

Chapter 3

Section 3.10

Ministry of Transportation— Road Infrastructure Construction Contract Awarding and Oversight

1.0 Summary

The Ministry of Transportation (Ministry) is responsible for the construction and maintenance of provincial highway and bridge infrastructure, which is currently valued at \$82 billion. It consists of about 40,000 km of highway lanes covering a distance of about 17,000 km, and almost 5,000 bridges and culverts.

The Ministry enters into construction contracts for work either to rehabilitate existing infrastructure in order to continue using it or to create new infrastructure to expand capacity. The road network, most of which was originally built by the 1990s, requires considerable ongoing maintenance. The Ministry expects to spend about \$14 billion over the next 10 years for road and bridge rehabilitation and about \$4 billion for road and bridge expansion.

In the past five years, the Ministry has awarded about 600 large construction contracts (greater than \$1 million each) totalling about \$5.5 billion. These contracts are for projects such as re-paving sections of highways, expanding highways, building new bridges or rehabilitating existing bridges. The average contract was valued at \$9.1 million.

The Ministry also awarded about 1,450 minor construction contracts totalling about \$580 million. Minor work usually involves less significant repairs on existing structures. The average value of these contracts was about \$400,000.

The road construction industry in Ontario is mainly represented by two groups: the Ontario Road Builders' Association (ORBA) and the Ontario Hot Mix Producers Association (OHMPA). They consult with the Ministry on technical matters and lobby on behalf of their members' interests.

Our audit found that, in 2000, the Ministry began identifying significant problems throughout the province with pavement cracking years before it is expected to, resulting in increased cost to taxpayers for highways having to be repaired or repaved sooner than expected, and increased inconvenience and time lost for drivers due to more frequent road work. In 2004, the Ministry confirmed that poor quality asphalt cement was the primary cause of premature cracking. In 2007, two tests for assessing the quality of asphalt and the likelihood of it cracking prematurely were developed; however, at the time of our audit, the Ministry had fully implemented only one of them—five years after it was developed—and was using the second on only a limited number of projects. This is the case because

over the years, the Ministry decided not to implement all the tests due to multiple requests from the asphalt industry to not implement them.

Similarly, in response to requests from construction contractors who belong to ORBA, the Ministry made significant policy changes that benefit the contractors over taxpayers' best interests.

The Ministry has also paid bonuses to contractors after it became aware that contractors may have tampered with samples, substituting good samples for testing in place of the actual asphalt used. As well, the Ministry has paid for costs to repair roads that should have been covered under contractors' warranties. Although the Ministry works with contractors to change their behaviour through discussions and improvement plans, it rarely penalizes poorly performing contractors, including contractors that breach safety regulations, and allows them to continue to bid on and be awarded future contracts.

We also noted that it is the contractors, not the Ministry, that hire the professional engineers responsible for certifying that construction of structures (such as bridges) adheres to required standards. A few of these engineers have certified that construction, that was subsequently found to be unsafe, was in compliance with the standards.

Some specific observations in this audit include:

- **Premature cracks in highways have significantly increased Ministry's highway-repair costs.** We identified highway projects in all regions of the province where pavements had to be fixed for cracks much earlier than their expected life of 15 years—and some as early as only one year after the highway was open to the public. Sufficient documentation is not available for us to determine the full extent of this issue and the total additional cost paid by the Ministry to repair pavement because of premature cracking. However, we were able to examine five highway projects where all repair costs incurred because of premature cracking were tracked; we noted that the Ministry paid \$23 million to repair these highways

on top of the \$143 million originally paid to pave them. The highways had to be repaired just one to three years after the pavement was laid.

- **Ministry delayed implementing tests to identify asphalt likely to crack prematurely.**

The Ministry extensively studied two tests that would allow it to detect, before asphalt was laid, whether pavement is likely to crack early—both tests are required in combination to understand if pavement will in fact crack early. But rather than implementing these new tests as soon as they were validated in 2007, the Ministry waited five years to implement one of them—and still has not implemented the other one across all contracts nine years later. When we asked why action was not taken sooner, the Ministry informed us that instead of a traditional client/supplier relationship between the Ministry and its contractors and suppliers, its approach is to work “collaboratively” with the industry. Thus, decisions such as implementing these tests were discussed and determined through a Joint Pavement Committee made up of OHMPA and Ministry staff and, in essence, allowed the Ministry's suppliers to determine the quality of materials they would supply, even though premature cracking would result in additional revenue for the industry as a whole and incur additional costs for taxpayers.

- **Ministry pays contractors bonuses for meeting the requirements of the contract, something contractors are always expected to do.**

In 2012, the Ministry paid contractors about \$8.8 million in bonuses for providing the quality of asphalt specified in contracts. It has continued to pay roughly the same amount of bonuses since then (although in 2013 it stopped tracking the amounts paid). However:

- The Ministry has been aware since 2000 of quality issues surrounding asphalt, and

had neither addressed its concerns about premature cracking in a timely manner, nor changed its bonus-payment practices.

- Contractors have the opportunity to tamper with asphalt samples to obtain bonuses. The Ministry was aware of sample-switching but has neither investigated it to impose fines nor implemented controls to ensure that sample-switching does not occur.
- **Ministry policies changed to benefit the Ontario Road Builders' Association (contractors' association).** Although it is rare throughout the provincial government for ministries' internal audit reports to be shared with outside parties (unless a request is made through the *Freedom of Information and Protection of Privacy Act*), the Ministry shared with ORBA an internal audit report of a review of its construction contracts program. ORBA requested to review the report's recommendations with the Ministry, so the Ministry established a joint policy committee of ORBA and Ministry representatives to review the report. Ministry staff had concerns with the establishment of this committee because it would allow ORBA to strongly influence how the report's recommendations should be implemented, which was an internal operational matter. The Ministry decided against staff's recommendations and created a joint policy committee comprised of six ORBA members (five of which are contractors) and six government representatives (only three from the Ministry of Transportation, with one other from the Ministry of Infrastructure, one from Infrastructure Ontario, and one from the Ministry of Finance). Moreover, the Ministry decided that rather than working on implementing recommendations made by Internal Audit, the joint policy committee would focus on addressing an action plan document created by ORBA and its recommendations. We noted that ORBA's action plan, not unexpectedly, was in the best interests of its members.

Through this process, and because of multiple requests made by ORBA prior to it, ORBA influenced internal Ministry policy in its favour, including the following:

- **A Ministry policy changed to allow contractors to delay paying fines; some fines are now uncollectible.** Prior to 2011, contractors had to pay liquidated damages (late fines) right away when they were late delivering on projects. However, the Ministry agreed to a change in its policy to allow contractors to delay paying fines if the contractor wanted to contest the fine. We noted that other provinces such as Alberta, British Columbia and Quebec collect fines immediately, then issue a refund if the dispute is resolved in the contractors' favour. With this change in policy, contractors have been able to postpone paying a total of about \$6 million in fines for up to four years. During these four years, two contractors went bankrupt; the Ministry will never be able to collect the \$660,000 in late fines they owed.
- **New policy no longer discourages litigious contractors from repeatedly suing the Ministry.** Prior to 2015, the Ministry could prohibit contractors that filed multiple lawsuits that it deemed to be frivolous from bidding on future contracts. Lawsuits considerably add to the workload of Ministry staff and to legal costs for the Ministry. Upon the industry's requests, the Ministry removed a contract clause in 2015 that had given the Ministry the ability to exclude litigious contractors from bidding on future contracts. Ministry records show that between 2007 and 2015, contractors filed 12 lawsuits. Prior to 2007, lawsuits were virtually non-existent. The new policy change may contribute to even more lawsuits.
- **The Ministry changed its dispute-resolution policy, providing incentive**

for contractors to dispute more often. In the Ministry's original dispute-resolution process, a contractor wishing to make a claim against the Ministry had to escalate the claim through three levels within the Ministry before launching legal action. This process worked well given that about 95% of disputes were successfully resolved through this process. However, upon the industry's request, the Ministry agreed in 2016 to change the process, allowing contractors to ask for a third-party referee to be involved at any level of the dispute process. There is a risk that referees may make middle-ground decisions instead of strictly applying the terms of the contract. This may create an incentive for contractors to file more claims and go directly to a referee.

- **Engineers who certify structures are built correctly are hired by the contractor, and have provided false certifications.** One of the most important quality-control measures in building public infrastructure is to have sufficient oversight by a professional engineer to verify and provide certification that key construction activities are performed to the appropriate standards. Given the nature and importance of their work, the Quality Verification Engineers (QVEs) who perform this work should be independent from the contractors whose work they are reviewing—but, in fact, we found that they are hired by, work for and report directly to the contractors. We noted that Ministry regional staff had identified instances across the province where QVEs provided erroneous or misleading conformance reports to the Ministry. The Ministry also relies on its contract administrators and quality assurance staff to provide oversight, but a sign-off by the QVE provides assurance to the Ministry that a structure will be safe for public use and that specifications have been met.
- **The Ministry is lenient in managing poorly performing contractors.** The Ministry does

not effectively penalize contractors that have serious performance issues, and allows them to bid on future contracts. Contractors that have received unsatisfactory ratings are allowed to continue to bid on and have been awarded significant amounts of work for the Ministry. For instance, three contractors that have consistently received an unsatisfactory rating for several years because of their poor performance were awarded construction contracts worth about \$45 million each over the last five years—for a total of about \$135 million. As well, the Ministry has paid to repair the contractors' substandard work even when the work was to be covered by the contractor's warranty.

- **The Ministry awards new projects to contractors that have breached safety regulations.** The Ministry can penalize contractors that perform unsafe work; in practice, this rarely happens. Rather than imposing monetary fines for unsafe work, the Ministry's penalty process is intended to reduce the amount of future work a contractor can bid on. However, we noted that in seven such infractions we examined, none of the penalties were large enough to prevent contractors from bidding on Ministry projects. This is because the ceiling amount (the maximum amount a contractor can bid on for a contract) is not reduced enough by the penalty to impact any future bids by the contractor. Also, a smaller contractor that had breached safety regulations was banned from bidding on future contracts in one of the Ministry's regions but was still awarded work in other regions. In addition to these penalties, the Ministry also works with contractors to change their behaviour through discussions and improvement plans.

This report contains seven recommendations with 16 action items.

OVERALL MINISTRY RESPONSE

The Ministry appreciates the Auditor General's observations and recommendations. Building and maintaining the provincial highway network is key to moving both people and goods efficiently and safely across the province. These investments also ensure that the infrastructure is in place to meet the transportation needs of a growing population.

With a mandate to keep Ontario's highways and bridges in good repair, reduce congestion, improve safety and support the economy, the Ministry takes its responsibilities very seriously.

Over the past five years, more than 689 lane-kilometres of new highway and 58 new bridges have been built across Ontario. In addition, more than 4,848 centreline-kilometres of pavement and 592 bridges have been rehabilitated.

The Ministry continues to take the position that ongoing dialogue and consultation with stakeholders, including the contractors who work on our projects and their industry organizations, helps inform the Ministry's decisions about policies and programs and is critical to the successful implementation of our infrastructure programs.

