planned with the objective of being more specific in the monitoring frequency and summarizing of results. In addition, MOT is conducting pilot-tests on the new technology (e.g., touch-screen technology) in Ministry vehicles in the form of electronic diaries to improve the recording and analyzing of data, thereby replacing manual reports and permitting trend analysis, for example.¹⁶ This system enables staff to go online to determine, in real time, the location of vehicles on the network.¹⁷ The Ministry has committed to continue to explore system improvements for the integration and analyses of data for more effective contract oversight.

The Ministry has a *Guide to Business Conduct* to which it has committed to adhere to avoid conflict of interest situations. Finally, MOT indicated that it will review the administration guideline for sanctions and investigate mechanisms to improve the tracking and monitoring of sanctions.

Committee Hearings

Enhanced Enforcement Program

In response to the Committee's enquiry about the effectiveness of contract sanctions, the Ministry indicated that contractors' performance has been in compliance with established standards.¹⁸ For example, a demerit-point system is used for sanctions, as a basis for applying financial penalties.¹⁹ Generally the

Ministry has been impressed with the performance of the contractors, but sanctions have been applied, resulting in financial penalties.²⁰ In turn, the Ministry follows up with contractors with respect to remedial action to prevent reoccurrences.²¹ The sanctions option is taken very seriously and to date MTO has not broken a contract or refused to renew contracts.²²

There are no examples of public safety having been compromised. However, for example, depending on the severity of weather conditions, the threshold standard may not be met consistently due to such circumstances as weaknesses in record keeping, and response times in a severe snowstorm.²³

Enhanced Management Applications

The Committee noted the Auditor's conclusions with respect to enhancing management through the computerized recording of violations, consistency in contractor performance evaluations, and avoiding duplicate records. According to the Ministry, data is now analyzed, points applied and charges are indicated on the system.²⁴

Ministry Review of Sanctions Protocol

The Auditor noted the need to review regional procedures and records with the objective of ensuring fairness and consistency in the application of sanctions. The Ministry uses various data sources to determine inspection frequencies and to monitor contract performance, and updates its database on contract violations monthly.²⁵ Contract administrators deal with violations and impose sanctions within an established protocol.²⁶ The Ministry has decided to conduct a review to strengthen provincial consistency and fairness in the application of sanctions.²⁷

Miscellaneous Matters

The Committee raised concerns about the size and weight of vehicles and enquired whether the province should be addressing such matters. The Ministry explained that it is a federal responsibility to determine the dimensions, sizes and safety aspects of vehicles.²⁸

The Ministry has stringent requirements for both weight and moving violations on carriers, and it is implementing new approaches in its Roadside Data Capture System and spot audits, as follows:²⁹

- Electronic Monitoring System/Electronic Diary — MTO will be implementing the Roadside Data Capture System mid year 2005. This system will assist in flagging high-risk offenders for follow-up action by providing real-time information to officers on site (at a given threshold a company may be taken out of business based on the number of convictions or road weight violations).³⁰
- Spot Audits — MTO is working with industry (e.g., shippers and aggregate companies that load vehicles) by conducting spot audits and ensuring that vehicles are properly loaded, which in turn will help prevent infrastructure damage.³¹ The Ministry has recently allowed for the institution of studded tires

in specific locations in the north, with the objective of enhancing safety. The Ministry will be monitoring the maintenance costs of this initiative and usage in the future.³²

Committee Recommendations

Inspection Guidelines Update/Courses

The Ministry committed to a review of inspection guidelines in 2004, with the objective of enhancing monitoring frequency and the reporting of summarized results. A review was ongoing in February 2005 focusing on monitoring priorities and frequency, documentation and reporting, and the use of advanced technology.³³ On the basis of this information, the Ministry plans to update its monitoring manual and implement refresher courses by March 2006 for maintenance contract administrators.

The Committee therefore recommends that:

2. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the review of its inspection guidelines with respect to monitoring priorities and frequency, documentation and reporting, and the use of advanced technology. The report should address the Ministry's agenda for incorporating the results in the monitoring manual, and status of planning for updated maintenance contract administrator course work.

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

Review of Sanctions Methodology

The need to review regional procedures and records for the application of sanctions was noted in the audit, with specific attention to matters of fairness and consistency. The Ministry acknowledged the need to ensure consistency in the procedures followed in applying sanctions.

The Committee therefore recommends that:

3. The Ministry of Transportation should report to the Standing Committee on Public Accounts on its review of the administration of sanctions policy, with a focus on strengthening consistency, fairness, and effectiveness. The report should address the findings, specifically outlining the administrative steps to be taken to ensure equitable treatment.

