



**Office of the Auditor General: Follow-up to the  
2010 Audit of the Mackenzie King Bridge  
Rehabilitation, Tabled at Audit Committee – June  
14, 2018**



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## Executive summary

The 2010 Audit of the Mackenzie King Bridge Rehabilitation was presented to Audit Committee and Council in 2015.

Our original audit examined the maintenance procedure for the Mackenzie King Bridge (MKB). We reviewed the scheduling of asphalt rehabilitation for the bridge, the alternative solutions examined and the procedures used for selection of asphalt rehabilitation methods, including coordination with structure renewal procedures.

The key findings of the original audit were:

- The decision to resurface the bus lanes appeared not to have taken into consideration previous reports commissioned by Infrastructure Management relating to evaluation of alternative pavement rehabilitation strategies.
- There was no documentation in the files attesting that the decision to use the Rosphalt modified hot mix asphalt (RMHMA) was preceded by appropriate tests, financial studies and preparation of specifications.
- The decision to remove the waterproofing membrane and to use RMHMA was made by a pavement engineer without approval by the Structures section of Infrastructure Management.
- The pavement engineer that selected the RMHMA strategy for the MKB left the City in early 2008. No other City staff had the experience or training to vet the decisions made by the manufacturer and/or the contractor with respect to the RMHMA mix design.
- The City did not engage a consultant to assist with pavement mix design and quality control issues, even though it became clear after 2008 that the City staff did not have the required training and experience.
- As a result of the lack of experience and training with RMHMA, Quality Assurance and Construction Services left it to the manufacturer and the contractor to prepare the mix design, test it, and control it during construction.
- Advice on project problems was provided by the same engineer that was responsible for the original design.

Table 1: Summary of status of completion of recommendations

<b>Recommendations</b>	<b>Total</b>	<b>Complete</b>	<b>Partially complete</b>	<b>Not started</b>	<b>No longer applicable</b>
<b>Number</b>	11	10	1	-	-
<b>Percentage</b>	100%	91%	9%	-	-

## Conclusion

Management has made substantial progress in fully implementing 10 of 11 recommendations.

We recommended that management ensure all departments involved with the implementation of a new technology have proper training on that technology. Management has indicated that they are updating the procedures related to the use of new technologies and that the procedures will address training requirements for staff.

## Acknowledgement

We wish to express our appreciation for the cooperation and assistance afforded the audit team by management.

## Detailed report – Assessment of implementation status

The following information outlines management's assessment of the implementation status of each recommendation as of December 15, 2017 and the Office of the Auditor General's (OAG) assessment as of March 2018.

**Recommendation #1**

Table 2: Status

Management update	OAG assessment
Complete	Complete

**Audit recommendation:**

That the City modify its procedures to ensure that pavement work on structures be scoped with the specific agreement and approval by the Structures unit of Asset Management.

**Original management response:**

Management agrees with this recommendation, and it has been implemented. The Asset Management branch has documented procedures related to resurfacing on structures and associated approval processes. This information was provided to the auditor during the audit review process.

**Management update:**

Implementation of this recommendation is complete. The documented procedures have been in place since December 22, 2010, and this information was shared with the auditor during a previous follow-up audit.

**OAG assessment:**

OAG confirmed that the Asset Management branch has documented procedures relating to resurfacing work on structures. These procedures include a documented approval process.

**Recommendation #2**

Table 3: Status

Management update	OAG assessment
Complete	Complete

**Audit recommendation:**

That the City modify its procedures to ensure that application of new technologies be preceded by a sufficiently detailed, tested and documented investigation of alternatives and costs and that application receives specific management approval.

**Original management response:**

Management agrees with this recommendation. In May 2011, the General Manager, Infrastructure Services issued a departmental directive outlining requirements to be followed when piloting new technologies. Management will monitor amendments that may be required to further clarify the directive. The audit recommendation will be reflected in the next amendment, which is expected in Q4 2011.

**Management update:**

Implementation of this recommendation is complete. In 2011, IS issued directive ISD-2011-02 outlining the requirements to be followed when piloting new technologies. This information is included in the Project Delivery Manual (Section 5.9) released to Infrastructure Services Department<sup>1</sup> (ISD) staff on May 8, 2013.

**OAG assessment:**

OAG confirmed that Infrastructure Services has modified their procedures to include requirements to be followed when piloting new technologies.

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<sup>1</sup> Effective 2016, Infrastructure Services is a branch of the Planning, Infrastructure and Economic Development Department.

**Recommendation #3**

Table 4: Status

<b>Management update</b>	<b>OAG assessment</b>
Complete	Complete

**Audit recommendation:**

That the City ensure that the specifications for application of new technologies be vetted by management in the same or more strict manner than the production of standard specifications.