The safety of the travelling public and those who work on our projects, construction quality and fiscal responsibility remain top priorities for the Ministry. Although the Ministry has a long history of well-established and adhered to policies and procedures for the procurement and administration of our construction contracts, the Ministry strives for continuous improvement in all of its programs. Over the coming months, the Ministry will be carefully reviewing the audit's findings and recommendations and will develop an Action Plan that addresses the Auditor General's observations and recommendations for the awarding and oversight of construction contracts.

2.0 Background

2.1 Overview of Provincial Transportation Infrastructure

The Province's transportation infrastructure is made up of road infrastructure and public-transit infrastructure, both falling under the responsibility of the Ministry of Transportation (Ministry). (Municipalities have their own road and public-transit infrastructure for which the Ministry is not responsible.)

Ontario's road infrastructure is currently valued at \$82 billion. It consists of about 40,000 km of highway lanes covering a distance of about 17,000 km, and almost 5,000 bridges and culverts.

Ontario's public transit infrastructure is currently valued at \$11 billion. Operated by Metrolinx, which is an agency of the Ministry, it consists of a network of train and bus routes serving an area of more than 11,000 square kilometres in the Greater Toronto and Hamilton Area (GTHA).

The Ministry enters into construction contracts for work either to rehabilitate existing transportation infrastructure in order to continue using it or to create new infrastructure that will expand the network. In the next two sections, we discuss the magnitude of both types of construction work in Ontario.

2.1.1 Construction Work Performed to Rehabilitate Existing Infrastructure

Most of the Province's existing transportation infrastructure was originally built by the 1990s. Therefore, construction work in the 2000s has mainly focused on rehabilitation rather than building new infrastructure.

Bridges, stations and other large structures are built with the intention that they will last about 75 years. However, they do require regular maintenance and rehabilitation in order to continue to be used. For example, highway pavement is

expected to last about 15 years before requiring new pavement. The quality of this work will affect whether the road will need repair work, such as the sealing of premature cracks, before the pavement is replaced again.

As shown in **Figure 1**, the Ministry expects that road construction work will cost about \$18 billion for the next 10 years. Of this, \$14 billion will be for road rehabilitation versus \$4 billion for road expansion. This is because the road network, which is already mature, requires considerable ongoing maintenance and rehabilitation. For example, one out of every five bridges and culverts in Ontario is in poor condition and needs to be rehabilitated over the next five years.

2.1.2 Major Construction Work Planned to Expand Province’s Transportation Network

In 2008, the government announced its 25-year “Big Move” plan (also known as the Regional Transportation Plan) to make huge upgrades to Ontario’s existing transportation infrastructure. The government identified that traffic congestion alone costs \$11 billion annually, and that Ontario’s population would grow by about 40% in the next 25 years.

The Big Move plan is the single biggest wave of investment to build new infrastructure since the time these systems were initially built. A sizeable investment is being made to upgrade Ontario’s public transit network to help with traffic congestion. For example, train frequency on each line traveling to and from downtown Toronto is expected to increase to every 15 minutes in the daytime on weekdays. Outside the downtown core, light rail transit is being built in Toronto, Mississauga and Brampton.

Upgrades are also being made to Ontario’s road infrastructure. Highways within the GTA are being widened and car pool lanes will be expanded. Outside of the GTA, there are also plans to widen some highways, such as ones connecting Kitchener and Guelph.

Figure 1: Planned Spending to Rehabilitate and Expand Ontario’s Transportation Infrastructure, 2016/17–2025/26

Source of data: Ministry of Transportation and Metrolinx

Type of Infrastructure	Planned Spending		Total (\$ billion)
	to Rehabilitate Existing Infrastructure (\$ billion)	to Build New Infrastructure (\$ billion)	
Highways and bridges	14	4	18
Public transit	3	27	30
Total	17	31	48

Significantly more money is allocated for expansion over the next 10 years than in previous years. As **Figure 1** indicates, the Ministry expects that building new transportation infrastructure will cost about \$31 billion over the next 10 years.

2.2 Overview of Asphalt, the Asphalt Industry and Construction Contractors

2.2.1 Asphalt Is Critical in the Construction of Highways

At least 2.6 million tonnes of asphalt are laid on Ontario’s highways each year, costing the Province about \$270 million annually. Asphalt laid on highways is a mixture of aggregate, which is essentially rock in various forms (such as crushed stone, gravel and sand), and asphalt cement, which is the “glue” or binding agent that holds the aggregate together. (See **Figure 2**, How Asphalt Is Produced.) Asphalt is about 95% aggregate and 5% asphalt cement. As a by-product of the refining of petroleum crude oil, asphalt cement is what remains after gasoline, kerosene, fuel oil and other products have been distilled from petroleum. In recent years, as the technology for extracting products such as gasoline from petroleum has improved, the asphalt cement remaining at the end of the process has become

less adhesive than it used to be. This is one reason that asphalt cement suppliers have used other substances, such as recycled engine oil, as additives to asphalt cement.

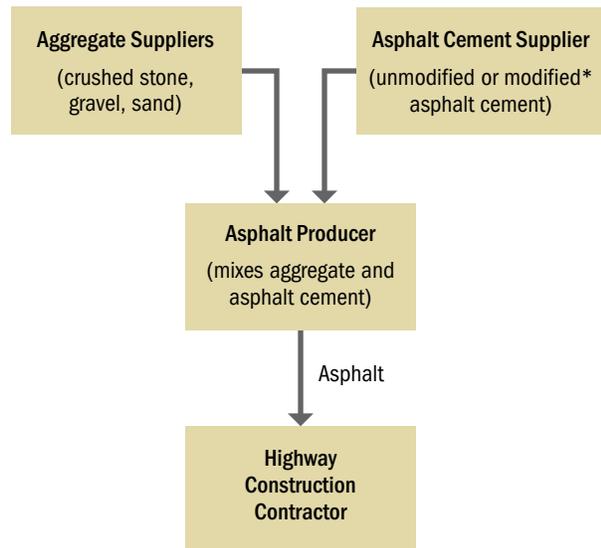
The Ministry has approved 11 asphalt cement suppliers and 28 aggregate suppliers whose cement and aggregate, respectively, can be used on construction projects for highways that have high traffic volumes (in **Section 2.5** we discuss how suppliers can be approved to provide material for use on the Ministry's construction projects). For highways that have low traffic volumes, the Ministry requires that asphalt cement be supplied by the 11 asphalt cement suppliers, however the aggregate can be supplied by unapproved aggregate suppliers as well.

As **Figure 2** shows, asphalt producers purchase asphalt cement from one of the 11 approved suppliers (four of which are also Ontario construction contractors), and mix it with aggregate from any one of the aggregate suppliers to produce the asphalt we see on highways. Thus, a contractor working on provincial highways should be assured that the asphalt it purchases from one of these asphalt producers meets the Ministry's requirements.

Having an optimum mix of aggregates and high-quality asphalt cement is important in ensuring that highways will last their expected life of 15 years with little to no cracks. Concerns about asphalt starting to crack and rut prematurely (rutting is when the weight of a car leaves a depression in the road) were widespread enough in the 1980s that the United States government spent \$150 million to study and develop a new way of creating asphalt. The outcome of this study was "SuperPave"—the combination of an Aggregate Mix Design Process and performance-graded asphalt cement. SuperPave became the industry norm throughout North America. In 1996, the Ministry began implementing SuperPave, resulting in a significant improvement in pavement quality—most notably, the elimination of rutting. SuperPave allowed the Ministry to accurately define the right combination of aggre-

Figure 2: How Asphalt Is Produced

Prepared by the Office of the Auditor General of Ontario



* In some cases, asphalt cement suppliers add recycled engine oil to unmodified asphalt cement—a petroleum product—creating a modified asphalt cement they supply to asphalt producers.

gates and asphalt cement that would be optimal for the traffic and climate conditions a road would be exposed to.

2.2.2 Stakeholders in the Road Building Industry

Ontario's road construction industry is mainly represented by two groups: the Ontario Road Builders' Association (ORBA) and the Ontario Hot Mix Producers Association (OHMPA). They are key players in providing technical input that helps shape the decisions made by the Ministry. Although the two groups represent different types of stakeholders, members can sometimes overlap as some contractors have multiple business interests. 30,000 highway construction workers—the vast majority of such workers in Ontario—are employed by the contractors and suppliers that are members of ORBA and OHMPA.

Ontario Road Builders' Association

Established in 1927, ORBA currently represents over 80 contractors that build roads and bridges in Ontario. Its goal is to advocate on issues that matter to the industry and to provide opinions on technical matters. ORBA also collaborates extensively with the Ministry. For over 20 years, ORBA representatives have served on joint committees established by the Ministry. In recent years, ORBA has been represented on three separate joint committees that decide when and how to implement new road-quality standards related to the quality of asphalt, the proper construction of bridges, and the environmental impact of construction. ORBA is also represented on a joint committee with the Ministry that discusses policies for construction administration and oversight.

ORBA is a registered lobbyist in Ontario, meaning that it can lobby for its interests with government ministers and public-sector employees. Annually, ORBA hosts a convention that is attended by the construction industry along with the Minister of Transportation and a number of Ministry staff. The focus of the convention is to recognize significant achievements and advancements made over the year, and to strengthen ORBA's relationship with the Ministry. In 2014, ORBA also started hosting annual informational events at Queen's Park, which have been attended by the Minister and other MPPs.

Ontario Hot Mix Producers Association

OHMPA represents 49 hot mix (asphalt) producers and five out of the 11 Ministry-approved asphalt cement suppliers that produce the asphalt that construction contractors use on Ontario's highways. (The remaining six approved asphalt cement suppliers do not belong to OHMPA because they are located outside of Ontario). One of OHMPA's main goals is to gather technical information about asphalt quality from various jurisdictions. It also aims to better educate people who work within the asphalt industry.

Although it was established in 1974, in recent years OHMPA has begun to work closer with the Ministry. OHMPA representatives now serve on joint committees specifically created by the Ministry to tackle technical problems related to asphalt. Currently, there are three active joint committees of OHMPA and the Ministry; they provide input on technical matters such as the production of high-quality asphalt and high-quality asphalt cement, and how new technologies can be used in assessing pavement performance.

2.3 Evolution of Projects at the Ministry

In the past five years, the Ministry has awarded about 600 large transportation construction contracts (greater than \$1 million each) totalling about \$5.5 billion. These contracts are for projects such as re-paving sections of highways, expanding highways, building new bridges or rehabilitating existing bridges. The average contract is valued at \$9.1 million. These contracts are tendered through the Ministry's central procurement department.

In addition to large construction projects, during that period, the Ministry has awarded about 1,450 minor construction contracts totalling about \$580 million. Minor work usually involves simple repairs on existing structures. The average value of these contracts is about \$400,000. These contracts are awarded and administered by Ministry regional offices, and work is usually done by small local contractors.

As **Figure 3** shows, in the last five years, 10 contractors accounted for 73% of all construction work awarded by the Ministry—about \$4.4 billion out of \$6.1 billion.