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

3.4. Monitoring the Impact of Salt on the Environment

In 2001/02 the Ontario Environmental Commissioner recommended that MTO explore the establishment of an ecological monitoring program to evaluate the impact of reducing road-salt usage. The Auditor recommended that in order to identify and better manage the impact of salt use on the environment, the Ministry should take steps to acquire the information and develop the analytical tools necessary to properly monitor salt use, and work with the Ministry of the Environment to establish ongoing testing and tracking of the impact of changes in salt use on the local environment.

The Ministry tracks salt usage and at the time of the 2004 audit, reported that it was working to improve this through the development and implementation of advanced winter maintenance methods.

In 2004 MTO, in co-operation with the Ministry of the Environment, undertook a project to establish a practical approach to environmental monitoring, with the objective of demonstrating the impact of reduced salt use on the environment.

Committee Hearings

Managing Salt Usage

The Ministry noted that it is a recognized national leader in best practices for salt management, and that it has participated in the Environment Canada multi-stakeholder working group on salt usage.³⁴ Furthermore, it is developing a Winter Weather Severity Index for comparative purposes, in conjunction with other provinces and the United States. The objective is to establish a goal for a reduction in salt usage as high as 20%.³⁵ The Ministry has taken several steps in this regard, including:³⁶

- ongoing consideration of new winter maintenance technologies to improve salt management and safety. The development and implementation of Automatic Vehicle Location Systems (AVL) for example, will include the location of ploughs and spreaders, and total salt distribution on roadways;
- development of a system of automated reports to improve the monitoring of salt applications;
- deployment of the Advanced Road Weather Information System (ARWIS) over several years, providing computerized spreader controls, pre-wetting of various mixtures applied to the highway, and infrared thermometers ensuring the appropriate application; and
- as noted in 2004, the Ministry of the Environment and MTO are involved in an environmental monitoring project on salt usage, with a completion timeframe of the fall 2005.

Construction Techniques

Measures have been taken to protect bridges against salt damage, specifically the exposed sections of the infrastructure. These include, for example, using stainless steel in some cases on exposed areas, the sealing of bridge decking, and applying a thicker concrete cover to reduce salt penetration and damage to metal reinforcing.³⁷ In conjunction with these construction/maintenance measures, the longer-term challenge is to design bridges to actually prevent corrosion.

Committee Recommendation

Monitoring Salt Usage/Application of New Technology

The Ministries of Transportation and the Environment undertook an environmental monitoring project in 2004 to demonstrate the impact of the reduction of salt usage on roads. The Committee concluded that this initiative is of central importance to addressing the fundamental issue of usage, and is a priority.

The Committee therefore recommends that:

4. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the study to address environmental monitoring of salt usage on roadways and the environment. The report should include, but should not be limited to the following:

- **the Ministry of Transportation and the Ministry of the Environment joint project, undertaken in 2004 with a fall 2005 completion date, to establish an environmental monitoring methodology to demonstrate the impact of reduced salt use on the environment; and**
- **the impact of initiatives to address salt usage (e.g., Advanced Road Weather Information System, Automatic Vehicle Location System, and the Winter Weather Severity Index).**

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the completion of this project in the fall 2005.

4. PRIORITIZING CAPITAL EXPENDITURES

Capital projects are designed and delivered primarily by the private sector; however, the Ministry continues to do some design work. Expenditures are segregated into three separate funding envelopes; namely, minor capital, rehabilitation/reconstruction, and expansion projects. The Ministry allocates funding for minor capital projects, but rehabilitation/reconstruction and expansion projects require Management Board of Cabinet approval.

Minor capital and rehabilitation/reconstruction projects cover maintenance and improvements to existing infrastructure, whereas expansions entail safety improvements and reduction of congestion. Rehabilitation/reconstruction and expansion projects are prioritized at head office, and minor capital projects at the regional level.

4.1. Funding of Preventive and Preservation Maintenance Projects

Pavement deteriorates naturally over time; however, high-quality highways last approximately 17 years without maintenance. With proper maintenance and rehabilitation the useful life of highways can be extended to 50 years or more. Preventive and preservation maintenance is time sensitive and cost effective, and delays in maintenance result in major rehabilitation/reconstruction projects. However, fewer than half of the recommended maintenance projects are funded each year.

The Auditor noted several concerns related to the prioritization and funding of preventive and preservation maintenance projects, as follows:

- the prioritization process was subjective and not adequately documented; and
- the Ministry's allocation process for regional funding of preventive and preservation maintenance projects did not permit a comparison of project priorities and evaluations across regions. Consequently, there was no assurance that on a province-wide basis the highest benefit/cost ratio projects would be addressed first.

The Auditor pointed out the cost effectiveness of preservation/preventive maintenance relative to highway expansion projects. However, the practice of separate funding envelopes for each capital expenditure category does not allow maintenance projects to compete with expansion projects for funding, based on their relative cost effectiveness.

The Auditor recommended that in order to make the best use of available capital funds, the Ministry's prioritization process should allow preservation and prevention projects to compete with all other projects for the available funding based on a full analysis of their costs and benefits.

