

# Transportation—Systems to Manage the Structural Safety of Bridges Follow-up

## SUMMARY

In 2012<sup>1</sup> we reported the results of our audit of the Department of Transportation's systems to manage the structural safety of bridges. We concluded that the department generally had well-designed systems but identified several significant findings resulting in nine recommendations to improve processes related to:

- inspection contracting, quality and frequency
- contractor certification
- bridge information system access
- maintenance activity reporting
- capital planning submissions

We have followed up on the department's progress in implementing the recommendations and have concluded the department has implemented seven of the recommendations.

### Overall conclusion

The department has made significant improvement to processes to inspect and monitor the structural safety of Alberta's bridges. We did not find evidence of unsafe bridges when completing our follow-up audit procedures. Processes to contract inspections to independent third parties still require improvement. The department's decisions on selecting contractors lack clarity, and it should complete an analysis on the cost effectiveness of contracting out these services.

### What we found

The department improved its systems to manage the structural safety of bridges by:

- collecting information on the duration of each bridge inspection
- re-designing the contractor certification process and ensuring all inspectors are certified
- implementing an overdue inspection process
- monitoring that contractors comply with standards
- monitoring access to the bridge information system
- reporting inspection activities and results to executive management
- improving its capital plan submissions

### What needs to be done

We repeat two recommendations related to the department's process to contract external parties to monitor the safety of bridges. The department has not fully implemented recommendations to:

- improve contracting processes for visual inspections
- regularly assess if contracting out the inspections is cost effective

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<sup>1</sup> *Report of the Auditor General of Alberta—October 2012, pages 17-33.*

## Why this is important to Albertans

The Department of Transportation is responsible for ensuring the safety of bridges across Alberta. Well-maintained bridges are necessary to ensure the safety of Albertans and protect their investment. Many of Alberta's major industries rely on the highway system to move goods.

## AUDIT OBJECTIVES AND SCOPE

Our audit objective was to determine if the department implemented our nine October 2012 recommendations. To perform the audit, we:

- interviewed management and staff to learn what actions they took in response to our recommendations
- examined the department's systems, processes and policies for overseeing and delivering the bridge program
- tested the department's spot audit and inspection frequency for compliance with policy

We conducted our work from July 2014 to May 2015. We substantially completed our audit on May 26, 2015. Our audit was done in accordance with the *Auditor General Act* and the standards for assurance engagements set by the Chartered Professional Accountants of Canada.

## BACKGROUND

The department is responsible for building and maintaining provincial highways, including all bridges and culverts on the highway network. Bridges and culverts on local roads are generally the responsibility of municipalities.

The number of bridge structures managed by the department is about 4,400, which includes both bridges and culverts:<sup>2</sup>

- Major bridges are typically built from site-specific drawings but can also be built from standard girder drawings. Typically, major bridges are river crossings, highway interchanges or railway crossings.
- Standard bridges are built using standard bridge design drawings and generally are comprised of standard precast girders, with steel or concrete substructure elements, and supported on steel or concrete piles. Typically, standard bridges are river crossings.
- Culverts are cylindrical structures made of metal or concrete. They manage water flows under roadways. Bridge sized culverts have a diameter at least 1,500 mm, or where several culverts are at the same location, the total diameter of all of them is at least 1,500 mm.

The department designed an inspection program to assess the condition of bridges, identify if maintenance is needed, and provide information to decide when bridges should be either rehabilitated or replaced.

The department has established two levels of bridge inspections and documented the standards for each type in inspection manuals:

- Level 1 inspections are visual assessments of the bridge's condition, using basic tools and equipment, performed on all bridges and culverts with diameter of 1,500 mm or larger.
- Level 2 inspections are in-depth inspections using specialized equipment. They are conducted on bridges that have known structural defects or need frequent monitoring due to age, design or traffic.

<sup>2</sup> [http://www.transportation.alberta.ca/Content/docType30/Production/bis\\_v2\\_05.pdf](http://www.transportation.alberta.ca/Content/docType30/Production/bis_v2_05.pdf)

The department's manuals detail the:

- qualifications and training of bridge inspectors
- rating scale inspectors use in level 1 inspections to assess bridge conditions
- bridge information systems that store data on bridges and level 1 inspection results

All bridge inspectors must complete the department's training and certification program. Two levels of certification are available: Class A inspectors can inspect all bridges while Class B inspectors can only inspect standard bridges and culverts.