In keeping with industry norms, the Ministry structures almost all of its projects using either of two delivery models:

- **Traditional** (also known as design/bid/build)—the Ministry contracts with separate entities for the design and then construction of a project based on the design; or

Figure 3: Value of Contracts Awarded to Top 10 Contractors vs. Other Contractors, 2010/11–2015/16

Source of data: Ministry of Transportation

Contractor	Total Value of Contracts Awarded (\$ million)	% of \$6.1 Billion in Total that Ministry Awarded to Contractors
Miller Group Inc.*	963	16
Dufferin Construction Company*	866	14
Aecon Construction and Materials Limited*	738	12
Coco Paving Inc.*	402	7
Pioneer Construction Inc.	345	6
Teranorth Construction & Engineering Limited	318	5
J&P Leveque Bros. Haulage Limited	271	4
R.W. Tomlinson Limited	186	3
Bot Construction Limited	175	3
Cruikshank Construction Limited	163	3
Subtotal	4,427	73
Other	1,653	27
Total	6,080	100

* Asphalt cement supplier.

- **Fixed-Price Contract** (also known as design-and-build)—the Ministry hires a single entity to perform both the design and construction phases.

Under the traditional model, where the construction contractor is not responsible for the design, the Ministry retains more control and risk of cost overruns. Under the design-and-build model, the Ministry transfers a significant amount of control and risk of cost overruns to the contractor.

2.3.1 Much Work Performed In-House at Ministry—Before 1996

Until the 1950s, the Ministry performed all design, some construction and all oversight work on road construction projects itself. In the 1950s, it began outsourcing construction work to contractors, but continued to perform its own design and oversight work in-house. This meant that Ministry staff monitored construction activities to ensure that work was performed according to the project's design. They also performed materials testing in-house to

ensure that construction materials and workmanship were of an acceptable quality.

Most road infrastructure in the province—about 80% of the bridges we see today and about 90% of highways—was built by 1996 under this model.

2.3.2 Movement to Full Outsourcing—1996 to Present

In 1996, in response to provincial government direction to reduce operational costs and staffing levels, the Ministry commenced the process of completely outsourcing the oversight of construction projects. This meant that most design, testing and contract oversight would begin to be outsourced. This decision was approved by the Management Board of Cabinet with a goal of reducing overall staffing levels in the government.

Projects began to be designed mostly by external consultants who were qualified professional engineers. The Ministry shut down its testing laboratories and outsourced materials testing to certified labs. The Ministry also began outsourcing oversight responsibilities to external consultants as well.

The main objective was to reduce staffing; as a result, many staff were either let go or re-assigned to different priorities.

2.3.3 Continued Outsourcing with the Introduction of Design-and-Build Model and Performance Specifications—2008 to Present

The fully outsourced work that began to be rolled out in 1996 followed the traditional model whereby: the design work was outsourced to consultants, after which construction contractors would bid and complete the work, and consultants again would provide oversight.

In 2008, the Ministry started exploring using the design-and-build model that it hoped would further reduce costs and speed up delivery of projects. Under design-and-build, the Ministry would also establish “performance specifications” that focus on the expected outcome of the work rather than on how that outcome is supposed to be achieved. For example, performance specifications might dictate that seven years after a highway construction job is completed, there should be little to no long cracks running deeply in the asphalt. The steps to be taken to achieve this—which would be prescribed in traditional contracts—are left up to the contractor to decide. Under this model, the contractor generally assumes greater risk because it is bidding on a project before the project has actually been designed; therefore, costs are difficult to estimate with this approach. The Ministry’s risk is somewhat postponed: it depends on warranties from the contractor that the end-product will still be performing as intended at some future defined date.

The first design-build project was tendered in 2010. Since it required limited oversight, the Ministry did not need to hire expensive consultants for contract oversight. They performed the limited oversight internally through regional staff. This also allowed them to better understand the new model. By 2016, about 10% of all rehabilitation projects were design-and-build projects.

At the same time, the Ministry also started requiring extended warranties in some of its contracts for items such as asphalt. Generally, construction work comes with a standard one-year warranty. However, in projects with performance specifications, extended warranties are important to the Ministry because they can motivate the contractor to make good design and construction decisions so that the end structure will last long enough that the contractor does not have to perform work under the warranty. Warranties ranging from three years to seven years were phased in to some degree during this period.

By 2015, the Ministry’s approximately 900 engineering staff had been reduced to just under 700, and about 760 contract administration staff to about 150.

2.4 Ministry’s Procurement Process for Construction Contracts

The Ministry’s process for procuring contractors for construction projects consists of five steps:

1. Contractors submit documents that demonstrate they have relevant construction experience, are in good financial health, free of conflict of interest, and tax compliant. They also provide references of prior construction work. The Ministry reviews this information and determines if contractors are eligible to bid. If eligible, a contractor receives a unique contractor ID number, which is also tied to any subsidiaries associated with them.
2. When a construction project is determined, the Ministry publicly advertises the project on its Registry, Appraisal and Qualification System (RAQS/MERX, described below). A deadline for when a contractor can submit bid prices is also posted.
3. The system automatically closes the tender on the bid submission deadline—this prevents the system from accepting new bids. All bid prices are published publicly on the system’s

site for transparency. The three lowest bidders are notified to submit a more detailed itemized bid within 24 hours.

4. Ministry staff evaluate the detailed itemized submissions and ensure the bids meet all the requirements.
5. The lowest bidder in compliance with project requirements is awarded the contract.

RAQS/MERX is a secured online tendering system that automatically checks contractors' eligibility to bid, accepts and processes bids submitted by contractors within the tendering period, and rejects late bids. The system secures the contractors' submitted bids and ensures that no one can access the system to tamper the bid, including the bid price or company name.

2.5 Ministry's Approval Process for Asphalt Cement Suppliers

A supplier who wants to provide asphalt cement for Ministry construction projects can approach the Ministry at any time. The Ministry inspects the supplier's facilities to ensure that the supplier has appropriate quality control processes. The Ministry also visually inspects the asphalt cement, obtains samples and tests them to ensure they meet pre-approval specifications.

If the sampled asphalt cement passes the tests, the supplier's cement is added to the Ministry's approved materials list, known as the Designated Sources of Material. Approved materials can be purchased by asphalt producers, who mix the cement and aggregate to produce the asphalt that is used on roads.

During construction, the contractor has to ensure that it maintains sufficient documentation to prove to the Ministry that only designated asphalt cement has been used on the roads. Once the cement is used to create asphalt, the Ministry repeats the pre-approval tests just to ensure that the cement is of the same specification it approved for use (these pre-approval tests do not test for risk of premature cracking).

3.0 Audit Objective and Scope

Our audit objective with respect to construction projects in the transportation sector was to assess whether the Ministry of Transportation had effective policies and procedures in place to ensure that:

- contractors were selected in a competitive, fair, open and transparent manner that resulted in contracts being awarded to qualified bidders only, with due regard for economy;
- there was sufficient oversight of the contractors during construction; and
- final construction resulted in a high-quality asset that meets the needs of Ontarians.

Prior to commencing our work, we identified the audit criteria we would use to address our audit objective. Senior management at the Ministry agreed to our audit objective and criteria. Our audit work was primarily conducted between December 2015 and July 2016.

In conducting our work, we met with key personnel at the Ministry's head office in St. Catharines, and spoke to staff at all five of the Ministry's regional offices (Kingston, London, North Bay, Thunder Bay and Toronto) where the oversight of construction contracts takes place. We interviewed staff involved in procurement, administration and oversight of construction contracts, and examined related data and documentation (focusing on the most recent five years, between 2011 and 2016), including Ministry reports on the quality of construction work done by contractors. We performed research on construction contract administration in other jurisdictions—specifically the administration of late fines.

We also met with Ministry staff involved in the research and development of asphalt standards and testing requirements; and examined related data and documentation, including research they conducted on poor-performing pavements. We met with a professor at Queen's University (who has

been performing research on asphalt and asphalt quality since the 1990s) to understand how proper testing can aid the Ministry in predicting whether roads will crack early. We also contacted representatives from municipalities and met with the 407 ETR privatized highway company to find comparisons to Ontario's asphalt standards and testing requirements. Also, we met with ORBA and OHMPA to obtain their perspectives on the challenges they face in delivering construction contracts. As well, we reviewed the meeting minutes of the committee of the Ministry and ORBA that dealt with policy matters, and the committees between the Ministry and OHMPA that dealt with position papers related to asphalt issues.

Our audit also included a review of relevant audit reports issued by the Province's Internal Audit Division. These reports, the most recent of which was issued in October 2015, were helpful in determining the scope and extent of our audit work.

4.0 Detailed Audit Observations

4.1 Poor-Quality Asphalt Contributes to Additional Costs to Taxpayers for Repairs and Inconvenienced Drivers

Our audit found that the Province has a significant problem with pavement cracking years before it is supposed to. This results in increased cost to taxpayers for highways being repaired or repaved prematurely, and increased inconvenience and time lost for drivers forced to endure frequent road construction. The Ministry of Transportation (Ministry) has known since 2004 that pavement is cracking prematurely because poor-quality asphalt cement that cannot adequately withstand winter conditions in Ontario was being supplied and used on highways. Yet, as discussed in **Section 4.2.1**, it has repeatedly accommodated the asphalt indus-

try's requests to delay implementing two new tests the Ministry validated in 2007, that could be used to ensure that the industry supplies higher-quality asphalt cement.

Is the overall condition of Ontario's highways deteriorating? Although the Ministry's Pavement Condition Index (Index) suggests that pavement conditions are getting better, it does not accurately reflect road conditions. The Index indicates that pavement quality has improved by 8% over the last ten years, but this measure does not track how many cracks have occurred and whether they did so within a reasonable period of time.

The Index measures the smoothness of the road, meaning that if it was cracked and repaired, the Index would measure it as okay—but it would not measure whether the pavement performed poorly and cracked prematurely.

Once cracks are filled, the Index records the condition of the road as being good. It does not indicate if expensive repair work was needed long before the anticipated life expectancy of the pavement was reached. If the Ministry tracked more variables, the Index would likely paint a worse picture of the condition of Ontario's highways.

Ministry staff at each regional office have identified concerns about the lifecycles of their highways being reduced significantly in recent years. Engineers in one Ministry region tracked, documented and were able to provide us details on sections of highways requiring repairs and replacement. They confirmed to us that the lifecycle of many highways in that region had been reduced by between 50% and 60% from the normal lifecycle of 15 years (see **Figure 4** for examples of highways that needed early replacement). Although the Ministry plans and budgets for highways to have an average life expectancy of 15 years before they need to be completely removed and repaved, we noted numerous instances where sections of highways needed to be replaced many years earlier (**Section 4.4.2** discusses the additional costs incurred by the Ministry because of this).

