

City of Austin



**A Report to the  
Austin City Council**

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AUDIT REPORT

# Bridge Safety Audit

June 2016



## REPORT SUMMARY

The City's bridge maintenance program focuses on the structural safety of large bridge structures. Based on 2014 State inspection information, overall, the City's large bridge structures are structurally sound and safe for vehicular traffic. However, we found some limitations in the accuracy and completeness of information used to manage the program. Also, the City's ability to effectively manage and maintain small bridge structures and pedestrian bridges is limited by a lack of complete and accurate information on their locations and conditions.

## **TABLE OF CONTENTS**

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**BACKGROUND .....1**

**OBJECTIVE, SCOPE, AND METHODOLOGY .....1**

**WHAT WE FOUND.....3**

**Appendices**

Appendix A: Management Response.....9

## **GOVERNMENT AUDITING STANDARDS COMPLIANCE**

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We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## **AUDIT TEAM**

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Niki Raggi, CGAP, CRMA, CICA, Assistant City Auditor  
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## Report Highlights

### Why We Did This Audit

This audit was conducted as part of the Office of the City Auditor's (OCA) FY 2015 Strategic Audit Plan.

### What We Recommend

Public Works should create, maintain, and share with relevant parties, a complete inventory of the location and condition of all bridge structures within the City limits; it should also develop and implement a bridge maintenance program that applies a risk-based approach to all bridge structure classifications.



## BACKGROUND

- The Public Works Department is responsible for repairing and maintaining all municipally-owned bridge structures within the City limits. Bridges within the City's jurisdiction that the City is not responsible for include Federal Highway bridges, State-owned bridges, and private bridges.
- Bridge structures that fall within the responsibility of Public Works include vehicular bridges, culverts, and pipes. Public Works is also responsible for all pedestrian bridges, including those in City parks and those that are part of the City's urban trail system.

## OBJECTIVE AND SCOPE

The objective of the audit was to evaluate City's efforts related to the safety of bridge structures as compared to laws, regulations, policies, procedures, and industry practices.

The audit scope included all bridges within the City's jurisdiction which are to be maintained and repaired by the City of Austin.

## WHAT WE FOUND

The City's bridge maintenance program focuses on the structural safety of large bridge structures, which are vehicular bridges that are 20 feet or more in length. Based on 2014 State inspection information, the City's large bridge structures are structurally sound and safe for vehicular traffic. However, we found some limitations in the accuracy and completeness of information maintained by Public Works to manage large bridges.

Also, Public Works does not currently have a complete inventory, nor conduct routine inspections, for pedestrian bridges or small bridge structures (those that are less than 20 feet in length).

### Vehicular Bridges > 20 feet



some limitations in accuracy/  
completeness of information

**PUBLIC WORKS RECORDS  
INCLUDE 450 BRIDGES**

### Vehicular Bridges < 20 feet



incomplete/inaccurate location  
and no condition assessment

**PUBLIC WORKS RECORDS  
INCLUDE 1060 BRIDGES**

### Pedestrian Bridges



incomplete location and no  
condition assessment

**PUBLIC WORKS HAS  
LIMITED RECORDS**

Finally, data limitations noted in this audit have also impacted the City of Austin's Controller's ability to accurately account for and estimate the monetary values for this type of infrastructure assets. While we were unable to quantify the exact discrepancy and its relevant value, we estimated that the Controller may be missing information on as many as 1,000 bridge structures.

## BACKGROUND

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The City's Public Works Department (Public Works) is responsible for repairing and maintaining all municipally-owned bridge structures that are located within the City's jurisdiction. Such structures include bridges, culverts, and pipes, as defined below. Public Works is also responsible for all pedestrian bridges, including those in City parks and those that are part of the City's urban trail system.

### Basic Bridge



### Bridge

is a structure, including supports, erected over a depression or an obstruction, such as water, a highway, or a railway; having a roadway or track for carrying traffic or other moving loads

### Box Culvert



### Culvert

is a structure under a roadway, usually for drainage which may include a pipe

### Pipe Culvert



There are also bridges within the City's jurisdiction which the City is not responsible for repairing and maintaining. These include Federal Highway bridges, State-owned bridges, and private bridges, such as railroad bridges.