The department outsources level 1 bridge inspections. Contracts are for three years, and include doing the inspections, reviewing the results for completeness and compliance with standards, and data entry. For the three-year period 2015–2018, the department will pay four contractors about \$3.1 million.

## FINDINGS AND RECOMMENDATIONS

### Contracting level 1 bridge inspections—repeated

#### Background

In 2012<sup>3</sup> we recommended that the department improve its process to contract its level 1 inspections by:

- documenting how it establishes criteria for assessing candidates and awards points for each criterion
- ensuring proposal requirements do not limit qualified candidates

When contracting visual inspections for the three-year period 2012–2015, we found the department excluded past performance and did not establish or document how it awarded points for the criteria it used to evaluate proposals. The department's Project Administration Manual requires that proposals be evaluated using specified and established weightings.

The department also required that potential contractors must be Class A bridge inspectors that had reviewed at least 50 inspection reports in the prior three years to be eligible. This limited candidates to incumbent contractors and new contractors employing Class A bridge inspectors previously employed by incumbents.

We repeat part of this recommendation as the department did not document how it selected criteria for assessing the 2015–2018 contract proposals, did not establish how it awards points, and did not demonstrate that it had applied criteria consistently.

#### **RECOMMENDATION 10: IMPROVE CONTRACTING FOR LEVEL 1 BRIDGE INSPECTIONS—REPEATED**

We again recommend that the Department of Transportation improve its process to contract its visual inspections by documenting how it establishes criteria for assessing candidates and awards points for each criterion.

<sup>3</sup> Report of the Auditor General of Alberta—October 2012, no. 6, page 27.

**Criteria: the standards for our audit**

The department should comply with its Project Administration Manual when contracting inspection work:

- The request for proposals should include criteria and the weighting assigned to each. A selection committee consisting of three to five experienced and senior staff should review the proposal and agree on the criteria.
- All criteria should initially be assigned the following minimum range value, and then adjusted based on project requirements to give a total score of 100:

CATEGORY	PERCENTAGE
Clarification and presentation	0 – 10
Project comprehension	10 – 30
Resource budget	10 – 20
Project control	5 – 10
Innovation	0 – 25
Project team	20 – 30
Past performance	30
<b>Total</b>	<b>100</b>

**Our audit findings****KEY FINDINGS**

- Contracting requirements were improved to reduce limitations on eligible contractors.
- Contracting decisions do not demonstrate consistent application of criteria.

The department ensured candidates were not limited for 2015-2018 level 1 inspections by:

- removing the requirement that inspectors perform a minimum of 50 inspections in the previous three years
- increasing the number of inspection contracts from four to ten and limiting the number of contracts that could be awarded to one consultant to four

The department revised its criteria for 2015-2018 level 1 inspections to include relevant experience, both past performance and other experience relevant to the inspections. The department considers the following criteria and weightings to be reasonable and in compliance with the department's current practice:

CATEGORY	PERCENTAGE
Project comprehension	25
Resource budget	30
Project team	25
Relevant experience	20
<b>Total</b>	<b>100</b>

The department did not, however, establish the specific requirements to be met for each criteria and points assigned for meeting each requirement. The department's support for contracting decisions did not demonstrate consistent application of criteria, and what distinguished the score for one proposal from another.

**Implications and risks if recommendation not implemented**

Without a rigorous, fair and transparent contract process, the department risks not obtaining the best services for the best price.

## Assessing whether to contract out inspections – repeated

### Background

In 2012<sup>4</sup> we recommended that the Department of Transportation regularly assess whether it should contract out inspections or do them itself. We found an analysis of the cost effectiveness of outsourcing inspection work has not been completed since 1997.

For the year ended March 31, 2015, contracted inspectors performed approximately 2,000 inspections in 400 working days at a cost to the department of \$900,000.

We repeat this recommendation as the department has yet to complete a cost effectiveness analysis on outsourcing inspections.

### RECOMMENDATION 11: ASSESS WHETHER TO CONTRACT OUT PROGRAM DELIVERY – REPEATED

We again recommend that the Department of Transportation regularly assess whether it should contract out inspections or do them itself.

### Criteria: the standards we used for our audit

The department should periodically assess if it is more cost effective to outsource inspections or do them itself.

### Our audit findings

#### KEY FINDINGS

- An analysis of the cost effectiveness of outsourcing inspections has yet to be completed.
- The department plans to perform an analysis prior to awarding inspection contracts in 2018.

In February 2015 the department completed its process of contracting inspections for the three-year period 2015–2018. No analysis of cost effectiveness of outsourcing the inspection work was done prior to the department's decision to award contracts.