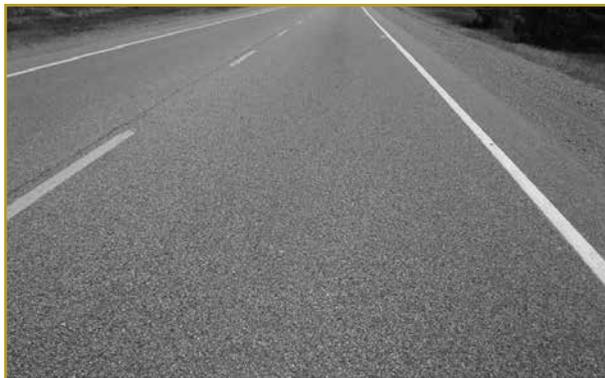
Figure 4: Reduced Age of Specific Sections of Highways in Ministry's Central Region

Source of data: Ministry of Transportation

Highway	Age of Highway Section When Replacement Required (Years)
A 10-km section of Highway 403 completed in 2006	5
A 15-km section of Highway 12 completed in 2007	8
A 7-km section of Highway 400 completed in 2009	6
A 9-km section of Highway 10 completed in 2009	8
A 10-km section of Highway 400 completed in 2010	5
An 8-km section of Highway 403 completed in 2010	6

Figure 5: Comparison of Good-Performing Pavement and Poor-Performing Pavement

Source of data: Ministry of Transportation



13-year-old highway performing as expected, in Petawawa, Ontario.



Six-year-old highway with premature cracks, in Coldwater, Ontario.

4.1.1 Ministry Allowed Asphalt Industry to Use Poor-Quality Cement in Making Asphalt

As discussed in **Section 2.2.1**, the Ministry's introduction of SuperPave in 1996 resulted in significant improvement in pavement quality; in particular, rutting was essentially eliminated. However, there continued to be problems with cracking even after the introduction of SuperPave. The Ministry noticed that roads had begun cracking in all directions, as opposed to mainly horizontal cracks prior to SuperPave. Even more significantly, pavements were cracking long before they were supposed to. As discussed in **Section 4.1.2**, premature cracks add millions to the Ministry's highway-repair costs. (**Figure 5** shows premature cracking versus what asphalt should look like when performing

as expected.) In this section, we discuss what was causing these cracks.

Starting in 2000, Ministry experts, including engineers, studied nine highway pavement jobs that had premature cracking. Whereas these highways should not have experienced much cracking earlier than 15 years, the Ministry noted cracks as early as four years. Some examples include:

- Within four years, an 11-km section of Highway 41 in south-eastern Ontario had 66 km of cracks running through it.
- Within five years, a 13-km section of Highway 7 in south-eastern Ontario had 131 km of cracks running through it.
- Within six years, a section of Highway 62 in eastern Ontario had about 13,000 cracks.

Premature cracking similar to these examples was found in all regions of the province.

Working alongside external experts in the field, the Ministry ran field trials, retested asphalt and came to the conclusion that the problem resided with how the asphalt industry was creating “performance-graded asphalt cement.” (SuperPave’s Aggregate Mix Design process and the construction of the foundation of the road, or road beds, were not the problem). The asphalt industry, specifically the asphalt cement suppliers, were adding cheaper materials, notably excessive amounts of recycled engine oil, into the cement they supplied for use on Ministry projects. The suppliers’ cement was still able to pass the SuperPave tests used by the Ministry even when the cement contained large amounts of recycled engine oil. Unmodified asphalt cement costs about \$540/tonne, whereas recycled engine oil, which is basically used car engine oil, is a waste product that costs very little to acquire. Thus, it was very profitable for the asphalt industry to mix almost-free recycled engine oil into asphalt cement. (Since the Ministry deals directly only with contractors in its procurements, and not with asphalt cement suppliers, it has no way of knowing whether cheaper materials bought by the contractor result in savings to the Ministry through lower bid prices).

The use of recycled engine oil in itself does not cause premature cracks and reduce the life of highway pavements; rather, it is excessive use of this material that causes premature cracks. In colder climates like Ontario’s in winter, excessive amounts of recycled engine oil greatly reduces the life of a highway because it becomes hard and brittle in colder winter temperatures. Therefore, after a winter or two, pavement with excessive recycled engine oil will show a large number of cracks that should not occur for some 12 to 18 years.

Ministry staff informed us that it wanted to implement tests that would predict whether pavement would crack prematurely regardless of whether recycled engine oil was added or not. This is because implementing better tests that could cover a range of additives was seen as a better long-term solution. The Ministry’s implementation of these tests is discussed in **Section 4.2**.

4.1.2 Premature Cracks Significantly Increased Ministry’s Highway-Repair Costs

The Ministry annually allocates funds for minor repair work including repairing cracked pavements. Since 2007, this budget has almost tripled, increasing from \$45 million to \$125 million per year. (This amount is included in the 10-year, \$14-billion capital budget discussed in **Section 2.1.1**.) Minor cracks that penetrate only the topmost layer of pavement can be sealed with a crack sealant, at a cost of about \$7,500 per kilometre of cracks. However, when cracks are severe, a highway needs to be resurfaced; this costs about \$180,000 for each kilometre of a highway lane. Thus, for example, on a four-lane highway, it would cost \$720,000 to resurface all four lanes for one kilometre. Further, sealing and repairing cracks is a short-term solution; if a highway is poorly paved or the asphalt used is of poor quality resulting in constant cracking, it could need to be resurfaced as often as two times during the 15-year expected life of the highway—costing about \$1.4 million in unexpected costs for one kilometre of a four-lane highway.

During our audit, we identified that highways across all regions of the province had pavement issues where cracks had to be fixed much earlier than the expected life of 15 years. Unfortunately, the Ministry did not maintain sufficient documentation for us to be able to calculate the full extent of the pavement problem province-wide and the total cost for repairing premature cracking. Nevertheless, as shown in **Figure 6**, we did identify five major highway jobs where the Ministry had documentation that enabled us to calculate the total cost of repairing premature cracking. In one of these cases, pavement needed to be repaired due to cracking within only one year of having been laid.

We noted that the Ministry paid a total of about \$143 million when it originally paved these five highways. Test results at the time showed that the pavement quality was good, so four of the five contractors received bonuses. The average of the bonuses they received was \$687,000. However, within one to three years, the Ministry had to repair

Figure 6: Increased Costs Resulting From Having to Repair Premature Cracks

Source of data: Ministry of Transportation

Highway	Cost of Originally Paving the Highway (\$)	Cost of Having to Repair Premature Cracks (\$)	Subsequent Repair Costs as a % of Original Paving Costs (%)
	A	B	B/A
Section of Highway 400*	6,913,000	3,372,000	49
Section of Highway 403*	23,226,000	12,280,000	53
Section of Highway 7*	89,246,000	700,000	1
Section of Highway 10*	11,239,000	5,500,000	49
Section of Highway 23	11,885,000	1,210,000	10
Total	142,509,000	23,062,000	16

* The contractor on this contract also received a bonus. The average of all bonuses received on the four contracts in this figure was \$687,000.

pavement on all five jobs at an additional cost of \$23 million. These costs could have been avoided if the asphalt cement had not been of poor quality. Ministry staff told us that, in some cases, even this rehabilitated pavement was of such poor quality that it would likely need to be repaired again or even replaced.

One of the highway jobs we reviewed clearly illustrated the extent of the poor quality of the asphalt that was being laid. For example, a 10-km stretch of Highway 403 was paved in late 2006 for about \$23 million. Test results indicated that the pavement was of excellent quality and thus should have lasted until 2021. The contractor received \$686,000 in bonuses because test results indicated that the asphalt met all of the Ministry's requirements. However, between 2008 and 2011, that section of highway was rehabilitated twice at an additional cost of \$12.3 million:

- The first rehabilitation, in 2008, cost the Ministry \$489,000 to seal 100,000 metres of cracks.
- Because the condition of the road continued to deteriorate after 2008, during 2010 and 2011, sections of highway were re-paved, costing the Ministry \$11.6 million plus an additional \$218,000 in bonuses paid to the contractor because test results indicated it had used high-quality asphalt.

However, the Ministry predicts that some of this repaved highway will need to be rehabilitated for a third time within the 15 years it was expected to have lasted with little to no cracks.

4.1.3 Ministry Paid Bonuses to Contractors for Asphalt Quality Even Though the Asphalt Cracked Prematurely

As discussed in **Section 4.1.1**, the Ministry has known since 2000 that asphalt throughout the province was beginning to crack prematurely. We also found that the Ministry did not implement tests to determine whether the asphalt laid would crack prematurely, however, it still continued to award asphalt bonuses (the tests they did perform are not the tests needed to detect the premature cracking—we discuss the shortfalls in testing in more detail in **Section 4.2.1**). **Figure 7** shows in detail how these bonuses are calculated.

In addition, one would expect contractors to pave asphalt as specified in their contracts without being awarded an extra bonus payment for doing so. However, the Ministry pays contractors bonuses when the asphalt they use on highways meets the Ministry's requirements—something contractors are always expected to do. (Penalties can also be applied in some cases if the asphalt is of poor quality.)

Figure 7: How Bonuses to Contractors for Asphalt Quality Are Calculated

Source of data: Ministry of Transportation

Asphalt Quality Test	Contractor Receives Bonus If...	Bonus Paid as % of Total Value of the Asphalt Used
Compaction test: to ensure that pavement has been densely compacted	At least 96% of all samples meet the specified density rating.	Up to 3%
Air voids test:* to ensure that there are not too many air voids in the pavement	Air void content in at least 98% of all samples does not exceed the maximums allowed.	Up to 2%
Asphalt test: to ensure that a sufficient quantity of asphalt cement has been used and that the right proportion of various aggregates, or rocks, are used	At least 96% of all samples have enough asphalt cement, and have used the right proportion of the various aggregates.	Up to 2%

* Air voids are small pockets of air that occur between the aggregate particles in the final compacted asphalt mix or what we know as pavement. A certain percentage of air voids is necessary to allow for some additional pavement compaction under traffic and to provide spaces into which small amounts of asphalt can flow during this subsequent compaction.

In 2012, the Ministry paid contractors about \$8.8 million in these bonuses. It has stopped tracking the amounts paid since 2012 because of increased workload and lack of time. But since bonuses are calculated on the price of asphalt, which has increased by about 8% since 2012, it is reasonable to estimate that yearly bonus payments have continued to total at least \$8.8 million.

We further noted that the Ministry’s four largest contractors are also asphalt cement suppliers, so their asphalt bonuses were in addition to the revenue they made by supplying the asphalt cement as well. (As discussed earlier in **Section 4.1.1**, asphalt cement containing excessive amounts of recycled engine oil had resulted in premature cracks in pavements).

RECOMMENDATION 1

To ensure that cracks on highways are minimized and that highways can remain problem-free for the duration of their expected life cycle, the Ministry of Transportation should:

- review the practice of paying bonuses to contractors for providing asphalt that meet contract specifications; and
- assess whether contract amounts should be withheld when all contract specifications are not met.

MINISTRY RESPONSE

The Ministry appreciates the recommendations made by the Auditor General regarding how we pay contractors for asphalt placed on provincial highways. We agree that payment for asphalt should be linked to the quality of the asphalt and its expected durability. As part of our Action Plan, the Ministry will review our current practice of paying bonuses or deducting financial consequences for asphalt quality. The Ministry is committed to continuing our efforts to enhance our specifications and payment procedures related to asphalt and, more specifically, improving the quality of the asphalt cement used to produce the asphalt used on our highways.