## **OBJECTIVE, SCOPE, AND METHODOLOGY**

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The Bridge Safety Audit was conducted as part of the Office of the City Auditor’s Fiscal Year (FY) 2015 Strategic Audit Plan, as presented to the City Council Audit and Finance Committee. This audit was included in the audit plan due to recent national news that brought to light risks related to maintenance and inspection of bridges.

### **Objective**

The objective of this audit was to evaluate City’s efforts related to the safety of bridge structures as compared to laws, regulations, policies, procedures, and industry practices.

### **Scope**

The audit scope included all bridges within the City’s jurisdiction which are to be maintained and repaired by the City of Austin.

### **Methodology**

To accomplish our audit objective, we performed the following steps:

- interviewed staff in Public Works Department;
- interviewed staff in other relevant departments/offices, including the Parks and Recreation Department, the Risk Management Office, and the Controller’s Office;
- analyzed City records related to bridge maintenance, including complaints made by citizens through 3-1-1;
- analyzed Texas Department of Transportation (TxDOT) inspection reports on the condition of the bridges;
- reviewed bridge records from Public Works, the Parks and Recreation Department, and the Controller’s Office for accuracy and completeness;
- conducted site visits on a sample of bridges to verify existence and conditions;
- researched bridge maintenance practices in other governmental agencies; and
- evaluated internal controls related to bridge safety.

## WHAT WE FOUND

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The City's bridge maintenance program focuses on the structural safety of large bridge structures, which are vehicular bridges that are 20 feet or more in length. Based on 2014 State inspection information, the City's large bridge structures are structurally sound and safe for vehicular traffic. We found, however, some limitations in the accuracy and completeness of information maintained by Public Works to manage large bridges. We also found that Public Works currently does not have a complete inventory nor conduct routine inspections for pedestrian bridges or small bridge structures (those that are less than 20 feet in length). As a result, Public Works lacks current information on their condition assessments and maintenance needs. Finally, data limitations noted in this audit have also impacted the City of Austin's Controller's ability to accurately account for and estimate the monetary values for this type of infrastructure assets, as required by government accounting standards.

### Vehicular Bridges > 20 feet



some limitations in accuracy/  
completeness of information

### Vehicular Bridges < 20 feet



incomplete/inaccurate location  
and no condition assessment

### Pedestrian Bridges



incomplete location and no  
condition assessment

**Finding 1: The City bridge maintenance program focuses on the structural safety of large bridges which, overall, are structurally sound and safe for vehicular traffic; however, we found some limitations in the accuracy and completeness of information used to manage the program.**

The foundations of a good bridge maintenance program is based on the availability of quality data on the bridge structures owned by an agency, including complete and accurate information on the bridge structures and their individual elements.

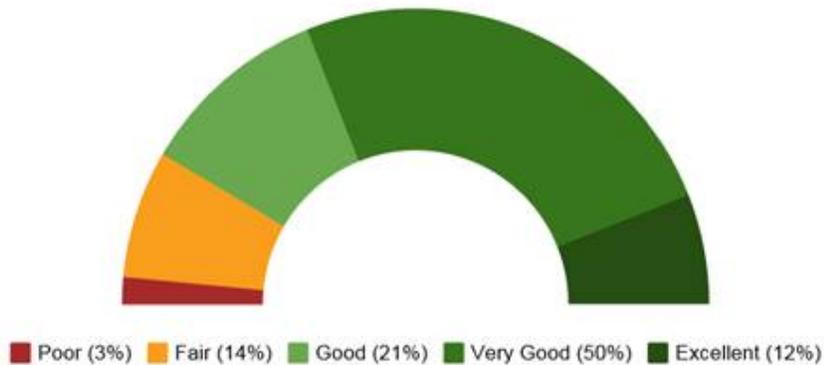
The Federal government mandates specific maintenance requirements for large bridge structures, which are those bridges, culverts, and pipes that are more than 20 feet in length. The US Department of Transportation's Federal Highway Administration requires all public bridge owners (state, city, and county) to routinely inspect their large bridges and report information, including bridge condition ratings, as part of their requirements in the National Bridge Inventory Standards. More specifically, these bridges must be inspected within 90 days of a bridge being open to traffic and every 24 months throughout the life of the structure. The results of these mandated inspections

provide information on the structural safety of the bridges and assigns each bridge a specific a sufficiency rating that speaks to the overall conditions of each bridge.