The department plans to do a comprehensive review of its inspection process, before the current contracts finish in 2018. It will document the inspection process, assess whether changes are required, perform a risk assessment, and conclude whether contracting inspections is optimal.

### Implications and risks if recommendation not implemented

Without a regular assessment of the costs and benefits of contracting out bridge inspections, the department does not know if it is getting value for the money it spends on these services.

<sup>4</sup> Report of the Auditor General of Alberta—October 2012, no. 5, page 26.

## Improving inspection processes—implemented

### Background

In 2012<sup>5</sup> we recommended that the department improve its inspection processes by ensuring that it collects all the information it needs to assess the quality of inspections.

We found the department had well-structured and comprehensive manuals to guide inspectors and the inspection forms were clear and well organized. However, the department was not collecting information on the time spent for inspections and the number of inspections done in a day. The department's assessment of the quality of the inspections should consider this information. Of the 40 spot audits conducted in 2011 that we tested, 12 had recommendations not identified in the original inspection. We also observed that one contractor appeared to perform a high number of inspections in one day.

### Our audit findings

Since October 2013, the department requires inspectors to record their arrival and departure time for each inspection. This information is recorded in the department's Bridge Inspection and Maintenance System (BIMS). We examined on a sample basis the duration of inspections and identified inspection data outliers. The department acknowledged that it has not used the inspection duration information in its quality assurance process but will use it when selecting bridges for its 2015 spot audits. The department only had duration information on less than half its bridges prior to 2015.

## Proper certification of contractors—implemented

### Background

In 2012<sup>6</sup> we recommended that the department should only accept inspections if they are performed and reviewed by inspectors that maintain valid certification. We found the department overrode controls to ensure that only inspections completed by certified inspectors were entered into the bridge information systems. As a result of overriding the control, approximately 50 per cent of inspections entered into the system for the year ended March 31, 2011 were completed by inspectors whose certification had lapsed.

### Our audit findings

The department implemented our recommendation by verifying all inspectors are fully certified prior to performing inspections. This verification is confirmed by documenting each inspector's practical and historical experience, training and certification requirements. Bridge inspector certification is required at the start of every contract regardless of the contract duration.

The department also revised its certification requirements to include more stringent mentoring and practical experience for inspectors. We examined a list of all bridge inspectors as of April 9, 2014 and examined the department's documentation that inspectors were properly certified. We also confirmed that all bridge inspectors that performed and recorded inspections in the BIMS from April 1, 2013 to March 31, 2014 were properly certified as either a Class A or Class B inspector.

<sup>5</sup> *Report of the Auditor General of Alberta—October 2012*, no. 1, page 21.

<sup>6</sup> *Report of the Auditor General of Alberta—October 2012*, no. 3, page 24.

## Inspection frequency of bridges—implemented

### Background

In 2012<sup>7</sup> we recommended that the department ensure bridges are inspected as frequently as standards require. We found in one period about 150 inspections were done more than a year after they were due in one of the department's four inspection regions. The department's reporting processes did not identify that the bridge inspections were late or missed. The region could not explain why it did not inspect several structures.

### Our audit findings

The department implemented a quarterly process that identifies any overdue bridge inspections. Overdue inspections are brought to the attention of the regional bridge managers to remedy.

We examined four bridge structures with inspections 18 months overdue as of March 26, 2015. Management provided valid explanations for the overdue inspections and we observed the department included the four structures in the next inspection cycle.

## Assessing quality of inspections—implemented

In 2012<sup>8</sup> we recommended that the department regularly assess whether contractors perform inspections following department standards and take corrective action if contractors do not.

We found the department's process to monitor the quality of inspections was not followed consistently as required spot audits had not been done for two of the prior four years. Spot audits that were done reported inaccurate inspector ratings. The department lacked a process to remedy poor contractor performance.

### Our audit findings

In late 2012 the department implemented revisions to its quality assurance process by documenting the goals, responsibilities, bridge spot audit selection and review processes. One goal is to identify inspections that do not meet the department's standards so that action can be taken. Inspectors found to have poor performance are reported to the regional bridge managers for a corrective review within one month of receiving the performance information.

The department completed about 40 spot audits in each of 2013 and 2014 applying its revised procedures. Reports to regional bridge managers described how the bridges were selected, the results of the audits, and maintenance recommendations not identified by the inspectors. Of the 39 spot audits completed for 2014, the department assessed three as unacceptable. We examined the department's documentation of the actions taken by inspectors to correct their performance.