4.2 Ministry Agreed to the Asphalt Industry’s Requests to Delay Implementing Tests That Would Identify Asphalt Likely to Crack Prematurely

It is a reasonable and accepted practice for government ministries to work collaboratively with suppliers of products and services they rely on, and it is legal for registered lobbyists representing such suppliers to meet with and provide advice to government staff and officials. In the case of highways

Figure 8: Chronology of Key Events Relating to Issue of Asphalt Cracking Prematurely

Source of data: Ministry of Transportation

Year	Event
2000	Ministry of Transportation (Ministry) becomes aware of the premature cracking of pavement and issues related to the quality of asphalt.
2003–2007	Ministry conducts various trials and reaches the conclusion that poor-quality asphalt cement used in the asphalt is linked to poorly performing (prematurely cracking) pavements. Ministry, in partnership with Queen’s University, also works on developing tests (Enhanced Tension and Extended Aging) that will better predict the likelihood of pavement cracking prematurely. They conduct validation tests that demonstrate the effectiveness of the developed tests.
2007	The Ministry completes the development of both the Enhanced Tension and Extended Aging tests and recommends implementation of these tests as acceptance criteria for asphalt cement on Ministry contracts. Ontario Hot Mix Producers Association (OHMPA) objects to the implementation of these tests, and begins lobbying efforts against incorporating them in contracts.
2008	A joint Ministry-OHMPA asphalt committee is formed to address the industry’s concerns with the new proposed tests, and to determine when to implement them.
2012	An independent engineer verifies that Extended Aging test developed by the Ministry (in partnership with Queen’s University) was best able to predict the premature cracking of pavement.
2012	The joint asphalt committee agrees to implement only the Enhanced Tension test as acceptance criteria on all Ministry contracts.
2014	The Ministry tries to implement Extended Aging test as acceptance criteria on all Ministry contracts. OHMPA objects to the Extended Aging test and requests the Ministry not to implement the test.
2015	OHMPA requests the Ministry to defer implementation of Extended Aging test on all Ministry contracts, citing cost and supply chain issues as a concern. The Ministry agreed to defer full implementation and instead, implementation of the Extended Aging is phased in and used only on 10 contracts in 2015.
2016	The Ministry continues not to implement Extended Aging test on all Ministry contracts but includes the test in only 30 contracts.

and bridges, the asphalt-production industry and the highway-construction industry have expert technical knowledge and experience for which it is prudent for the Ministry of Transportation to avail itself. That said, it is important for decision makers in any ministry to remain vigilant that suppliers’ best interests not outweigh the best interest of taxpayers.

We found instances where decisions made by the Ministry were not in the Ministry’s—and hence, Ontarians’—best interests, but were instead responses to pressure from the Ontario Hot Mix Producers’ Association (OHMPA) and the Ontario Road Builders’ Association (ORBA). Ministry staff that work with industry representatives told us that they believed the Ministry’s prevalent “collaborative culture” of working with the industry had gone too far, resulting in OHMPA and ORBA being able

to influence actions that favoured the industry over the Ministry. In **Section 4.2.1**, we discuss how, under pressure from OHMPA, the Ministry delayed for years instituting quality tests that would have addressed the serious problem of prematurely cracking pavement. See **Figure 8** for a chronology of key events relating to the issue of asphalt cracking prematurely.

4.2.1 Ministry Delayed Implementing Tests That Would Identify Asphalt Likely to Crack Prematurely

From 2000 to 2007, Ministry experts studied the problem of premature cracking of pavement. In 2007, after spending four years working with an expert at Queen’s University to develop and prove the validity of tests, Ministry engineers developed

two new tests that, in combination, could better predict whether asphalt would crack. Yet it still has not fully implemented them both; the **Enhanced Tension test** was implemented in 2012—five years after it was developed and the **Extended Aging test** was only recently introduced in some contracts in 2015. The tests are described below.

- The **Enhanced Tension test** gauges whether pavement is flexible enough. Pavement that has more flexibility can withhold more stress throughout its life span. This test is particularly important for heavily travelled roads.
- The **Extended Aging test** predicts how well pavement will hold up in cold temperatures. In this test, asphalt cement is put under heavy pressure for 20 hours. After the 20 hours of “aging”, the sample is chilled for 72 hours (this is done to replicate winter conditions in Ontario); within these 72 hours, a standard engineering test is performed whereby a weighted load is applied on the sample (at three different intervals) to assess how it reacts. In comparison, the chilling process in the previous aging tests was only one hour and the weighted load was applied only once. The Ministry and Queen’s University experts found that the 72 hour process was a much better predictor of how the asphalt cement would perform and whether the pavement would crack.

Although the asphalt cement suppliers agreed that overly modifying cement with the inclusion of recycled engine oil is detrimental to pavement performance, it aggressively opposed implementing these two new tests that could detect the poorly performing asphalt and premature cracking.

One might reasonably expect that when the Ministry recognizes that something can be done to improve the poor quality of highways being provided by its contractors, it would insist that the contractors—and, if necessary, their suppliers—quickly take action to improve the quality of their work. After all, the Ministry is the client paying the contractors many millions a year. But

this is not what occurred. Ministry staff explained to us that instead of a traditional client/supplier relationship between the Ministry and contractors, the Ministry’s approach is to work “collaboratively” with the industry.

Therefore, the Ministry did not change the specifications for the asphalt it is paying for nor implement the tests to determine whether asphalt would crack prematurely. Instead, it has agreed that decisions such as these be discussed with OHMPA in a joint pavement committee (made up of OHMPA and Ministry representatives), and that any changes be agreed to and approved by that group. We also noted that when OHMPA was not satisfied with discussions at the joint pavement committee, it progressively approached senior Ministry officials on several occasions to not have the tests implemented.

Enhanced Tension Test Implemented Five Years Late

The Enhanced Tension test was implemented in 2012—five years after it was developed and validated.

When the test was first brought forward by the Ministry, OHMPA representatives questioned the validity of the test. They disputed testing methodologies with technical staff, and reached out to the Ministry, requesting that the test not be implemented.

They also proposed two alternative tests, which the Ministry agreed to adopt, however neither test actually addressed the issue of premature cracking. One test intended to predict whether pavement would rut—but rutting had already been eliminated in 1996 with the introduction of SuperPave. The other test was intended to limit the amount of recycled engine oil that could be in asphalt cement—but the limit was proposed by the industry and thus may not have been adequate, and as a result the test did not solve the Ministry’s cracking issues. (In addition, as discussed in **Section 4.1.1**, the Ministry did not want to prescribe limits on the amount of recycled engine oil that could be used

in asphalt cement, instead it wanted to implement better tests that could predict whether asphalt laid would crack prematurely).

After five years, OHMPA representatives on the joint pavement committee agreed with Ministry representatives to implement the Enhanced Tension test in 2012.

Extended Aging Test Still Not Implemented Across All Contracts

Although the Extended Aging test was recommended for implementation in 2007, it has only been implemented for use on some of the Ministry's contracts. As a result of OHMPA and the asphalt industry's requests, the Ministry chose to phase in the implementation of the test instead of implementing it across all contracts.

The industry's position was that the Extended Aging test's 72-hour test process was not an accurate predictor of the likelihood of pavement cracking, even though Ministry and Queen's University experts had concluded it was.

As a result, the Ministry agreed to have an independent engineer review the already-verified testing methodology. This engineer had 30 years of experience in this field and was considered an expert in asphalt and SuperPave. In 2012, the independent engineer confirmed the Ministry's original findings and concluded that the test was able to predict the future performance of pavement with a good degree of certainty. In scientific terms, this meant that the test was accurate in predicting whether pavements would crack early. However, the industry objected to the engineer's results.

Rather than acting upon the independent engineer's findings, the Ministry again accommodated OHMPA's request and agreed to wait for results of more field trials on highway construction jobs before implementing the test. In late 2014, results showed that two sections of pavement on Highway 403 performed significantly differently. For one section, the contractor was not required to perform the Extended Aging Test before laying the asphalt;

that pavement cracked within three years. In the second section, the contractor was required to meet the requirements of the Extended Aging Test on its asphalt before laying it—that section of highway was still crack-free three years later.

With results now confirmed and validated numerous times, the Ministry had planned to implement the test that year. OHMPA objected to its implementation, stating that it needed more time to develop a better supply chain network. Industry members escalated the matter within the Ministry. The Ministry again agreed to delay implementation until the industry's concerns were addressed. As a result, instead of implementing the test across all contracts in 2015, the Ministry chose to phase-in implementation. The Ministry informed us that this approach was chosen to allow OHMPA time to adapt to the new testing regime, even though OHMPA had been aware of this proposed change since 2007, giving it plenty of time to adapt. Moreover, as **Figure 9** shows, some municipalities (as well as the privatized Highway 407) had begun implementing the Extended Aging test across all their road construction contracts as early as 2010. OHMPA had been able to satisfy the new asphalt standards in large municipalities, so it was questionable why it was unable to do so for the Province.

Figure 9: Year in which Municipalities and Highway 407 Began Implementing the Extended Aging Test

Source of data: Municipality and Highway 407 Representatives

Municipality	Year Test Implemented
Kingston	2010
Durham Region	2014
Hamilton	2015
Peel Region	2015
Timmins	2015
407 Privatized Highway	2015
Ministry	Yet to be implemented on most construction projects*

* The Ministry began implementing this test only on some contracts in 2015. This test was implemented in 10 contracts in 2015 and 30 contracts in 2016 (the Ministry annually tenders about 250 highway construction contracts).

In June 2015, the test began to be phased into major construction work for highway jobs. However, it was included in only 10 of the 240 contracts that year, and in an additional 30 contracts tendered in 2016. (At the time of our audit, the Ministry had tendered about 110 asphalt-related contracts in 2016 but was still in the process of tendering.) The Ministry informed us that it is moving toward including the test in all contracts at some future time; however, a target date for complete implementation of the test on all contracts has not been decided.

RECOMMENDATION 2

To identify poor-quality asphalt before it is laid on highways, the Ministry of Transportation should immediately incorporate the Extended Aging test into its standard testing methodology for asphalt.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General's recommendation. As one of the first road authorities to identify the issue with asphalt cracking in colder climates, the Ministry actively led research and consultation with multiple subject matter experts, including the expert referenced in the Auditor General's report, to conclusively determine the underlying cause and potential solutions. In December 2015, the Ministry implemented the Extended Aging test into its standard test methodology for all 2016 projects that required a 15-20 year pavement service life. As planned, starting in 2017, this testing will be extended to all projects that require a shorter pavement service life of 10-15 years. As part of our Action Plan, the Ministry will review and determine whether it will extend the test to all asphalt paving contracts.

4.3 Ministry's Internal Operational Policies Changed to Benefit the Ontario Road Builders' Association

ORBA's success in influencing the Ministry to change policies on late fines, highly litigious contractors and dispute resolution has weakened the tools the Ministry has to manage contractors' performance, is increasing Ministry costs, and unnecessarily adding to staff and management workloads.

Similar to the Ministry making decisions that favoured the asphalt industry's interests over those of Ontarians (as discussed in **Section 4.2**) so too has it changed its policies to accommodate requests made by the road builders. In particular, we noted three significant policy changes the Ministry made following pressure from the Ontario Road Builders' Association (ORBA) that favour contractors:

- contractors can delay paying fines for delivering late work (2011);
- highly litigious contractors can continue to bid on Ministry jobs even though they repeatedly sue the Ministry (2015); and
- contractors can take disputes to external referees rather than have them reviewed by Ministry staff (2016).