The Ministry's 2004 response indicated that it plans to have the Asset Management Business Framework (AMBF) implemented by 2007. The Framework will provide additional analytical tools such as benefit/cost and other economic assessments to allow for a more consistent means to prioritize investments.

Committee Hearings

Multi-Year Planning

Funding is provided on a multi-year planning basis with annual capital budgeting approval.³⁸ Under the AMBF, the planning process will begin with an asset valuation, within the budgeting model, taking into account all provincial highway assets:

It's [the AMBF] really a business process whereby we [MTO] are using everything from corridor plans in each region of the province's highway network, segment by segment, to have an assessment of the asset state and to then apply various business measures to determine what levels of rehabilitation you need to spend money on at what time. It gives us an overall picture of the asset at any point in time.³⁹

Priorities are balanced with trade-offs, using engineering expertise with consideration of other factors, such as Canada-U.S. trade demands on infrastructure.⁴⁰ Decisions on expenditures for public infrastructure renewal are assessed based on priorities in other sectors, followed by annual results-based planning across provincial ministries.⁴¹ The budget process does not allocate a block amount with latitude for the Ministry; rather the planning sets detailed assessments, with justification, by highway corridor covering planning/design/construction, and expansions, rehabilitation and general maintenance projects.⁴²

The (AMBF) process entails a determination that certain expenditures will provide savings over the long term.⁴³ It is based on distinct life-cycle costing for individual projects, and according to the Ministry, it is a transparent method of managing critical assets, and defending why the Ministry is spending the money.⁴⁴ This approach is unlike the management of operating funds, which permits the movement of money from one area to address priorities elsewhere.⁴⁵

Capital Allocation–New Build

The Committee enquired about the criteria used to make decisions affecting capital allocations for new construction.⁴⁶ New build is included in expansion priorities, addressing the following:⁴⁷

- highway traffic in terms of volumes; and
- key economic corridors and access points to border entry areas.

These features are examined across the network with the objective of determining the best application of funds for expansion, prioritizing with respect to the maximum economic benefit, and identifying the greatest congestion relief.⁴⁸

Increasing Maintenance Costs

The Committee enquired about the reasons for increases in highway maintenance costs, and whether this is attributable to such factors as privatization and weather conditions.⁴⁹ The total maintenance cost has increased by approximately \$20 million on an annual basis, accounting for inflation and enhancements.⁵⁰ Benefits have been derived from the competitive tendering process, and the Ministry has forgone capital expenditures for example, approximately \$7 million per year in equipment as these costs are being passed along.⁵¹ The Ministry now has 800 maintenance staff, down from approximately 2,400.

The Ministry noted that although it has realized cost reductions in recent years, increases are evident for several other reasons:

- enhanced emergency response methods;
- approximately 11 new requirements for contractors to meet;
- the Ministry transferred lower-cost highways to municipalities and retained higher-cost highways. Therefore the average cost per kilometre increased; and
- maintenance has been altered through new technology and regulations, for example, in approaches to traffic control while working on highways.

Committee Recommendation

Competition for Funding

The Committee is in agreement with optimizing the use of available capital funds. This is dependent on MTO's budget prioritization process allowing preservation and prevention projects to compete with other projects for funding. The Ministry committed in 2004 to implement its Asset Management Business Framework (AMBF) by 2007 to provide analytical tools such as benefit/cost and other economic assessments for a more consistent prioritization of investments.

The Committee therefore recommends that:

5. The Ministry of Transportation should provide the Standing Committee on Public Accounts with a progress report on the planned implementation of the Asset Management Business Framework.

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

5. INSPECTING BRIDGES

5.1. Compliance and Enforcement

5.1.1. Ministry Bridges

Structural engineers are supposed to perform bridge inspections at least once every two years. The results are recorded on a standardized template and entered in the Bridge Management System (BMS). Implementation of this system began in 2002 and is to be completed by the end of 2005, thereby replacing the need for regional inventory records and providing an accurate inventory of all provincially owned bridges. At the time of the audit, a regional inventory was maintained, which was updated for new bridges, demolitions and transfers of Ministry-owned bridges to municipalities.

The Auditor noted that procedures were not in place for periodically verifying that all Ministry bridges were accounted for and that bridge profiles (e.g., a history of major maintenance or improvement work) were accurate. Furthermore, the inventory records did not provide sufficient information on each structure to facilitate the inspection process (e.g., unique design features and risks) or to prepare summary information and demonstrate compliance with regulations. BMS has the capacity to address existing information gaps; however, it does not automatically identify overdue inspections.

5.1.2. Municipal Bridges

The province has responsibility for bridge safety, but municipal governments are responsible for inspecting their own bridges. The Auditor noted that MTO had not established procedures for obtaining assurance that municipalities comply with bridge inspection regulations, and maintain accurate inventories of their bridges. In some instances in which bridges had been transferred to a municipality, inspections had not been performed for several years.

