



CITY AUDITOR'S OFFICE

Infrastructure Condition Assessment

June 14, 2019

AUDIT REPORT NO. 1905

CITY COUNCIL

Mayor W.J. "Jim" Lane
Suzanne Klapp
Virginia Korte
Kathy Littlefield
Vice Mayor Linda Milhaven
Guy Phillips
Solange Whitehead



June 14, 2019

Honorable Mayor and Members of the City Council:

Enclosed is the audit report for *Infrastructure Condition Assessment*, which was performed as the construction contract audit included on the Council-approved FY 2018/19 Audit Plan. The audit was conducted to evaluate the management processes and related contracts for condition assessments of the City's infrastructure.

This audit found that the Public Works division did not have processes in place to review ADOT bridge inspection reports and address the repair and maintenance recommendations. As well, a bridge inspection and maintenance program was not yet in place for those bridges not inspected by ADOT. While a parking garage inspection program had started, recommended repairs and maintenance had not been addressed. In addition, Public Works had not yet inspected all stormwater drainage assets, and the inspections did not consistently identify needed repairs and maintenance. Further, inventories had not been reconciled or completed and condition assessment and maintenance programs established for streetlights, sidewalks and parking lots.

If you need additional information or have any questions, please contact me at (480) 312-7867.

Sincerely,

A handwritten signature in blue ink that reads "Sharron Walker".

Sharron E. Walker, CPA, CFE, CLEA
City Auditor

Audit Team:

Paul Christiansen, CPA, CIA - Senior Auditor
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TABLE OF CONTENTS

AUDIT HIGHLIGHTS 1

BACKGROUND 3

 Figure 1. Recent Infrastructure Repair and Rehabilitation Projects 3

 Figure 2. Public Works Division Organization Chart 4

 Figure 3. Comparison of Asset Condition with and without Preservation Efforts 5

 Figure 4. Bridge Components 6

 Figure 5. NBIS Bridge and Culvert Examples..... 7

 Figure 6. NBIS Bridge Rating Scale 7

OBJECTIVES, SCOPE, AND METHODOLOGY 9

FINDINGS AND ANALYSIS 11

 1. Inspections of City bridges have not been consistently monitored, and recommended repairs and maintenance have not been completed. 11

 Figure 7. Example Repair and Maintenance Issues 11

 Table 1. ADOT Bridge Inspection Recommendations and Related Street Operations Work Orders 12

 Figure 8. ADOT Bridge Inspections with “Structurally Deficient” Classifications 13

 2. The management of other infrastructure assets’ condition assessments could be improved. 15

 Table 2. Parking Garage Structural Assessments 16

 Figure 9. Maintenance Needs Not Identified in City Drainage Asset Inspections 17

MANAGEMENT ACTION PLAN 19



AUDIT HIGHLIGHTS

Infrastructure Condition Assessment

June 14, 2019

Audit Report No. 1905

WHY WE DID THIS AUDIT

This audit of Infrastructure Condition Assessment evaluates the management processes and controls, including contracts relating to condition assessments of City infrastructure. These infrastructure assets include bridges, parking garages, sidewalks, streetlights, parking lots, and stormwater drainage assets.

BACKGROUND

As part of the City's annually adopted comprehensive financial policies, proposed capital projects are required to prioritize prevention of existing infrastructure deterioration before the addition of new infrastructure.

Preventing deterioration through effective asset management can also minimize an asset's total life cycle cost while maintaining its desired condition.

The Arizona Department of Transportation (ADOT) regularly inspects approximately 230 bridges in the City and recommends needed repairs or maintenance. The Public Works division is responsible to perform any needed work.

Public Works is also responsible to inspect and maintain the other bridges, along with parking garages, parking lots, stormwater drainage assets, streetlights, and sidewalks.

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WHAT WE FOUND

Inspections of City bridges have not been consistently monitored, and recommended repairs and maintenance have not been completed.

Processes to review and monitor bridge inspection results and perform recommended work have not been implemented. Specifically:

- Since 2014, ADOT bridge repair and maintenance recommendations have not been addressed. Also, the bridge inspection inventory has not been updated to add new bridges or to remove privately owned ones.
- An inspection and maintenance program for bridges not inspected by ADOT has not yet been established.