We discuss these three policy changes in detail in the following sections. But first, it is important to establish some context.

According to Ministry staff, the relationship between ORBA and the Ministry has changed considerably in the last ten years. Established over 80 years ago, ORBA has typically provided the Ministry with important input on technical issues, prices and contract management. Listening to ORBA's input has been important to the Ministry because ORBA represents a majority of the contractors that work on Ministry projects. However, ORBA has transitioned from being an advisor to playing a much more influential role in the Ministry's internal policy-making processes. ORBA has become a more persistent and effective lobbyist

on issues important to contractors, in an attempt to resolve matters in the contractors' favour, even when it is not in the best interest of taxpayers. We noted that, in recent years, ORBA has been increasingly escalating matters beyond working-level Ministry staff to senior Ministry officials. These matters relate to internal Ministry policies that if changed, would benefit ORBA members.

4.3.1 Despite Staff Advice, the Ministry Allowed ORBA to Significantly Influence Internal Ministry Policies

ORBA's increasing influence started in 2010 when a large contractor was assessed \$2.1 million in late fines (also known as "liquidated damages") for not completing jobs on time. The contractor (whose employees sit on ORBA's senior management committee) was late by about five months on average. Unsuccessful in having the fines waived by Ministry staff, the contractor persuaded the Ministry to order a review of whether the Ministry's policies on late fines were fair.

The review was conducted by Internal Audit and, in addition to looking at policies around late fines; it also looked at other broader aspects of contract management. Although it is rare throughout the provincial government for internal audit reports to be shared with outside parties, the Ministry shared this one with ORBA. (The Ministry informed us that it did so because the report would have been released in any event if a request was made under the *Freedom of Information and Protection of Privacy Act*.)

ORBA requested that it be able to sit down with the Ministry to review the report. The Ministry agreed and established a joint policy committee of ORBA and Ministry representatives. Ministry staff were strongly concerned with establishing such a joint policy committee because it would allow ORBA to strongly influence how the report's recommendations should be implemented, which was an internal operational matter. Moreover, it was also decided that:

- the composition of the policy committee be six ORBA representatives (five of which are contractors, including the one that was assessed significant late fines and persuaded the Ministry to initiate the internal audit) and six government representatives (of which only three were staff members of the Ministry of Transportation; the other three consisted of one representative from Infrastructure Ontario, one from the Ministry of Infrastructure, and one from the Ministry of Finance); and
- rather than working on implementing recommendations made by Internal Audit, the joint policy committee should use the action plan and recommendations made by ORBA itself as the basis of discussion. We noted that ORBA's action plan, as expected, was in its members' best interests.

Several policy changes made by the policy committee were not in the best interests of the taxpayers. We discuss these in subsections A, B and C, which follow.

The scope of activities of the joint policy committee was not limited to the three topics discussed below; we noted that four other topics were under discussion and that policy changes stemming from these discussions are at various stages.

A. Contractors Are Now Able to Delay Paying Fines; Some Large Fines Now Uncollectible

Collecting Late Fines—Original Policy

Liquidated damages (late fines) were collected when a contractor was late in completing a job. If a contractor did not agree with the fine, it could file a dispute at the field-staff level and, if needed, escalate the matter for a regional or head office review.

ORBA's Position

In 2010, ORBA raised concerns that the Ministry collected late fines right away (known as field level collection), even if the contractor wanted to file a dispute or escalate the matter to higher levels for review.

Collecting fines right away is a common practice in other jurisdictions (Alberta, British Columbia and Quebec) as it encourages contractors to be proactive and timely so as not to be charged late fines that they would have to pay right away. We noted that ORBA's concern likely stemmed from a handful of contractors that made little effort to meet timelines, and from which the Ministry had collected large late fines.

Policy Change Allows Contractors to Escalate Claims and Delay Paying Fines; Some Fines Now Uncollectible

In 2011 (before the joint policy committee was established), the Ministry changed its policy and agreed to postpone collecting late fines if the contractor was escalating the fine for further review. Contractors were thus given an incentive to escalate claims as frequently as possible because they could postpone paying these fines. After this change in policy, there was an increase in the number of claims filed by contractors. For example, between 2012 and 2015, the number of claims filed for head-office review increased from eight to 16. We also noted that, in the same time period, there was no increase in the percentage of claims eventually settled in the contractors' favour, so it is likely that some contractors may have increasingly escalated claims not because they expected to win, but because they wanted to delay paying. (In addition, there are five regional offices and numerous field-level staff that also receive hundreds of claims—and only a fraction of their claims get escalated to head-office for review. However, the Ministry does not track the total number of their claims).

By escalating these claims, contractors have been able to postpone paying a total of about \$6 million in fines for up to four years. Although escalated claims generally take up to one year to review, we noted some took up to four years to review. Ministry staff told us the delays were due to the increased volume of claims to be reviewed and also because, for a period, fine collection was put on hold until the joint policy committee finished its work on implementing ORBA's action plan.

During these four years, two contractors went bankrupt; their fines, worth \$660,000, will never be collectible by the Ministry. Two other smaller contractors have six large fines assessed against them totalling \$1.4 million. Ministry staff informed us that they will need to negotiate payment plans with these contractors because of the contractors' cash flow limitations. There is some risk that the fines might not be paid in full.

We asked the Ministry if, before changing its policy on paying late fines, it had conducted any analysis of whether contractors were experiencing an increased need to escalate claims or if there was some other need for changing the existing policy. The Ministry informed us that it had conducted no such analysis.

In comparison, we noted that Alberta, British Columbia and Quebec all collect late fines immediately, then issue refunds to contractors later if the escalated dispute is resolved in the contractors' favour.

B. Litigious Contractors Can Repeatedly File Lawsuits against the Ministry and Continue to Take on Ministry Projects

Excluding Litigious Contractors from Bidding—Original Policy

The Ministry had the ability to exclude highly litigious contractors from bidding on future work. This "exclusion clause" was created in 2005 in response to the behaviour of some contractors. Its purpose was to prevent contractors from filing frivolous suits, and to stop extremely litigious contractors from winning more contracts where they can again sue the Ministry.

ORBA's Position

ORBA opposed this clause from the beginning because it felt the clause unfairly discriminated against contractors simply because they had sued the Ministry.

However, we noted that the Ministry had never actually used the clause to exclude a contractor.

We also noted that the process was much fairer to contractors than similar processes in other jurisdictions. In Ontario, if the Ministry was considering excluding a contractor, the contractor could present its case prior to a decision being made. If the contractor was unhappy with the decision, it could then appeal to a committee made up of Assistant Deputy Ministers (from the Ministry of Transportation and other Ministries) to review the decision. In other jurisdictions, contractors are not given the opportunity to present their case nor to appeal the decision.

Ministry Removed Exclusion Clause even though Some Contractors Were Becoming More Litigious

After several rounds of discussions at the joint policy committee, ORBA's stance on this clause remained unchanged. Although the Ministry has never exercised this clause, the Ministry removed it from all contracts in 2015 after two years of deliberation with ORBA. The Ministry informed us that it made this decision because, given it had never excluded a contractor in the past for being too litigious, if it began exercising the clause, there was a risk it could be challenged in court.

However, there were business reasons for having the exclusion clause—since most contractors that work for the Ministry obtain most of their revenue from the Ministry, they were wary of getting excluded. So the exclusion clause helped ensure that they only sued when they felt the Ministry's dispute decision was clearly unfair.

In addition, about 95% of disputes never made it to mediation or litigation, and were successfully resolved through the dispute-resolution process; the clause was intended for the contractors that were involved in some of the remaining 5% of cases. Ministry records show that between 2007 and 2015, contractors filed 12 lawsuits against the Ministry. Prior to 2007, lawsuits had been virtually non-existent. In 2015, instead of addressing the problem caused by litigious contractors, the Ministry decided to remove the clause.

At the time of our audit, there were four outstanding lawsuits against the Ministry for \$27 mil-

lion in total. There were also 26 disputes at the mediation stage; some of these could end up in court as lawsuits. Lawsuits considerably add to the workload of Ministry staff and to legal costs.

Litigious Contractor Avoided Exclusion and Continues to File Lawsuits Against the Ministry

One contractor had disputes with the Ministry in 14 of its 19 contracts between 2004 and 2014. The contractor escalated six disputes to the mediation stage, of which three were taken to court. In 2010, the Ministry could have exercised its right to exclude this litigious contractor from bidding on future contracts. This would have been the first time that it did so. However, before the Ministry could decide on whether to exclude the contractor, the contractor asked the Ministry to conduct the review discussed at the beginning of this section. Thus the decision to exclude this contractor from bidding on future projects was put on hold until the joint policy committee implemented recommendations from ORBA's action plan. This specific contractor was one of the members that represented ORBA on the joint policy committee and participated in discussions around the removal of this clause.

After discussions with the joint policy committee, the Ministry removed the clause. This contractor did not get excluded from bidding on other contracts and has recently filed a \$22 million lawsuit against the Ministry, which is for about 40% of the value of the contract. The Ministry had previously reviewed the contractor's claim through its dispute-resolution process and found it to be unfounded.

C. Change in Ministry Policy May Provide Incentive for Contractors to File Claims More Often

Dispute-Resolution Process—Original Policy

In the original dispute-resolution process, a contractor had to escalate its claim through three levels within the Ministry before launching legal action. The intention was to minimize litigation

by first providing three different opportunities for assessment.

ORBA's Position

ORBA's concern was that the process lacked sufficient independence because disputes were reviewed only by Ministry staff at all three levels of escalation. However, we noted that about 95% of disputes had been successfully resolved through the existing process and that, based on the sample of dispute files we reviewed, the Ministry's decisions were in accordance with contract terms. Nevertheless, ORBA proposed that the Ministry allow contractors to escalate claims to an independent referee at an early point during the dispute. Contractors would benefit from this change as referees tend to settle on middle ground decisions.

Under the new dispute-resolution process that the joint policy committee and Ministry agreed to implement in 2016, contractors can now ask for a referee to be involved at any level of the dispute process. Since the referee system is still being developed, there has not been a refereed decision yet. However, Ministry staff have identified several risks, including:

- Referees are independent third-party professionals (typically practising or retired engineers, claim consultants or construction lawyers) who may come to a decision that is in the “middle ground” between the parties involved instead of strictly applying the terms of the contract. This might not be in the best interests of the Ministry, especially in cases where the Ministry feels it is in the right contractually. In addition, the Ministry informed us that there is a risk of contractors inflating their claims in order for the “middle-ground” ruling (i.e., the settlement amount) to be higher.
- Decisions made by the referee are final and can only be challenged either through arbitration or in court. Historically, the Ministry has not taken contractors to arbitration or court unless the situation is extreme. Ministry staff

informed us that it is highly unlikely that the Ministry would challenge these middle-ground decisions in court.

For these reasons, the contractor may have an incentive to pursue the referee route. Even if the contractor incurs additional referee costs, any resulting payout from the Ministry would generally offset the costs. For the Ministry, referees are costly because, rather than having Ministry staff decide on escalated claims, the Ministry must pay 50% of all referee costs when a contractor chooses to escalate a claim.