5.2. Measuring and Reporting on Bridge Condition

The Ministry implemented a measurement of “bridge condition” in its Bridge Condition Index (BCI), which measures the structural condition and provides a basis for prioritizing and costing future repairs or replacements. The BCI includes an estimate of the replacement cost together with the level of deterioration of each major structural component of the bridge.

The Ministry planned to have an index for all bridges in BMS by the end of 2004. As of May 2004, although the condition of the entire bridge inventory had not been assessed, approximately 68% of the assessed bridges would not require replacement or rehabilitation within five years, compared to the target of 85%. The cost to achieve the Ministry’s target could not be estimated until the assessments were completed.

The Auditor recommended that in order to meet its responsibilities for complying with and enforcing the regulation of the *Public Transportation and Highway Improvement Act* dealing with inspections of bridges, the Ministry should:

- ensure that its Bridge Management System contains complete and accurate information needed for the inspection of each bridge — including details of recent structural and maintenance work done, and the key aspects of each structure that must be inspected;
- ensure that the BMS can automatically generate reports on overdue inspections for management’s attention; and
- take steps, perhaps in conjunction with stakeholders, to obtain adequate assurance that local governments have appropriate systems and procedures in place, including reliable bridge inventories, to comply with the regulation requiring bridges to be inspected every two years.

The Ministry reported in 2004 that it periodically assesses its procedures for effectiveness, and that it will enhance BMS for the purposes of collecting and providing information on structural details, and notification if inspection reports are not properly filed every two years. Furthermore, the province will continue to work with municipalities to remind them of their responsibilities to conduct bridge inspections. Finally, the province is also working with the federal government to assist municipal partners, for example, through funding assistance.

Committee Hearings

Bridge Maintenance

Several related issues were raised during the hearings, specifically, the number of provincial and municipal bridges in use, the costs involved in the rehabilitation process, and the nature of the Ministry’s oversight role.⁵²

Bridge Management System

The Ministry is of the opinion that the BMS is a sophisticated and effective model with information that is both complete and accurate. However, a notification process is necessary to trigger inspection cycles.⁵³ At the time of the hearings the BMS was under review for the purposes of modifying the system to address the Auditor’s concerns.⁵⁴

The Ministry has undertaken the following initiatives:⁵⁵

- Bridge Inspection Reports - in addition to BMS, automatically generating a report on overdue bridge inspections with data loaded into the system, and system modifications to ensure that notifications are issued if inspection reports are not filed every two years;⁵⁶
- Municipal Asset Management Database - the establishment of a joint working group, led by MTO and comprised of the Ontario Good Roads Association, the Ministries of Public Infrastructure Renewal and Municipal Affairs, and Housing to create a municipal asset management database for roads and bridges; and

- **Municipal Bridge Inspection Responsibilities** – the Ministry is working with the federal government to ensure that a portion of the funding available under the Canada-Ontario Municipal-Rural Infrastructure Fund (COMRIF) is allocated to the development of asset management capabilities among municipalities. The objective is to inform municipalities of their specific bridge inspection responsibilities.

The Ministry's inspection manual and the structural manual have been updated, with staff instructions.⁵⁷

Some counties and municipalities are using the Bridge Condition Index, while others are using more basic asset management tools. In the long term the Ministry expects that as more jurisdictions become comfortable with BMS, the usage of this system and the BCI indices will be expanded.⁵⁸

Municipal Bridges

The matter of municipal responsibility for bridges was raised, specifically affordability as it relates to inspections, maintenance, and liability for injuries.⁵⁹ The Auditor concluded that the Ministry should ensure that local governments have appropriate systems and procedures in place for this responsibility.⁶⁰

Legally, local governments have responsibility to ensure that a municipal bridge meets set standards.⁶¹ The province has taken certain measures to assist municipalities, specifically through the Bridge Management System, the Ontario Structure Inspection Manual and an educational program.

Assistance Programs

The Committee expressed concern that municipalities may need further assistance resulting from the allocation of certain highways to the local level.⁶² The Ministry is providing the tools to ensure that municipalities are able to inspect bridges and that the asset management plan is in place to monitor bridges and road networks, providing for properly timed rehabilitation and maintenance work, thereby avoiding undue costs.⁶³

In addition, the Ministry, with the federal government, is attempting to provide assistance in expertise and technology, combined with funds for infrastructure:

Not only have we [MTO] alleviated their [municipalities'] need to spend on developing their own technology so they have the technology that allows them to apply that indice to their bridge structures, but we've provided funding, through OSTAR [Ontario Small Town and Rural Development] previously and currently COMRIF [Canada-Ontario Municipal Rural Infrastructure Fund], so that when they prioritize that a particular bridge needs or

bridges need rehabilitation, they make that application to those funds. Of the 350 applications that have been received this year, 62 are for bridge projects, and they are the priorities of that community, as distinct from perhaps a road priority, as distinct from perhaps some other infrastructure priority.⁶⁴

