

Action Plan for Highway Construction Contracts and Oversight

February 17, 2017

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Executive Summary

Ontario continues to invest in its highways to ensure that people and goods can move safely and efficiently across the province. Over the past five years, the Ministry of Transportation (MTO) has constructed 58 new bridges and more than 689 kilometres of new highway lanes across Ontario, with more than \$13 billion invested to maintain and expand the provincial highway network. The province has also provided ongoing annual funding for connecting links through municipalities that connect our highways to ensure they are properly maintained.

The ministry appreciates the findings and recommendations contained in the Auditor General's report: *Road Infrastructure Construction Contract Awarding and Oversight*. The following Action Plan addresses all seven of the Auditor's recommendations. The plan has two parts:

1. Actions for the 2017 construction season and;
2. Longer-term actions to be implemented for the 2018 construction season and beyond.

The plan includes actions to:

Address Asphalt Quality, Durability, and Repair

The asphalt used to pave our roads should last at least 15 years before repaving is needed. Contractors must use asphalt that meets the ministry's quality standards. The ministry will ensure this by:

- Strengthening the requirements and specifications for asphalt used on Ontario's highways to improve overall quality and durability. This will also include making changes to how contractors are paid for asphalt.
- Immediately implement the "Extended Aging" (Extended Bending Beam Rheometer (ExBBR)) test on all new contracts to enhance the quality of asphalt cement used, and ultimately improve the durability of the province's asphalt highways.
- Increasing inspections of asphalt and asphalt cement to ensure the ministry receives the product it has asked for.
- Suspend the use of recycled asphalt pavement in the top layer of pavement where long lasting pavement is required.
- Highways that last longer have a positive effect on environmental sustainability and generate fewer greenhouse gases.
- Taking direct responsibility for the care, control, and oversight of asphalt samples for all new contracts to ensure the ministry has complete custody of samples.
- Launching a fraud reporting tip-line to anonymously report suspected violations or fraudulent construction activity directly to the ministry.

- Implementing a province-wide tracking system for all pavement warranties to enhance our administration and oversight of work after it is complete.

Ensure Decisions Are Made in the Best Interests of all Ontarians

The ministry works with the Ontario Road Builders' Association (ORBA) and others to deliver a wide range of capital projects. Many of the contractors who build and maintain the province's highways are members of ORBA and look to that organization to represent their interests with the government.

Having ongoing dialogue and consultation with our stakeholders, including ORBA, helps the ministry make informed decisions about policies and programs, and is critical to the successful implementation of our infrastructure programs.

The ministry is always looking for ways to improve its working relationship with stakeholders and will:

- By the end of 2017, complete a review of how the ministry develops policy, standards, and specifications. The review will focus on the best approach for involving stakeholders, while adopting the principles of openness, transparency, and avoidance of conflicts of interest.
- Establish a third-party panel to review and provide advice regarding key contract provisions and administrative practices to ensure that the best practices and experiences from other jurisdictions are considered.

Strengthen Oversight of Contractor Performance

The ministry's current practice is to use consulting engineering firms and in-house staff to provide the primary level of construction oversight. In addition, Quality Verification Engineers (QVEs) employed by contractors are used to certify certain elements of the project.

Starting in the upcoming construction season, the ministry will:

- Enhance the oversight of the QVE certification process and conduct random province-wide audits.
- Use ministry staff in place of QVEs to review some critical construction elements on a number of projects across the province.

Promote Continued Safety and Quality

Safety remains the ministry's top priority. The ministry has a strong record of ensuring that contractors provide safe work environments for their workers and the travelling public. The ministry wants to continue to verify that those building Ontario's highways and bridges have the highest regard for safety and quality. Contractors

with a history of safety violations or poor performance will be under enhanced scrutiny.

Starting this construction season, the ministry will:

- Complete a review of the qualification process for contractors, and implement more safeguards and sanctions to improve contractor performance and safety by the end of 2017, including changes to the current contractor performance rating system.
- Develop additional controls to hold contractors accountable for financial information they report, to ensure they have the necessary resources to perform the work they are bidding for.

Vision, Mission, and Objectives

The ministry's vision is to be a world leader in moving people and goods safely, efficiently, and sustainably to support a globally competitive economy and a high quality of life.

This vision is supported through all of the ministry's divisions and branches. We have a long history of delivering and maintaining a first-rate highway system that benefits both the travelling public and taxpayers. Over the past five years, we have constructed 58 new bridges and more than 689 kilometres of new highway lanes across Ontario.