The sufficiency rating is a numerical rating between 0 and 100 given to each highway bridge. The value is based on the bridge's structural adequacy and safety, essentiality for public use, and its serviceability and functional obsolescence.

Public Works bridge maintenance program focuses on maintaining large bridge structures and, in coordination with TxDOT, conducts routine inspections to collect information on the condition of large City bridges. Based on the available information from the 2014 inspections, the vast majority of City bridges has a sufficiency rating of good or better. This indicates that these bridges are structurally sound and safe for vehicular traffic.

**EXHIBIT 1**  
**City of Austin Large Bridge Conditions Based on TxDOT 2014 Inspections**



SOURCE: OCA analysis, May 2016

Also, Public Works maintains an inventory of its large bridge structures, including information on the location, structure classification, and condition assessments of each bridge. However, we found some limitations in Public Works inventory information for large bridges. While Public Works reported a total of 450 large bridges under its jurisdiction, we only found condition assessment information on approximately 390 bridges.

**Finding 2: The City’s ability to effectively manage and maintain small bridge structures and pedestrian bridges is limited by a lack of complete and accurate information on their locations and conditions.**

As mentioned, the foundations of a good bridge maintenance program is based on the availability of quality data on the bridge structures owned by an agency, including complete and accurate information on the bridge structures and their individual elements. Another key element of a good bridge maintenance program is performing routine safety inspections, in order to:

- ensure public safety and confidence in bridge structural capacity,
- protect public investment and allow sufficient allocation of resources,
- effectively schedule maintenance and rehabilitation operations,
- provide a basis for repair, replacement, or other improvements such as retrofit railings, and
- ensure that federal funding will remain available for bridge rehabilitation and replacement.

While Federal laws mandates inspections only for large bridge structures, many states and municipalities have adopted inspection policies that require inspections of bridge structures less than 20 feet in length. These policies require inspections with different timeline intervals.

As already mentioned in this report, Public Works is responsible for maintenance of all vehicular bridges and is also responsible for pedestrian bridges, including those that are part of the City’s urban trail network. Although Public Works has a policy that speaks to an annual maintenance program of all City bridges, it does not have an inventory of small bridge structures and pedestrian bridges. Additionally, Public Works does not have current information on the condition or maintenance needs for all bridges. and does not performs routine inspections of these bridge structures.

**Public Works does not have complete and accurate information on small bridge structures and pedestrian bridges.** Public Works currently has an inventory of 1,060 small bridge structures<sup>1</sup>, but the list is inaccurate and incomplete. Public Works also lacks a complete list of pedestrian bridges. For example, we were unable to locate several small bridge structures at the location indicated by this list, several pedestrian bridges were not listed, and we determined that some structures were categorized incorrectly. Exhibit 2 shows examples of pedestrian bridges not included in Public Works inventory.

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<sup>1</sup> Small bridge structures are defined as vehicular bridges, culverts, and pipes, that are less than 20 feet in length

**EXHIBIT 2**  
**Pedestrian Bridges Not Included in the Small Bridge Structures Inventory List**



**SOURCE:** OCA photographs selected pedestrian bridges, May 2016

**Public Works does not routinely inspect small bridge structures and pedestrian bridges, resulting in a lack of current information on their condition assessments and maintenance needs.** According to Public Works staff, minor bridge structures are not inspected on a regular basis and none of the pedestrian bridges, regardless of length, have been inspected. Further, staff indicated that repairs for small bridge structures and for pedestrian bridges are primarily performed in response to citizen complaints and City work crew notifications. Our site visits of a sample of Austin 311 service requests regarding bridges confirmed that the services requested were completed.

We also noted that, in 2014, Public Works was tasked with working with the Parks and Recreation Department and the Watershed Protection Department to develop a city-wide agreement that would address all future urban trails (including related bridges). However, to date such an agreement has not been completed.

Public Work's executive management asserted that while in recent years they have been investing significantly in an improved asset management tool, the focus so far has been on streets and sidewalks and not the management of bridge structure assets.

Without routine bridge structure inspections, Public Works lacks complete and accurate information on the condition of each bridge structure. As a result, Public Works is limited in its ability to effectively and timely manage maintain and repair bridges and to address bridge maintenance beyond structural integrity, such as maintenance of pedestrian bridge hand railings. During our site visits of a sample of bridge structures, we identified several bridges with safety issues not related to structural integrity, such as hand rails not meeting current standards. Exhibit 3 includes some examples of hand railing safety risks.