RECOMMENDATION 3

In developing internal policy, the Ministry of Transportation should ensure that decisions made are in the best interest of all Ontarians. In this regard, the Ministry should:

- evaluate industry best practices on the collection of liquidated damages and determine whether to re-implement its original policy of collecting liquidated damages at the field level to be in line with industry best practices;
- re-incorporate the provision for excluding highly litigious contractors from bidding on further contracts, and appropriately exercise it when needed;
- pilot and fully assess the use of reviews of referee decisions as an alternative to escalating to litigation before this process is included into policy and procedures;
- re-implement its original dispute-resolution process if it determines that the use of referees will not be incorporated into its policies and procedures; and
- ensure that whenever committees are established to review and make policy implementation decisions, that the committee members are not in a conflict of interest.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General that its policies need to continue to be developed and made in the best interest of all Ontarians, and free of any conflict of interest. The Ministry is committed to the timely completion of its contracts and fair compensation for all of its contractors, consultants, and suppliers. The Ministry will engage a third-party expert to undertake a review of its key contract provisions including those identified in the Auditor General's recommendation. This review will be completed by 2017.

4.4 Increased Outsourcing Has Led to Less Oversight On Construction Projects

Over the last two decades, the Ministry has steadily contracted out more and more of the work on construction jobs: not only the design of projects, but also the oversight on its construction. The Ministry generally outsources the contract administrator role and has the contractors hire their own Quality Verification Engineers to certify that key construction activities are performed to appropriate standards. Since 1996, contractors have also been responsible for collecting and submitting asphalt samples for quality testing. The Ministry's Quality Assurance staff visit construction sites periodically to assess whether the contractor and the contract administrator are performing their work as required.

Such an approach has certain benefits, particularly in an environment where the government is attempting to minimize the number of staff it keeps on its payroll. However, this approach also comes with risks: if the oversight function is not performed by Ministry staff, then whomever it is outsourced to must be reliable, professional and independent of the contractors performing the work. During our audit, we found that oversight was structured in such a way that the contractors were essentially monitoring themselves with respect to engineering (QVE) and material quality.

In **Section 4.4.1**, we discuss how the handling of asphalt test samples used to determine contractors' bonuses was lax in that contractors would be able to tamper with and substitute samples of high quality for actual asphalt samples. In **Section 4.4.2**, we discuss how professional engineers who are responsible for certifying that infrastructure is built to the quality standards it was designed to achieve are engaged by the contractors, not the Ministry; some have provided conformance certificates for infrastructure that was later determined to not meet standards. In **Section 4.4.3**, we outline how on some projects started since 2008, there is no sample testing of asphalt used: contractors have to provide a warranty that the roads will hold up over a certain period of time. However, when the roads fail to function as required, the Ministry has had difficulties having contractors honour their warranties.

4.4.1 Contractors Have the Opportunity to Tamper with Samples to Obtain Bonuses

As discussed in **Section 4.1.3**, contractors receive bonus payments if their asphalt samples pass tests with certain results. During our audit, we found that contractors have the ability to tamper with samples. This is because they have full custody of the sample after it is taken from the road and before it is sent to the testing lab.

In 2012, these bonuses totalled about \$8.8 million. Since 2013, the Ministry stopped collecting information about bonuses, citing decreasing staffing levels and increasing staff workloads as reasons for why it stopped.

In 2011, Ministry engineers suspected something irregular had taken place when they reviewed test results on one job and found that all 100 samples passed tests with "great results." When Ministry engineers visited the job site, they were surprised to find that they could only locate three areas from which samples had been extracted from the highway. The Ministry was not able to determine exactly what took place and retracted the bonus it had paid the contractor for this job.

A similar instance occurred in 2012 in a different region with a different contractor.

In 2014, a whistleblower approached the Ministry with detailed information on how one contractor was switching samples in order to obtain bonuses. The whistleblower explained that the contractor would submit good samples for testing purposes but lay poor-quality asphalt on highways. The whistleblower, who had been working in the asphalt industry for a long time, explained that sample switching has been happening as far back as the early 2000s and stated that this is a systemic issue throughout the industry. The whistleblower explained in detail how contractors could circumvent the controls the Ministry had put in place on the collection and submission of samples.

The Ministry provided details shared by the whistleblower to its Forensic Investigation Team, which concluded that “there is not enough evidence to justify an investigation at this time.” When we met with the OPP, they told us that they thought the information provided by the whistleblower was credible, but they did not conduct an investigation as they were waiting for the Ministry to provide additional information if it wanted to start an investigation, which it did not.

We also noted that in October 2015, Internal Audit had a similar concern it had reported in its audit report. It noted that contractors had the opportunity to tamper with samples as they were in full custody of the sample after it was taken from the road and before it was sent to the testing lab.

We found that the Ministry has not taken any action to investigate which contractors could have switched samples and impose fines on them. Even if the Ministry’s belief is accurate that there is insufficient evidence to investigate the incident brought forward by the whistleblower, there are still no controls to prevent contractors from tampering with samples as the whistleblower claimed.

We also noted that the Ministry has not taken timely action to put in place processes to ensure that sample switching cannot occur. Although the issue with tampered samples was first documented

in 2011, it was not until July 2016 that the Ministry conducted a pilot to assess the feasibility of having an independent party, instead of the contractor, collect and ship samples to labs for testing.

RECOMMENDATION 4

To ensure that testing of asphalt quality is a constructive process and that information from whistleblowers is adequately investigated, the Ministry of Transportation should ensure that controls and appropriate processes over asphalt samples are in place to prevent the risk of sample switching.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General with regard to the custody of asphalt samples and had already implemented a province-wide trial in May 2016 where the care and control of samples was undertaken by the Ministry or its agents. As planned, starting in 2017, for all new contracts, the care, control and oversight of samples used for verification purposes will be the responsibility of the Ministry.

4.4.2 Engineers Who Certify Structures Are Built Correctly Are Not Independent from Contractors, and a Few Have Provided Certifications For Structures Later Found To Have Problems

One of the most important quality-control measures in building public infrastructure is to have sufficient oversight by a professional engineer independent from the contractors to verify and provide certification that key construction activities are performed to the appropriate standards. For the Ministry, this role is fulfilled by Quality Verification Engineers (QVEs)—hired by the contractors—who are responsible for signing off on 41 different standards that relate to structural, foundational and electrical specifications. The Ministry also relies on its contract administrators and quality assurance

staff to provide oversight, but a sign-off by the QVE is intended to provide assurance to the Ministry that a structure will be safe for public use and that specifications have been met.

Given the nature and importance of their work, QVEs should be independent from the construction contractors whose work they are reviewing. Yet we noted that they are actually hired by, work for and report directly to the contractors. Although QVEs are professional engineers and must adhere to the ethical guidelines of Professional Engineers Ontario (the engineering regulatory body) or risk losing their license, during our audit, we noted that Ministry regional staff had identified instances across the province where QVEs provided erroneous or misleading conformance reports to the Ministry. The consensus of almost all Ministry regional offices was that they had concerns with the lack of independence of QVEs and certification work the QVEs performed.

Contractor's Engineer Certified that Nipigon River Bridge Was Properly Constructed; Bridge Malfunctioned Shortly after It Was Opened to Public

In January 2016, just six weeks after it was opened to the public, the Nipigon River Bridge failed and had to be closed to traffic. One end of the bridge was lifted about 60 cm higher than the other when motorists were driving on it (see **Figure 10**).

Figure 10: Nipigon River Bridge After It Malfunctioned

Source of data: Ministry of Transportation



The Nipigon River Bridge failed after one end rose by 60 cm.

The Ministry conducted four separate investigations. The investigations found that one of the concerns was that the bridge had not been built—and specifically the bridge bearings—according to specifications. A bridge bearing is a component of a bridge that typically provides a resting surface between bridge piers and the bridge deck to reduce stress and allow some controlled movement of the bridge. The investigation also found that the QVE, however, had signed off stating that the bearings used on the bridge were in accordance with required specifications. According to a publication by the Professional Engineers Ontario, sign-offs such as this one are held in high regard because the responsible engineer is assuring others that the information can be depended upon with a high degree of confidence. The investigations, however, showed that the QVE provided an inaccurate sign-off. Specifically:

- One component of the bearings was not made from the right grade of steel. The steel used was about 30% weaker than required.
- The bearings were required to be rotatable, but in fact could not rotate at all.
- One of two bearings was not properly equipped to sustain the upward pull of the bridge's cables.

As a result, some of the bridge bearing components did not meet the Canadian Highway Bridge Design Code on multiple counts. (The Ministry informed us that it, and the Professional Engineers of Ontario, are both still in the process of conducting additional investigations into this incident to determine all other causes that could have also led to the malfunction of the bridge.)

Other Examples of Engineers Providing Inaccurate Conformance Reports

We noted that in several other cases between 2011 and 2016, the Ministry identified that QVEs provided inaccurate conformance reports (the Ministry informed us that it had filed a few complaints with

the Professional Engineers of Ontario regarding this). For example:

- In one case, a QVE certified that a bridge was built correctly with appropriate metal components. However, the bridge partially collapsed during construction. It was later determined that the metal components could only hold about 90% of the required load.
- In another case, a QVE conformance certificate was issued even though the contractor failed to place reinforcement steel bars inside a highway barrier wall, as required.
- The QVE is required to witness when concrete is being poured into a steel cage in the construction of a footing that holds up highway signs (footings provide foundational stability to overhead highway information signs and can run about 10 metres deep into the ground). However, in one instance, the QVE was evidently not on site to witness this as the contractor actually installed the steel cage upside down (which, if left unfixed, would have caused the highway information sign to collapse onto car traffic below). The QVE signed off affirming that the bridge and steel cage were built to specifications.

In these noted instances, the construction mistakes were fixed by the contractor at the contractor's expense.

We also noted that Ministry staff found that one QVE had photocopied and pre-signed blank conformance certificates, and had used the same certificate on five different Ministry projects.

RECOMMENDATION 5

To ensure it obtains a high level of assurance that infrastructure is safely built according to specifications, the Ministry of Transportation should hire or contract its own engineers who are independent from the contractors to perform verification activities.

MINISTRY RESPONSE

The Ministry appreciates the Auditor General's recommendation and is committed to constructing infrastructure that meets its specifications, codes, and standards. The Ministry's current practice is to use consulting engineering firms or in-house staff to provide the primary level of oversight, supplemented with Quality Verification Engineers for specific critical elements. As part of our Action Plan, the Ministry will review its contract administration process as it relates to Quality Verification Engineers, including how they can perform their duties independently from the contractors.

4.4.3 Ministry Has Had Difficulties Enforcing Contractors' Warranties

In 2008, the Ministry began introducing performance-based specifications on some contracts. Performance specifications focus on the expected outcome of the work rather than on how that outcome is supposed to be achieved. For example, performance specifications might dictate that seven years after a highway construction job is completed, there should be little to no long cracks running deeply in the asphalt. The steps and construction actions required to achieve this—which would be prescribed in traditional contracts—are generally left up to the contractor to decide. Thus, in projects with performance specifications, the Ministry allows the contractor to make more decisions on its own, there is less oversight of the contractor, and the Ministry does not test nor receive the result on the pavement quality under these contracts.