Provincial Highways Management (PHM) Division is responsible for the expansion and rehabilitation of provincial highways under the Public Transportation and Highway Improvement Act (PTHIA). They are the stewards of Ontario's provincial highway network, managing the engineering, construction, operations, and maintenance activities performed for the network's upkeep and expansion.

The division supports Ontario's excellent road safety record as one of the safest jurisdictions in North America guided by three priorities:

- Sustainable infrastructure through smart investment decisions and innovation.
- Projects delivered in the most efficient and flexible way to optimize the expenditure of our annual budget.
- Being an organization that delivers through strong, collaborative relationships.

Ensuring the safety of the public, ministry staff, and our contractors is our top priority. We have several levels of oversight in place for ensuring quality, safety, and performance of the highways and bridges being built in Ontario. Private consultant engineering firms and ministry staff provide direct oversight of the consultant firms and work as a team to oversee and administer construction projects.

Purpose

The ministry takes its responsibilities for the safety and quality of the provincial highway network very seriously.

The November 2016 Auditor General's report on *Road Infrastructure Construction Contract Awarding and Oversight* contained seven specific recommendations on how the ministry could enhance oversight, ensure value for money, and improve asphalt pavement quality.

In its response to the Auditor General's report, the ministry committed to developing an Action Plan that would outline how the ministry would address the Auditor's recommendations for the coming construction season and beyond.

Background

The Ministry of Transportation is committed to identifying and implementing innovative solutions to improve the quality of its infrastructure. That is why Ontario was at the forefront in both identifying and developing solutions for the issue of early cracking of asphalt pavements in colder climates.

Over the years, we have worked closely with our industry partners to ensure that some of the safest roads in North America are also built to last. This has also included using a combination of private-industry and ministry staff to oversee and inspect all ministry projects.

We also work extensively with our industry partners. Between 2012 and 2016, the ministry issued over 1,700 public contracts ranging from repaving asphalt to building new bridges and highways. The vast majority have been successful in providing a first-rate highway system that benefits both the travelling public and taxpayers.

The ministry takes all reported cases of potential fraudulent activity very seriously. In response to a few cases, in 2016 a province-wide trial to prevent switching of asphalt samples for testing was successful, and will now be implemented for all new contracts. These new measures, in addition to procedures we already have in place, are designed to manage concerns related to safety, quality and avoiding fraud. We are committed to continuing to sanction contractors where these concerns are proven.

In recent years, there has also been a renewed focus on maintaining the province's infrastructure. Since 2007, the percentage of provincial highway pavement classified as being in good repair has risen by 20 per cent. Similarly, the percentage of highway bridges in good repair has increased by 16 per cent.

End Result Specification (ERS) System for Materials

The ministry has high requirements for the materials used to construct highways and bridges. Because these are made of natural materials (i.e. concrete, asphalt and aggregates) that come from a number of sources throughout the province, there is variability in their characteristics as well as in the testing and sampling results.

To address this inherent variability, the ministry and other road authorities set "acceptance" ranges for test results. Materials within an acceptable range are suitable for use during construction of the project. Materials that do not meet the requirements are rejected and not used.

Within the acceptable range, lower or higher price adjustments are typically applied to the price the contractor submitted. When the material meets the highest end of

the range there is payment adjustment (or incentive) upwards and when it is at the lower end of the range there is a price reduction (penalty).

In place for a number of decades, the ministry's ERS System and associated payment adjustments are used to ensure high standards for the materials, such as asphalt, used on Ontario highways. Many other jurisdictions have a similar approach and the ERS System is seen as an industry standard in North America. Contractors who exceed expectations are provided payment incentives ("bonuses"), because the workmanship and materials provide an increased benefit by extending the life of the pavement. In some circumstances, a material fails to significantly meet MTO expectations and is rejected.

Developed and implemented in the early 1990's, the ERS System has evolved as new technology and industry practices have changed. Over the next year, MTO will make a number of changes to define higher requirements that will ultimately improve the quality and durability of Ontario's highways.