The Ontario Small Town and Rural Development initiative and the Canada-Ontario Municipal Rural Infrastructure Fund have provided municipalities with financial assistance for bridge maintenance, road maintenance and road enhancements.⁶⁵ The COMRIF application process has demonstrated that the majority of municipalities applying have had some form of bridge inspection and asset management plans in place.⁶⁶

Committee Recommendations

Municipal Infrastructure Responsibilities

The Ministry has undertaken several initiatives with respect to the maintenance of the bridge system, and the Committee has concluded that these steps are proactive in addressing some of the Auditor's concerns. In addition, the Committee noted the Auditor's concern that local governments have appropriate systems and procedures in place, including reliable bridge inventories, to comply with the regulation for bridge inspections every two years. At the centre of this issue is the matter of affordability, given that infrastructure maintenance costs may be onerous for certain smaller municipalities.

The province gave its assurance that it will work with municipalities, reminding them of their responsibilities to conduct bridge inspections, and that it would, with the federal government, pursue funding assistance.

The Committee concluded that, in addition to the initiatives already taken, a clear definition of municipal responsibilities based on an inventory of bridges is required.

The Committee therefore recommends that:

6. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the status of its efforts;

- **to ensure the Bridge Management System contains an accurate inventory of provincial bridges and projected maintenance requirements; and**
- **to obtain assurance that municipalities have adequate systems in place to maintain accurate inventories of their bridges and projected maintenance requirements.**

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

Management Planning for Bridges

Financial assistance has been made available for bridge maintenance through the Ontario Small Town and Rural Development funding initiative and the Canada-Ontario Municipal Rural Infrastructure Fund.⁶⁷ However, as noted through the COMRIF application process, some municipalities applying did not have bridge inspection and asset management plans in place.⁶⁸ The Committee concluded that all bridges in the province require a comprehensive management approach, including financial planning to ensure proper maintenance over the long term.

The Committee therefore recommends that:

7. The Ministry of Transportation should report to the Standing Committee on Public Accounts on steps taken to obtain assurance that municipalities are complying with legislation regarding inspections of their bridges, and have adequate asset management plans, including financing, to undertake maintenance and capital projects when they are needed.

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

6. MEASURING AND REPORTING ON PERFORMANCE

MTO has stewardship over highway assets, which includes the responsibility for measuring and reporting on their state, and the cost effectiveness of expenditures including expansions projects.

6.1. Performance Measures Currently Reported On

MTO's last business plan in 2003 contained only two performance measures; namely:

- highway accessibility – (a target of having 93.7% of the population living within 10 kilometres of major provincial highway corridors), and
- construction efficiency – the ratio of construction costs to administration costs (a target of having 80% of total highway capital costs spent on actual construction).

However, the construction efficiency measurement has not specifically addressed the “efficiency” component, which is an examination of the amount of construction work done in return for the level of investment. The Auditor

expressed the concern that these performance measures may encourage managers to economize on the cost of necessary administrative work (e.g., pre-engineering services), which could have a negative impact on total cost.

6.2. Performance Measures to Be Considered

Based on current literature and practices in other jurisdictions, the Auditor concluded that the Ministry should report on several performance measures each year, as follows:

- **Level of Service Provided to Highway Users:** The Auditor concluded that an indication of the level of service being provided over time should be measured and reported, in addition to cost. Measures of service levels would include such indicators as the level of highway congestion, and service outages (lane closures) due to routine maintenance work and capital projects.
- **Financial Impact of Major Variations from Design Life:** The Ministry does not calculate or report on the costs/savings resulting from negative/positive variations in the design life of bridges and pavements. Such information would help the Ministry to assess poor/good practices and identify the costs and benefits of transferring more of the risk of poor construction to the contractors through extended warranties or holdbacks.
- **Condition of Pavements and Bridges:** The Auditor concluded that analyzing and reporting year-to-year changes in the Pavement Condition Index and Bridge Condition Index data along with other measures, such as the remaining service life and the current value of assets, would assist in determining the appropriateness of capital investment decisions and the cost-effectiveness of efforts to maintain highway assets.
- **Highway System Costs per Kilometre:** The Auditor identified two measures to assist in assessing how effectively the Ministry spends its funding; namely, a highway's life cycle cost per lane/kilometre, and a highway's annual routine maintenance cost per lane/kilometre.
- **Effectiveness of Efforts to Reduce Excess-Weight Damage:** The Auditor suggested that obtaining and analysing data from the Ministry of the Attorney General on the outcome of charges laid by MTO enforcement officers would assist the Ministry in assessing the effectiveness of the enforcement program.