The Ministry required contractors to provide extended warranties so it would be protected in the longer term from deficient work. Previously, construction projects usually came with one-year warranties; with performance specifications, the Ministry has generally required warranties of three to seven years in length. As of the time of our audit, there had been about 100 three-year-warranty

projects, six five-year-warranty projects and 14 seven-year-warranty projects.

We reviewed almost all seven-year-warranty contracts as seven years is long enough for pavement defects requiring remedial work to show up. In about half of them, we found that contractors have repeatedly tried to absolve itself from its responsibilities under warranty (in the other half of the contracts, either there were no pavement defects or the contractor fixed the pavement defects under warranty).

For example, on a job where one kilometre of highway was originally paved in 2010, there were 1.5 kms of cracks by 2012 and, at the time of our audit, the contractor had not agreed to fix these cracks.

We found that to have contractors fix pavement defects under warranty, the burden of proof is on the Ministry to show that no other factors could have caused pavement defects other than the contractor's poor materials and workmanship. Ministry staff has had to dedicate considerable resources in disputing contractors' claims that other factors caused the pavement defects. For example:

- in one instance, the Ministry had to disprove the contractor's assertion that the motion and weak roadbed because of an adjacent lake will not cause pavement defects; and
- in another instance, the Ministry had to counter the contractor's claim that an accident on another highway nearby had contributed to increased car traffic on the highway that, according to the contractor, caused pavement defects such as cracks.

Ministry Paid Contractor for Fixing Defects that Were Covered under Warranty

In one instance, a contractor followed the Ministry's instructions to fix a road that was under warranty, but then submitted a claim and was reimbursed about \$1 million. The contractor claimed there were several reasons why it was not responsible for the repair costs. These included a claim that the contractually agreed-upon methodology for

determining the pavement defects was flawed, and that the Ministry was not using the right machine to determine pavement defects. The contractor presented the Ministry with its own analysis, claiming that about two-thirds of the repairs were not its fault.

The Ministry informed us that all of the contractor's claims were unfounded. Although the Ministry disagreed with the claim, it was compelled to pay the contractor about \$1 million for repairing defects that it believed the contractor was actually liable to repair. The Ministry decided to do this because of the high burden of proof it faced in having to prove to the contractor that the pavement defects were a direct result of the quality of the material and poor workmanship.

RECOMMENDATION 6

To ensure that contractors perform warranty work they are responsible for, the Ministry of Transportation should:

- change its warranty provisions so that the burden of proof is not on the Ministry to show that no other factors could have caused cracks for poorly performing pavement and that the warranty is based on items that should have been foreseen; and
- enforce its warranty provisions for costs to be borne by the contractor for all contracts with warranties.

MINISTRY RESPONSE

The Ministry appreciates the concerns raised by the Auditor General concerning warranties. In recent years, the Ministry made some initial improvements to its warranties, warranty provisions, administrative guidelines and oversight regime as a result of lessons learned from its earlier contracts. As part of its Action Plan, the Ministry will conduct a further review to see what additional improvements could be made including the recommendations of the Auditor General.

4.5 Ministry Selection Process Is Fair and Transparent, but Ministry Is Lenient in Managing Poor-Performing Contractors

We did not identify any concerns about the fairness and transparency in the process the Ministry uses to select contractors (as detailed in **Section 2.4**). However, we did note some concerns about the Ministry not adequately managing contractors' performance and not taking into account previous work performance in the determination of eligible contractors that can bid on future projects. These are detailed in the following section of the report.

4.5.1 Many Poor-Performing Contractors Have No Incentive to Improve

One of the ways the Ministry manages the performance of contractors is through its Contractor Rating System, which is used in selecting contractors for future projects. We noted that the Ministry's approach to addressing poor-performing contractors is lenient. For instance, contractors that receive a rating between 55 and 70 points (out of 100) are considered to have serious performance issues, but we noted they are not treated any differently for their poor performance and can continue to bid on Ministry projects. They simply receive warning letters. Contractors rated less than 55, of which there were only five over the last five years, were impacted through reductions in the total cost of projects they could bid on, which effectively prevented them from bidding on future work.

Although there is not a significant number of contractors that perform poorly, on average, at least four contractors are rated between 55 and 70 points each year. We noted that over that last five years, some of these contractors received unsatisfactory rankings for two or three years in a row. Each year, the contractor simply received a warning letter. As such, contractors with ratings between 55 and 70 have no incentive to improve their performance.

For example:

- One contractor received a poor rating of 66% because it refused to give the Ministry's Quality Assurance staff access to concrete test records. Withholding test results was in direct violation of its contract with the Ministry. In addition, a Ministry engineer had asked to review test results because he noted on two different occasions that the contractor was improperly ventilating or drying concrete slabs. This improper technique reduces the strength of the concrete and makes it susceptible to more cracks in the future. The contractor only received a warning letter and was not excluded from future contracts.
- Another contractor ranked low (63%) on the rating scale because it provided poor-quality asphalt and concrete. The contractor was also late in meeting interim deadlines several times and was rated 55% on timeliness. The contractor only received a warning letter and was not excluded from future contracts.

Contractors that have received unsatisfactory ratings continue to perform significant amounts of work for the Ministry. For instance, three contractors that have consistently received an unsatisfactory rating for several years because of their poor performance have been awarded construction contracts worth about \$45 million each over the last five years.

4.5.2 Ministry Continues to Award Projects to Contractors That Breach Safety Regulations

The Ministry penalizes contractors if they breach safety regulations during construction. For first-time offenders, the Ministry works with contractors to change their behaviour through discussions and improvement plans. For repeat offenders, the more serious the breach, the greater the penalty. The penalties are not monetary fines; instead, the penalties limit the amount of future work a contractor can bid on. For example, if a contractor is allowed

to bid on up to \$5 million worth of construction projects, a 40% penalty would put the contractor's new ceiling at \$3 million.

We reviewed seven such infractions in total and noted that none of the penalties were large enough to prevent contractors from bidding on Ministry projects. This is because a contractor's bidding ceiling can be high enough that, even despite a penalty, the contractor does not reach its full ceiling amount. For example, one contractor was authorized by the Ministry to bid on about \$100 million worth of projects, which was reduced to about \$75 million after it was penalized. However, we noted that this contractor had never bid on more than \$9 million worth of projects in the past. Without imposing penalties that actually impact contractors, there are no implications to contractors if safety regulations are not being met.

In another instance where the penalty did not impact the contractor, the contractor was removing very heavy pieces of concrete over a 400 series Highway without closing the lane directly underneath. This was a violation of safety regulations and posed a potential risk to the travelling public. Furthermore, the platform installed on the underside of the bridge was too weak to support concrete in the event that it fell from the bridge, which was also a violation of safety standards.

We noted a few other instances where the Ministry somewhat penalized contractors through a partial ban—for example a contractor with an infraction on a bridge construction project would not be allowed to bid on similar bridge construction projects. However, partial bans still allow contractors to bid on other Ministry projects, receive contracts and earn revenue from Ministry projects, thus making these types of penalties ineffective in providing sufficient incentive for contractors to improve their safety performance.

4.5.3 Contractors Misreport Financial Information to Increase How Much Work They Can Bid On

Contractors are required to self-report certain financial information that is used to determine their bidding room (the total value of contracts they can bid on). The Ministry started auditing contractors' self-reported numbers in 2014; however, it has yet to enforce action on contractors that falsely misreported financial information.

The Ministry's review found that, on average, one in every five contractors misreported their financial information. In some of these cases, the contractors misreported information to actually inflate their bidding room, effectively allowing them to bid on contracts with a higher total value than they should be allowed to. These ceilings are set by the Ministry to ensure that no contractor takes on more work than it is capable of completing; therefore, misreporting these numbers puts the Ministry at risk.

Many contractors that misreported information ended up bidding on projects that were higher than what their ceiling should have been if they had submitted accurate financial information. In one instance, a contractor won a \$4 million construction contract that was in excess of its approved ceiling.

We noted that, even though the Ministry had identified instances of misreported financial information, it never brought these to the Ministry committee that reviews contractors' non-compliance. The Ministry committee reviews non-compliance to determine what penalties should be assessed against a contractor. As a result, no penalties were issued against these contractors. Without any consequences imposed, there is little incentive for contractors to accurately report information.

4.5.4 Ministry Continues to Award Contracts to Smaller Contractors with a History of Performance Issues

We found that small contractors (those that can bid on minor construction projects less than \$1 million) that are banned from working with the Ministry in one region due to a history of poor performance can continue to bid on and win contracts in other regions. We noted that this is because the Ministry does not track performance of these contractors centrally as it does for larger contractors through its Contractor Rating System. Minor construction projects represent about 10% of all Ministry spending or about \$116 million annually.

We noted, as an example, a small contractor was banned in the Ministry's Eastern and Central regions and continued to receive contracts in other regions. In one contract in the Eastern region, it installed 58 of 61 highway signs incorrectly. Signs were placed either too close to or too far from their designated spots. This increased the risk to drivers that they might not see exit signs in time, which posed a potential safety risk to them. This contractor also had other issues, such as using cheaper paint for signs than the contract specified and not finishing jobs on time.

Two other regions continued to award contracts to this contractor, and both regions also noted performance issues.

Across these four regions (including the Eastern and Central regions before the contractor was banned), the contractor was awarded five contracts worth a total of \$2 million over a two-year period. The contractor made a serious safety breach on one of these jobs (in addition to various other performance issues). In this instance, while working on the shoulder lane of a live highway, the contractor violated safety standards by not setting proper barriers: workers and equipment encroached the live lane. Although there was no reported consequence, this jeopardized the safety of workers as well as the travelling public.

Between 2012 and 2016, this contractor received eight infraction notices where it was formally notified of its safety and performance issues. (The Ministry also continues to receive complaints from the contractor's subcontractors that they were not being paid at the time of our audit.) At the time of our audit, the contractor was still allowed to work in two of the four regions.

RECOMMENDATION 7

To ensure that poor-performing contractors and contractors that do not follow safety standards and other requirements are appropriately penalized for their performance or behaviour, the Ministry of Transportation should:

- establish appropriate penalties for contractors with unsatisfactory ratings;
- incorporate stricter rules around excluding contractors from bidding if they breach safety regulations;
- establish appropriate penalties for contractors that report inaccurate financial information to the Ministry; and
- implement policies and processes to exclude smaller contractors from bidding in all regions if performance issues are noted in one or more regions.

MINISTRY RESPONSE

Construction safety and quality are fundamental ministry priorities. As such, the Ministry agrees with the Auditor General's recommendation that contractors who do not follow safety standards and other Ministry requirements should be appropriately dealt with. The Ministry also agrees that our administrative practices must have adequate safeguards to ensure our contractors are operating safely and providing quality work, for all contracts large or small. As part of its Action Plan, the ministry will review and implement, as appropriate, additional safeguards beyond its current contract administration regime.

In June 2014, the Ministry enhanced its financial auditing and oversight of contractors. Based on the Auditor General's recommendation, the Ministry will review our financial reporting requirements and consider additional controls to hold our contractors accountable for the information they report.