Early Asphalt Cracking

Since 2009, the ministry has undertaken internal testing, funded university research, and developed new tests to address asphalt cement quality issues. We worked with industry stakeholders and academics for several years on an asphalt cement task group to address these issues. As a result of this work, several tests have been developed and incorporated into our testing regime to supplement those that were already in place, including;

- Ash Content Test (implemented in 2010) – used to estimate and restrict the amount of recycled engine oil bottoms added to asphalt cement,
- Enhanced Tension/Double Edged Notched Tension test (implemented in 2012) – developed to measure asphalt cement's elasticity (i.e. ability to stretch and resist cracking),
- Multiple Stress Creep Recovery test (implemented in 2012) – measures strain-stress relationship and elastic recovery to prevent pavement rutting during the hottest days of summer, and;
- Extended Aging/Extended Bending Beam Rheometer (ExBBR) test – extends the sample conditioning time of the asphalt cement from one hour to three days to significantly improve the test's ability to predict pavement cracking at cold temperatures.
- The ExBBR test was piloted on a limited number of contracts in 2016. Starting in 2017, the test will be used for all new asphalt contracts for Ontario's highways. Developed by experts from MTO and Queen's University, the test will help reduce cracking of asphalt pavement in our climate and will improve the quality and durability of Ontario highways.

Details of Action Plan

The Auditor General's report contains seven specific recommendations. For each recommendation this Action Plan lays out the areas the ministry reviewed, and the actions we are taking and will take.

There are nearly 50 individual actions being implemented in the next two construction seasons that, on their own, will have both immediate and longer-term impacts. Taken together, they represent the knowledge and dedication of ministry staff across the province. They are also aimed at providing the best value for taxpayers and the travelling public while ensuring contractors meet our standards for durability and safety of our highways.

Please note, that within this Action Plan, terms shown in quotes reflect how the Auditor General referenced the item in her report.

Recommendation 1: *Minimizing cracks on asphalt highways*

Key areas of review:

- Ministry's evaluation and payment system for asphalt (End Result Specification System – ERS)

For the 2017 construction season:

- Modify the ERS System, which the ministry and other jurisdictions use to determine payments (adjusted either above or below the original bid price), starting April 1, 2017 to increase the lifespan of our pavements by encouraging better quality, durability and workmanship of asphalt pavements.
 - Incentives will be suspended for asphalt material properties and compaction and specification requirements will be raised; contractors will still face disincentives.
 - A higher benchmark will be established for the quality of the asphalt driving surface (smoothness). Contractors will need to meet these higher requirements to qualify for incentives. Better workmanship that results in a smoother driving surface increases the lifespan of the asphalt pavement and is better for drivers and the environment through fuel savings.
 - The rejection of poor quality asphalt pavement and price reductions for lesser quality material and workmanship will continue.
- Deliver enhanced training for staff to administer the ministry's payment system accurately and consistently, including any future changes to the quality system.

For the 2018 construction season and beyond:

- Complete an in-depth review of the ERS System by the end of 2018 to identify and implement further enhancements to our asphalt requirements and payment procedures.

Recommendation 2: Incorporate the “Extended Aging” test for asphalt

Key areas of review:

- Extended Aging/Extended Bending Beam Rheometer (ExBBR) Test
- Use of modified and unmodified asphalt cement
- Asphalt cement sampling, testing, and oversight framework
- Establishing a Centre of Excellence for Transportation Infrastructure

For the 2017 construction season:

- Implement the ExBBR test on all contracts tendered after March 1, 2017. This new test, developed by experts from MTO and Queen’s University, will help achieve better cracking performance of asphalt pavement in our climate.
- Increase inspection and sampling for asphalt cement used in Ontario highways to ensure the ministry receives the quality product that it asked for. Contractors will also be required to provide documentation from asphalt cement suppliers certifying that the material conforms to the ministry’s requirements.
- Suspend the use of recycled asphalt pavement in the top layer of pavement where long lasting pavement is required.
- This action promotes long-term quality and durability of the province’s highways. Roads that last longer have a positive effect on sustainability and generate fewer greenhouse gases.
- Assess further restrictions on the use of recycled engine oil bottoms in asphalt cement used on Ontario highways.
- Deliver further training and improve guidelines for both ministry and consultant staff involved in construction sampling and testing oversight.
- Begin construction of a new Centre of Excellence for Transportation Infrastructure to be used for the research and testing of road building materials.

For the 2018 construction season and beyond:

- Conduct further research into new and emerging tests which can be used to better predict the performance and durability of asphalt pavement.
- Continue to review and implement new initiatives to improve the quality of asphalt cement and other materials used on Ontario highways.