There is an economic incentive to overload trailers, which has necessitated an enforcement program with fines for exceeding weight limits. The Auditor noted that the Ministry does not collect and analyze this data (e.g., carrier convictions and the resolution of charges), therefore its overall effectiveness has not been evaluated.

Committee Hearings

The Ministry reported that performance measures have been used to monitor activities against standards such as the time to achieve bare pavement after winter storms, and the condition of pavement and bridges.⁶⁹ Current work on

performance measures includes, for example, the implementation of the Ministry's asset management framework.⁷⁰

Vehicle Weight and Road Damage

The Ministry initiated a four-phase Vehicle Weight and Dimension Reform Project to reduce substantial heavy-truck/tractor-trailer road and bridge damage. The implementation of the initial phases of the Project began a gradual move to less damaging vehicles as older equipment is replaced. The Committee followed up on the Project, in terms of its impact in the initial phases.⁷¹ According to the Ministry, the damage is in the order of \$300 million, and addressing this issue is a function of the industry's movement to new equipment that is safe, productive and infrastructure-friendly to Ontario roads. The resolution is a matter of phasing out older vehicles over a 10 to 15 year period, and introducing new designs with active axles in place of fixed or liftable axles. The Ministry is in the third phase of this Project, and the benefits, in terms of avoidable damage to infrastructure, will not be addressed until the end of the phase four.⁷²

6.3. Other Information for Decision-making

Highway expansion projects require Management Board of Cabinet (MBC) approval. The Ministry's submission to MBC does not include the projected ongoing costs of maintaining new assets in good condition. The Auditor concluded that proposals for expansion projects should include the present value of the life cycle costs to maintain the highways in good condition.

The Auditor recommended that to better support decision-making and strengthen accountability to the public, the Ministry should:

- implement performance measures dealing with the condition of assets under management and the cost-effectiveness with which resources have been employed in managing the province's highway system and report annually on the results; and
- ensure that proposals for expansion projects contain information on the costs of maintaining the new highways.

The Ministry has been implementing its Asset Management Business Framework (AMBF) to help manage assets and to set priorities for sound investment decisions based on a full life-cycle analysis of costs and consideration of all relevant measures of performance. When implemented in 2007, this Framework will enable management to address gaps in performance measurement and general reporting.

The Ministry's 2004 response indicated that it is developing a comprehensive suite of performance measures to focus on the outcomes of transportation investments, which include:

- pavement and bridge conditions;
- asset value;

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- safety and mobility;
 - cost efficiency measures; and
 - benchmarking of pavement and bridge measures against other highway jurisdictions.

The plan is to include such measures in the annual planning process. The Ministry is in agreement with providing life cycle cost commitments associated with expansion projects in project proposals, which will be done through the AMBF.

Committee Hearings

Prioritizing Highway Investments

At the time of the hearings the Ministry was in the process of implementing the AMBF. The Ministry noted that this approach is deemed to be the most sophisticated route to valuing, addressing and maintaining investments.⁷³

Asset Management Methodology

This methodology will enable the Ministry to apply a consistent, long-term approach to highway management, focusing on prioritizing investments within a given timeframe and planning investment cycle.⁷⁴ The intention is to use this approach within a full-life-cycle costing approach for road rehabilitation - improving the condition of the highway infrastructure, looking at current asset valuation and the state of each infrastructure segment.⁷⁵ At the same time, it is seen to deliver greater cost efficiencies with increased justification for expenditures based on timely and reliable information with enhanced public accountability.⁷⁶

The Ministry elaborated on this methodology with reference to specific components, which include:⁷⁷

- consideration of the processes followed in asset valuation and the determination of remaining service life of various assets;
- preparing quarterly reports to provide the status of activities that will affect MTO performance measures;
- developing training programs in the use of all asset management tools, including performance measures;
- construction of a new integrated inventory monitoring system to enable more current/automated comparative analysis and reporting; and
- preparing contract administrator documentation based on annual updates to MTO inspection manuals, contract officer manuals and the consultant performance appraisal system.

According to the Ministry it provides flexibility in the treatment of assets, and the less expensive treatments can in turn focus on rehabilitation earlier, reducing the overall costs and extending the life of the assets.⁷⁸

Planning/Budgeting

The asset management process is a planning/management/decision process that will provide better information for budgeting. Currently funds are allocated on a regional basis with expenditures applied for asset preservation and expansion, and funding envelopes are used to track investments.⁷⁹ It will be possible under the AMBF to move money from one envelope to another on an immediate basis in keeping with the overall asset management priority.⁸⁰

Committee Recommendation

Comprehensive Performance Measurement

The Auditor identified a number of performance measures in an earlier section of this report, that would substantially assist in the stewardship of Ministry assets by measuring and reporting on their state and cost effectiveness of expenditures. The Committee noted that although the Ministry reports annually on certain performance measures, while expanding its framework to include additional such measures, it is necessary to enhance the overall administration and construction/maintenance programs.