**EXHIBIT 3**  
**Small Bridge Structure Issues**



**Large Gaps in Handrails**



**Missing Handrails**



**Incomplete Handrails**



**Large Gaps in Handrails**



**SOURCE:** OCA photographs,  
May 2016

**ADDITIONAL OBSERVATION**

Bridges are infrastructure assets and as such, according to government accounting standards<sup>2</sup>, their value needs to be reported in the City’s financial statements. However, we noted that the lack of a complete inventory of all City bridges have also resulted in incomplete information being provided to the City of Austin’s Controller’s Office, thus impacting their ability to accurately estimate the monetary values for this type of infrastructure assets. While we were unable to quantify the exact discrepancy and its relevant value, we estimated that the Controller may be missing information on as many as 1,000 bridge structures.

**RECOMMENDATIONS**

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- 1. The Director of the Public Works should ensure that the City creates and maintains a complete inventory of the location and condition of all bridge structures within the City limits. Such information should be periodically validated and shared with all relevant parties and departments.**

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<sup>2</sup> Statement No. 34 of the Governmental Accounting Standard Board (GASB), *Basic Financial Statements—and Management’s Discussion and Analysis—for State and Local Governments*.

MANAGEMENT RESPONSE: **Concur.** Refer to Appendix A for management response and action plan.

**2. The Director of the Public Works should:**

- **develop and implement a bridge maintenance program that applies a risk-based approach to all bridge structure classifications, and**
- **monitor the program's effectiveness.**

MANAGEMENT RESPONSE: **Concur.** Refer to Appendix A for management response and action plan.



MEMORANDUM

TO: Corrie Stokes, City Auditor  
Office of the City Auditor

FROM: Robert Hinojosa, P.E., Interim Director  
Public Works Department

DATE: June 20, 2016

SUBJECT: Action Plan – Bridge Safety Audit (AU15118)

In accordance with the Bridge Safety Audit, attached is the Action Plan with two recommendations for the Bridge Safety Audit. The spreadsheet outlines recommendations and proposed strategies for implementation with proposed dates.

Should you have additional questions, please contact David V. Magaña, P.E., City Engineer, at (512) 974-7042.

Thank you.

cc: Robert Goode, P.E., Assistant City Manager  
James Snow, PMP, CCC, Assistant Director  
Ryan Stipan, Financial Manager  
David V. Magaña, P.E., City Engineer  
Pirouz Moin, P.E., Supervising Engineer

## APPENDIX A

Action Plan – Bridge Safety Audit (AU15118)  
 June 14, 2016  
 Page 2 of 2

### Bridge Safety Audit ACTION PLAN

Recommendation	Concurrence and Proposed Strategies for Implementation	Status of Strategies	Proposed Implementation Date
<p>1. The Director of the Public Works should ensure that the City creates and maintains a complete inventory of the location and condition of all bridge structures within the City limits. Such information should be periodically validated and shared with all relevant parties and departments.</p>	<p>Public Works concurs with this recommendation.</p> <p>Public Works has sent a list of bridges that are missing to TxDOT area bridge engineer to reconcile with their files.</p> <p>The result of the reconciliation would identify and complete the list of bridges, with spans greater than 20', and will insure that Public Works receives all the required bi-annual inspection reports from TxDOT.</p> <p>Subject to funding, staff will be hired to perform inspections on a periodic basis.</p> <p>In the interim, a Memorandum of Understanding between Public Works and the Watershed Department regarding each department's responsibility for inspection and maintenance will be prepared.</p>	Planned	Fiscal Year 2018
<p>2. The Director of the Public Works should:</p> <ul style="list-style-type: none"> <li>• develop and implement a bridge maintenance program that applies a risk-based approach to all bridge structure classifications, and</li> <li>• monitor the program's effectiveness.</li> </ul>	<p>Public Works concurs with this recommendation.</p> <p>Public Works will secure a comprehensive bridge maintenance program that includes a Bridge Management Information System (BMIS).</p> <p>The data collected from TxDOT inspection reports on large structures as well as those collected in-house for small structures shall be included in the BMIS and a risk based approach will be developed.</p> <p>The BMIS shall enable the Department to better manage and monitor the assets.</p>	Planned	January 2021