**Original management response:**

Management agrees with this recommendation. In May 2011, the General Manager, Infrastructure Services (ISD) issued a departmental directive outlining requirements to be followed when piloting new technologies. Management will monitor amendments that may be required to further clarify the directive. The audit recommendation will be reflected in the next amendment, which is expected in Q4 2011.

**Management update:**

Implementation of this recommendation is complete. In 2011, IS issued directive ISD-2011-02 outlining the requirements to be followed when piloting new technologies. This information is included in the Project Delivery Manual (Section 5.9) released to ISD staff on May 8, 2013.

**OAG assessment:**

OAG confirmed that Infrastructure Services has created new policies to be followed when using a new technology. When a project designer recommends the use of a new technology, management requires the completion of a deviation report that Infrastructure Services must approve prior to project acceptance. Furthermore, Infrastructure Services continues to treat new technologies as pilot projects, which require additional documentation.



**Recommendation #4**

Table 5: Status

<b>Management update</b>	<b>OAG assessment</b>
Complete	Partially complete

**Audit recommendation:**

That the City modify its procedures when applying a new technology to ensure that all departments who will be involved in the implementation have proper training on the new technology.

**Original management response:**

Management agrees with this recommendation. In May 2011, the General Manager, Infrastructure Services issued a departmental directive outlining requirements to be followed when piloting new technologies. Management will monitor amendments that may be required to further clarify the directive. The audit recommendation will be reflected in the next amendment, which is expected in Q4 2011.

**Management update:**

Implementation of this recommendation is complete. In 2011, IS issued directive ISD-2011-02 outlining the requirements to be followed when piloting new technologies. This information is included in the Project Delivery Manual (Section 5.9) released to ISD staff on May 8, 2013.

**OAG assessment:**

OAG confirmed that Infrastructure Services has developed new processes surrounding the use of new technologies that increase the documentation and approvals required. However, as we found no specific reference to training requirements for staff following the approval to use a new technology, we consider the recommendation only partially complete. Management has indicated that they are updating the procedures related to the use of new technologies and that the procedures will address training requirements for staff.

**Recommendation #5**

Table 6: Status

Management update	OAG assessment
Complete	Complete

**Audit recommendation:**

That the City ensure that the application of new technologies be preceded by a documented investigation of references, including an assessment of whether the referenced applications had similar conditions as those known or anticipated in the City's site.

**Original management response:**

Management agrees with this recommendation. In May 2011, the General Manager, Infrastructure Services issued a departmental directive outlining requirements to be followed when piloting new technologies. Management will monitor amendments that may be required to further clarify the directive. The audit recommendation will be reflected in the next amendment, which is expected in Q4 2011.

**Management update:**

Implementation of this recommendation is complete. In 2011, IS issued directive ISD-2011-02 outlining the requirements to be followed when piloting new technologies. This information is included in the Project Delivery Manual (Section 5.9) released to ISD staff on May 8, 2013.

**OAG assessment:**

OAG confirmed that Infrastructure Services created a procedure for pilot projects using new technologies. For all pilot projects, staff are to complete the required documentation prior to project acceptance. We found that there is no explicit requirement to evaluate the references of a new technology as per the recommendation. However, when we reviewed the documentation related to a pilot project of a new technology, we confirmed that it included comments that were obtained from the project's owner discussing the performance of the new technology.

**Recommendation #6**

Table 7: Status

Management update	OAG assessment
Complete	Complete

**Audit recommendation:**

That the City modify its procedures to include all major rehabilitation work on structures, including major resurfacing work, in its guidelines for renewal options.

**Original management response:**

Management agrees with this recommendation, and it has been implemented. This requirement has already been reflected in the Asset Management branch’s Structures Best Practice Guide.

**Management update:**

Implementation of this recommendation is complete. This requirement has already been reflected in the Asset Management branch’s Structures Best Practice Guide (updated annually).

**OAG assessment:**

OAG confirmed the most recent version of the Asset Management branch’s Structures Best Practice Guide includes guidelines for rehabilitation work on structures. The guidelines include major resurfacing projects.

**Recommendation #7**

Table 8: Status

Management update	OAG assessment
Complete	Complete

**Audit recommendation:**

That the City review its requirement for a Quality Assurance lab, including staff requirements.

**Original management response:**

Management agrees with this recommendation. The services provided by the Quality Assurance section have been previously reviewed with a change in focus from a high dependence on materials testing towards specialty services. A further review will be conducted regarding the lab testing services. This review will be completed by Q3 2012.