The Committee noted that in 2004 the Ministry committed to the development of a comprehensive package of performance measures, focusing on investment outcomes. In addition, the Ministry reaffirmed this plan in relation to the AMBF.

The Committee therefore recommends that:

8. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the progress on its commitment to expand the use of performance measures for reporting annually in such areas as pavement and bridge conditions, asset value, safety and mobility, and cost efficiency measures.

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

7. INTERNAL AUDIT OF HIGHWAY CONSTRUCTION

MTO's Internal Audit Services examined major construction projects during 2002/03, with attention to procedures to control quality and costs.

Weaknesses were identified in the systems and procedures used to determine whether construction funds have been spent effectively, including projects conducted by design consultants and contract administrators, testing the quality of new pavement, and construction warranties. The Auditor plans to assess progress on these matters in a follow-up report in 2006.

Of the areas addressed by Internal Audit Services, the Committee focused on the role of design consultants.

7.1. Quality of Work by Design Consultants

Internal Audit Services identified concerns regarding the quality of design work prepared by consultants, specifically detailed project specifications and cost estimating. A consultant's report prepared in February 2004 assessed the relationship between the Ministry and its service providers, and noted that the design work was poor. The Internal Auditor expressed concerns with overall project cost-effectiveness and specifically, whether the design consultants fully understood Ministry requirements.

The Ministry's Internal Audit Services recommended that MTO amend its management processes governing project design and cost estimation to reduce the necessity for change orders and additions.

Committee Hearings

Performance Rating System

Ministry consultants are required to pre-qualify within their respective disciplines prior to bidding.⁸¹ A performance evaluation system is used to consider each submission based on various criteria, such as the overall project quality, past performance, and cost estimates.⁸² The Ministry indicated that past performance is a very important consideration.⁸³

The Committee addressed the relevance of a screening process that would identify work performed to standard without change orders, and in line with project estimates.⁸⁴ The Ministry noted the merit of this approach and indicated that the Consulting Engineers of Ontario for example, has recognized that additional quality control processes are necessary.⁸⁵ According to the Ministry, this Association will be working with MTO on this initiative, which may include such features as peer reviews on designs.⁸⁶

Design Component

The Ministry has taken steps since the internal audit to address the quality of work by design consultants through the following initiatives:⁸⁷

- introduction of an engineering project management system to ensure that designers have sufficient time for project completion;
- consideration of improvements to Ministry estimating tools, in conjunction with a refresher course/training module on estimating for Ministry staff; and
- the implementation of a tracking system for change orders.

Change Orders

The objective is to reduce the number of change orders by ensuring higher-quality design. The Ministry's plan is to have final cost estimates prior to going to contract.⁸⁸ With these estimates on hand it will be easier for the Ministry to reduce change orders and keep the overall prices for construction to within 5% to 10% of estimates.⁸⁹

Committee Recommendation

Monitoring/Ranking Design Consultants

The Ministry has taken initiatives to address the work of design consultants, through an engineering project management system, improvements to estimating tools, a course for staff on estimating, and a tracking system for change orders. Presently, the Management Board Secretariat directive on the procurement of consulting services sets out specific principles; namely, following a competitive process, providing access for vendors to compete avoiding a monopoly situation (through fair and equal treatment of vendors).

The Committee acknowledges the steps taken by the Ministry; however, it has concluded that additional quality control measures are needed within the broader performance evaluation system, for example, building on the suggestion of a peer review process.

The Committee therefore recommends that:

9. The Ministry of Transportation should expand on the initiatives taken to address new quality controls for design consultants (e.g., project timing, Ministry estimating tools and staff training, and a tracking system for change orders), with a focus on such features as peer review.

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the date of tabling this report in the Legislature.

8. LIST OF COMMITTEE RECOMMENDATIONS

The Committee requests that the Ministry provide the Committee Clerk with a written response to the following recommendations within 120 days of the date of tabling this report in the Legislature, unless otherwise indicated in a recommendation.

1. The Ministry of Transportation should report to the Standing Committee on Public Accounts on contractor compliance rates with performance measures by region, with explanations of any significant variances. The development of best practices for inclusion in new contracts should be based on performance data.