In April 2014<sup>9</sup> the department issued further detailed requirements and procedures for selecting bridges for the spot audit process, where:

- a risk-based approach is applied focusing on bridges that had components rated as poor in the previous bridge inspection—The department defines poor as structures with the presence of distress or deterioration and not functioning as intended.
- a minimum 10 spot audits are completed in each region

<sup>7</sup> Report of the Auditor General of Alberta—October 2012, no. 4, page 25.

<sup>8</sup> Report of the Auditor General of Alberta—October 2012, no. 2, page 23.

<sup>9</sup> Alberta Transportation, Bridge Inspection and Maintenance Systems Manual, December 20, 2005, Section 1.09.

## Monitoring access to the bridge information system—implemented

### Background

In 2012<sup>10</sup> we recommended that the Department of Transportation improve its inspection processes to monitor access to the computer system that manages bridge inventory and inspections. We found the department did not regularly monitor access to the bridge inspections and maintenance system and staff and contractors had access they did not need to perform their work.

### Our audit findings

The department implemented the recommendation by:

- performing annual reviews of access for staff and contractors in 2013 and 2014—We examined documentation of the results of the department’s monitoring of access and removal of inappropriate access and assessed the process was adequate.
- issuing written documentation, effective April 1, 2015, of the Annual System Security Roles Review Process—The process outlines roles and responsibilities and requires evidence of the annual access rights review to be retained by the department’s information technology security staff.

## Improving reporting of maintenance activities—implemented

### Background

In 2012<sup>11</sup> we recommended that the department improve the information that senior management receives on inspector activities, results, maintenance and other actions.

Bridge inspectors are required to assess the condition of each main bridge component and assign ratings from 1 to 9, using guidance in the level 1 Bridge Inspection Manual. Bridge components rated 3 or less should have a maintenance recommendation. Maintenance recommendations can include any of: replacement, repair, rehabilitation, assessment level 2 inspection, reduce inspection cycle or monitoring.

The Bridge Inspection Manual states that the timing of bridge maintenance should generally follow accepted timelines, depending on the rating assigned to the component. The timelines for components that are rated as 1 is immediate, 2 is six months and 3 is before the next inspection cycle. Timelines for components rated four to nine range from low priority to no action required.

In 2012 we found the department did not track the results of inspections, conclusions on bridge elements ranked as high priority, and whether required maintenance was done in recommended timelines. Senior management also did not receive good summary information on these areas.

### Our audit findings

Bridge managers in each of the four regions report monthly to the regional directors on the status of all inspections in the current and prior periods that identified major components in poor condition. We reviewed the reports and found that the department’s plan to deal with the deficiency was reported, and that the department tracked the status of the deficiency until it was corrected. If the department decided to repair the deficiency, the report tracked the timing of the work and current status.

<sup>10</sup> *Report of the Auditor General of Alberta—October 2012, no. 7, page 28.*

<sup>11</sup> *Report of the Auditor General of Alberta—October 2012, no. 8, page 29.*

The department reports annually to senior management on the bridge inspection activities. The reports are comprehensive and include:

- the overdue inspections by region, with explanation for the delay and actions to correct
- findings from the spot audit process, and actions taken to remedy any poor performance
- confirmation that all inspections were performed by certified inspectors
- the monitoring of access to the bridge information system, findings, and actions taken to correct access
- the listing of all inspections in the current and prior periods that identified major bridge components in poor condition, and the department's actions to respond to the deficiencies
- the department's capital funding request for the next year and the funding approved

### **Enhancing the capital planning submission—implemented**

#### **Background**

In 2012<sup>12</sup> we recommended that the department improve its capital plan submission to ensure that it gives decision makers the information they need to assess the impact of funding alternatives on bridge safety and protection of the province's investment.

We found the department's process to develop the capital plan submission was well-designed but did not fully follow the prescribed format. The department did not provide sufficient information to the Department of Treasury Board and Finance to allow decision makers to better understand the risks of different funding levels on safety, service levels and future funding needs.

#### **Our audit findings**

The department improved its capital plan submission by preparing detailed presentations on bridges, tailored for decision makers to easily understand the capital needs and expected outcomes. The presentations provide information on the current condition of provincial bridges using photographs and graphs to communicate specific and general examples of expected outcomes, costs, and safety risks. The presentation also examines the impact funding levels have on bridge deferred maintenance including the expected outcomes on the safety and condition of bridges and the optimal time to rehabilitate or replace bridges.

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<sup>12</sup> *Report of the Auditor General of Alberta—October 2012*, no. 9, page 31.