**Management update:**

Implementation of this recommendation is complete. ISD undertook a business case review, which led to a detailed review of the services provided as well as staffing requirements within the Quality Assurance Lab. The review confirmed ISD’s decision to amend the business process and to have all samples delivered directly to a certified laboratory.

**OAG assessment:**

OAG confirmed that Infrastructure Services completed a comprehensive business case on the Quality Assurance Unit (QAU) in September 2012. The business case included a review of QAU business practices, an identification and analysis of five alternatives and recommended two alternatives for further review. Infrastructure Services then amended its business process to have all samples delivered directly to a certified lab for testing.

**Recommendation #8**

Table 9: Status

<b>Management update</b>	<b>OAG assessment</b>
Complete	Complete

**Audit recommendation:**

That the City develop guidelines for the engagement of consultants to assist with unusual or new situations in construction projects where the required expertise or experience is not available within the City.

**Original management response:**

Management agrees with this recommendation. This is consistent with the procurement processes already in place through the Standing Offer, Request for Qualification and Request for Proposal processes.

**Management update:**

Implementation of this recommendation is complete. Enhanced guidelines related to engagement of consultants are included in the Project Delivery Manual (Section 4.6) released to ISD staff on May 8, 2013.

**OAG assessment:**

OAG confirmed that Infrastructure Services' Project Delivery Manual contains procedures to guide design and construction staff. Design and construction staff are required to determine if they have sufficient technical knowledge in house, or if consultants with the required expertise are needed to complete the project.

**Recommendation #9**

Table 10: Status

Management update	OAG assessment
Complete	Complete

**Audit recommendation:**

That the City modify its procedures for situations in which projects have presented problems to ensure that the reviewing engineer is different from the design engineer and that this procedure applies to both individual engineers and engineering firms.

**Original management response:**

Management agrees with this recommendation. For future projects that require further review or investigation after project completion, the engineering firm and engineer assigned for review will be different than the firm/engineer who originally undertook the work. This will be reflected in a departmental directive by Q4 2011.

**Management update:**

Implementation of this recommendation is complete. In 2011, IS issued directive ISD-2011-03 requiring that for projects that require further review or investigation after project completion, the engineering firm and engineer assigned for the review will be different from the firm/engineer who originally undertook the design work.

**OAG assessment:**

OAG confirmed that when a project is running into problems, the Infrastructure Services directive ISD-2011-03 requires the engineering firm and engineer assigned for the review will be different from the firm/engineer who originally undertook the design work.

**Recommendation #10**

Table 11: Status

Management update	OAG assessment
Complete	Complete

**Audit recommendation:**

That the City modify its procedures so that in cases where a project is found to have a design problem, the City retains an engineer different from the one responsible for the original design to provide advise on the possible solutions to the problem.

**Original management response:**

Management agrees with this recommendation. For future projects that require further review or investigation after project completion, the engineering firm and engineer assigned for review will be different than the firm/engineer who originally undertook the work. This will be reflected in a departmental directive by Q4 2011.

**Management update:**

Implementation of this recommendation is complete. In 2011, IS issued directive ISD-2011-03 requiring projects that require further review or investigation after project completion, the engineering firm and engineer assigned for the review will be different from the firm/engineer who originally undertook the design work.

**OAG assessment:**

OAG confirmed that Infrastructure Services issued a directive requiring that for projects that require further review or investigation after project completion, the engineering firm and engineer assigned for the review will be different from the firm/engineer who originally undertook the design work.

**Recommendation #11**

Table 12: Status

<b>Management update</b>	<b>OAG assessment</b>
Complete	Complete

**Audit recommendation:**

That the City request Legal Services to consider recovering the costs associated with both the 2008 and 2009 resurfacing contracts.

**Original management response:**

Management agrees with this recommendation, and it has been implemented.

**Management update:**

Implementation of this recommendation is complete. In 2011, Legal Services commenced an action to recover the damages arising from the 2008 resurfacing contract on March 1, 2011. A confidential settlement was reached in 2015.

**OAG assessment:**

OAG confirmed that the Legal Services branch began proceedings in March 2011 and reached a confidential settlement in September 2015. The Legal Services branch has confirmed that the City has received the confidential settlement amount.



Table 13: Status legend

<b>Status</b>	<b>Definition</b>
<b>Not started</b>	No significant progress has been made. Generating informal plans is regarded as insignificant progress.
<b>Partially complete</b>	The City has begun implementation; however, it is not yet complete.
<b>Complete</b>	Action is complete, and/or structures and processes are operating as intended and implemented fully in all intended areas of the City.
<b>No longer applicable</b>	The recommendation is obsolete due to time lapses, new policies, etc.