- 2. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the review of its inspection guidelines with respect to monitoring priorities and frequency, documentation and reporting, and the use of advanced technology. The report should address the Ministry's agenda for incorporating the results in the monitoring manual, and status of planning for updated maintenance contract administrator course work.**
- 3. The Ministry of Transportation should report to the Standing Committee on Public Accounts on its review of the administration of sanctions policy, with a focus on strengthening consistency, fairness, and effectiveness. The report should address the findings, specifically outlining the administrative steps to be taken to ensure equitable treatment.**
- 4. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the study to address environmental monitoring of salt usage on roadways and the environment. The report should include, but should not be limited to the following:**
 - the Ministry of Transportation and the Ministry of the Environment joint project, undertaken in 2004 with a fall 2005 completion date, to establish an environmental monitoring methodology to demonstrate the impact of reduced salt use on the environment; and**
 - the impact of initiatives to address salt usage (e.g., Advanced Road Weather Information System, Automatic Vehicle Location System, and the Winter Weather Severity Index).**

The Committee requests that the Ministry provide the Committee Clerk with a written response to this recommendation within 120 days of the completion of this project in the fall 2005.

- 5. The Ministry of Transportation should provide the Standing Committee on Public Accounts with a progress report on the planned implementation of the Asset Management Business Framework.**
- 6. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the status of its efforts;**
 - to ensure the Bridge Management System contains an accurate inventory of provincial bridges and projected maintenance requirements; and**
 - to obtain assurance that municipalities have adequate systems in place to maintain accurate inventories of their bridges and projected maintenance requirements.**

7. The Ministry of Transportation should report to the Standing Committee on Public Accounts on steps taken to obtain assurance that municipalities are complying with legislation regarding inspections of their bridges, and have adequate asset management plans, including financing, to undertake maintenance and capital projects when they are needed.

8. The Ministry of Transportation should report to the Standing Committee on Public Accounts on the progress on its commitment to expand the use of performance measures for reporting annually in such areas as pavement and bridge conditions, asset value, safety and mobility, and cost efficiency measures.

9. The Ministry of Transportation should expand on the initiatives taken to address new quality controls for design consultants (e.g., project timing, Ministry estimating tools and staff training, and a tracking system for change orders), with a focus on such features as peer review.

NOTES

¹ Ontario, Legislative Assembly of Ontario, Standing Committee on Public Accounts, Official Report of Debates (*Hansard*), First Session, 38th Parliament (31 March 2005); P-329.

² Ibid.

³ Ibid.

⁴ Ibid.

⁵ Ibid., P-332.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid., P-333.

⁹ Ibid., P-329.

¹⁰ Ibid., P-330.

¹¹ Ibid., P-336.

¹² Ibid.

¹³ Ibid., P-338.

¹⁴ Ibid., P-336.

¹⁵ Ibid., P-338.

¹⁶ Ibid., P-343.

¹⁷ Ibid.

¹⁸ Ibid., P-331 and P-332.

¹⁹ Ibid., P-332.

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

²³ Ibid.

²⁴ Ibid., P-340.

²⁵ Ibid., P-330.

²⁶ Ibid.

²⁷ Ibid.

²⁸ Ibid., P-341.

²⁹ Ibid., P-340.

³⁰ Ibid.

³¹ Ibid.

³² Ibid., P-341.

³³ Ibid., P-329.

³⁴ Ibid., P-330.

³⁵ Ibid., P-334.

³⁶ Ibid.

³⁷ Ibid., P-335.

³⁸ Ibid., P-333.

³⁹ Ibid.

⁴⁰ Ibid., P-334.

⁴¹ Ibid.

⁴² Ibid., P-333.

⁴³ Ibid., P-333 and P-334.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid., P-337.

⁴⁷ Ibid.

⁴⁸ Ibid.

⁴⁹ Ibid., P-337 and P-338.

⁵⁰ Ibid., P-341.

⁵¹ Ibid., P-338.

⁵² Ibid., P-339.

⁵³ Ibid.

- ⁵⁴ Ibid., P-331.
⁵⁵ Ibid.
⁵⁶ Ibid., P-339 and P-340.
⁵⁷ Ibid., P-340.
⁵⁸ Ibid., P-342.
⁵⁹ Ibid., P-341.
⁶⁰ Ibid.
⁶¹ Ibid., P-340 and P-341.
⁶² Ibid., P-342.
⁶³ Ibid.
⁶⁴ Ibid.
⁶⁵ Ibid.
⁶⁶ Ibid.
⁶⁷ Ibid.
⁶⁸ Ibid.
⁶⁹ Ibid., P-331.
⁷⁰ Ibid.
⁷¹ Ibid., P-339.
⁷² Ibid.
⁷³ Ibid., P-333.
⁷⁴ Ibid., P-330.
⁷⁵ Ibid.
⁷⁶ Ibid.
⁷⁷ Ibid., P-331.
⁷⁸ Ibid., P-330.
⁷⁹ Ibid., P-333.
⁸⁰ Ibid., P-333 and P-334.
⁸¹ Ibid., P-335.
⁸² Ibid.
⁸³ Ibid., P-335 and P-336.
⁸⁴ Ibid., P-336.
⁸⁵ Ibid.
⁸⁶ Ibid.
⁸⁷ Ibid., P-335.
⁸⁸ Ibid.
⁸⁹ Ibid.