Recommendation 3: *Making decisions that are in the best interests of Ontarians*

Key areas of review:

- Administration of liquidated damages (“late fines”)
- Contract provisions for excluding litigious contractors
- Dispute resolution process within contracts

For the 2017 construction season:

- Seek independent advice, through the establishment of an expert panel, on contract provisions and administrative practices, including best practices and approaches from other jurisdictions.
- Continue with the recently introduced practice of collecting liquidated damages immediately after completion of the contract dispute resolution process.
- Introduce interest charges on liquidated damages for all new contracts.
- By the end of 2017, complete a review of how the ministry develops policy, standards and specifications. The review will focus on the best approach for stakeholder involvement, while adopting the principles of openness, transparency, and avoidance of conflicts of interest.
- Monitor and complete a review of the current dispute resolution process to identify trends, weaknesses, and potential improvements.

For the 2018 construction season and beyond:

- Implement any improvements, as appropriate, arising from:
 - The expert panel review of the ministry’s contract provisions, and;
 - The ministry’s monitoring and review of the dispute resolution process.

Recommendation 4: *Appropriate care and control of asphalt samples*

Key areas of review:

- Asphalt sample chain of custody and delivery to testing labs
- Current reporting and investigation process for breaches in asphalt sampling handling

For the 2017 construction season:

- Assume responsibility for the care, control, and oversight of asphalt samples for all new contracts, to ensure the ministry has complete custody of asphalt samples.
 - This new approach will improve the integrity of the process and greatly reduce the risk of sample switching.
- Implement fraud prevention training for staff, with sample integrity courses for both ministry staff and consultant Contract Administrators by the end of spring 2017 to increase awareness and reduce potential opportunities for fraud.
- Establish a tip-line in the spring of 2017 to allow for the anonymous reporting of suspected fraud and any other violations or inappropriate activity by anyone who witnesses it.

For the 2018 construction season and beyond:

- Complete an independent risk-based audit of the new sample collection and delivery system to ensure integrity of new practices and procedures for testing asphalt.
- Expand fraud prevention training to external service providers.

Recommendation 5: *Obtain a high level of assurance*

Key areas of review:

- Current contractual requirements for Quality Verification Engineers (QVE)
- Activities that require verification by an engineer
- Independence of QVE services

For the 2017 construction season:

- Conduct random audits of key projects to ensure that QVE work has met ministry specifications, enhancing the oversight of QVEs.
- Implement a pilot project involving a minimum of 15 contracts across the province, where the current QVE certification process (as defined in our contracts) will be replaced with a process completed by the ministry's own staff.

For the 2018 construction season and beyond:

- Complete a review and implement recommended changes to the certification process. The review will involve key stakeholders and our current contract requirements to ensure independence.

Recommendation 6: *Enforce and modify warranty provisions*

Key areas of review:

- MTO General Conditions of Contract (Warranty Provisions)
- Item-specific warranties (pavement, culverts, etc.)
- Existing warranty tracking requirements

For the 2017 construction season:

- Improve the oversight and consistency of warranty administration by launching a province-wide tracking system by the end of 2017.
- Strengthen and improve contract warranties by:
 - Clearly defining contractor requirements, and;
 - Promoting the use of automated and objective data when evaluating pavement performance.
- Immediate and ongoing improvements to communications, guidelines and training for administration of existing warranties for ministry staff.

For the 2018 construction season and beyond:

- Launch a provincial automated data collection system for warranty administration.
- Publish a “Pavement Warranty Guideline” that can be used by staff across the province to consistently administer and oversee the warranty provisions used in our contracts.
- Complete a review and consider the use of other types of warranty provisions in our contracts.

Recommendation 7: *Take action on poor performance or behaviour*

Key areas of review:

- How we qualify contractors and restrict opportunities for poor performing or unsafe contractors
- Financial reporting requirements for contractors
- Contractor Performance Rating System
- Tendering processes that incorporate past performance

For the 2017 construction season:

- Implement more safeguards and sanctions in the qualification process for contractors, to improve contractor performance and safety by the end of 2017. This includes changes to the current Contractor Performance Rating system.
- Completing a review and implementing additional financial and accounting rules that hold contractors accountable for financial information they report.
- Reviewing how the ministry can prohibit smaller contractors from bidding on contracts if performance issues have been identified.

For the 2018 construction season and beyond:

- Continue implementation and monitoring of proposed changes.
- Develop opportunities to enhance the current contract tendering process by factoring the contractor's past performance regarding safety, quality and timeliness into the selection process.
- Determine whether the improvements have had the desired outcome of ensuring contractors who bid on our work have the appropriate finances, staff and equipment necessary to undertake the work they are allowed to bid.