The management of other infrastructure assets' condition assessments could be improved.

Condition assessments are not consistently performed and needed repairs and maintenance completed. We found:

- Recommended repairs and maintenance from the parking garage inspection program have not been addressed.
- Drainage asset inspections do not consistently identify needed repairs and maintenance.
- Condition assessment and maintenance programs have not yet been fully developed and implemented for parking lots, streetlights and sidewalks.

WHAT WE RECOMMEND

We recommend the Public Works Division Director require:

- Policies and procedures be developed to ensure that the City's bridge conditions are assessed and the bridges maintained.
- Appropriate condition assessment and maintenance programs be established for parking garages, drainage assets, parking lots, sidewalks and streetlights, including addressing identified maintenance and repair needs.

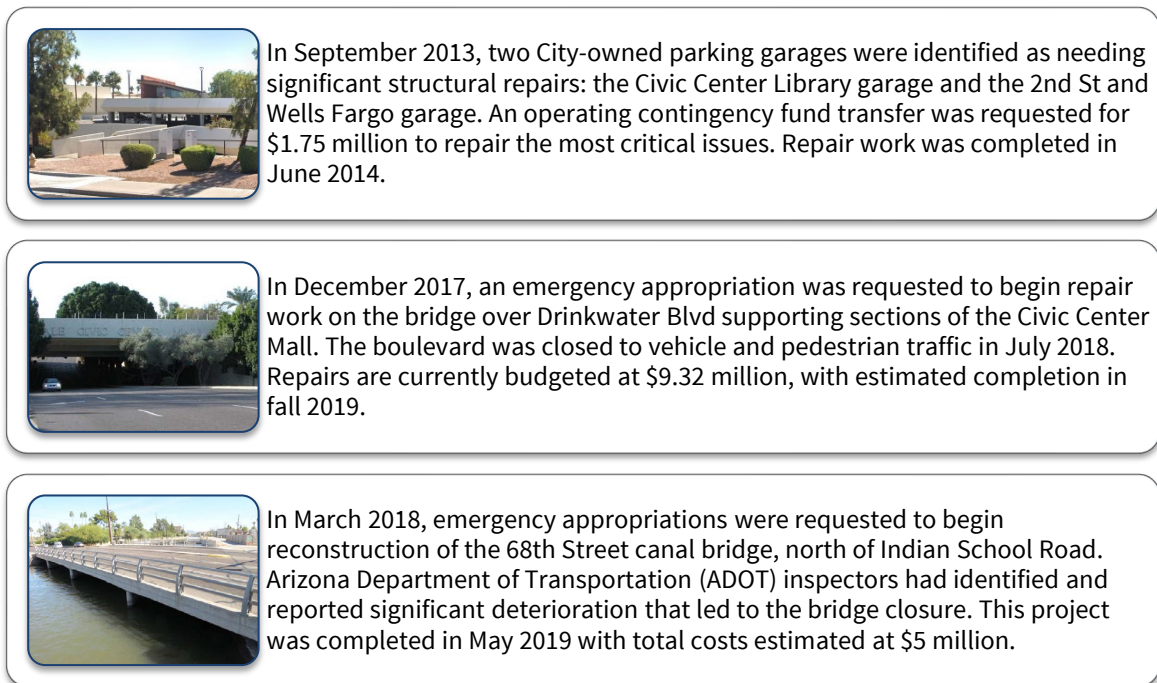
MANAGEMENT RESPONSE

The division agreed and plans to complete bridge assessment and maintenance program improvements by December 2020 and programs for other infrastructure assets by July 2021.

BACKGROUND

This audit of *Infrastructure Condition Assessment* evaluates the management processes and controls, including contracts, relating to condition assessments of City infrastructure. In recent years, the Public Works division has requested emergency funding appropriations for several infrastructure repairs or rehabilitation projects, as summarized in Figure 1.

Figure 1. Recent Infrastructure Repair and Rehabilitation Projects



SOURCE: Auditor analysis of reports to Council, Council meeting discussions, project budget reports, and project communications.

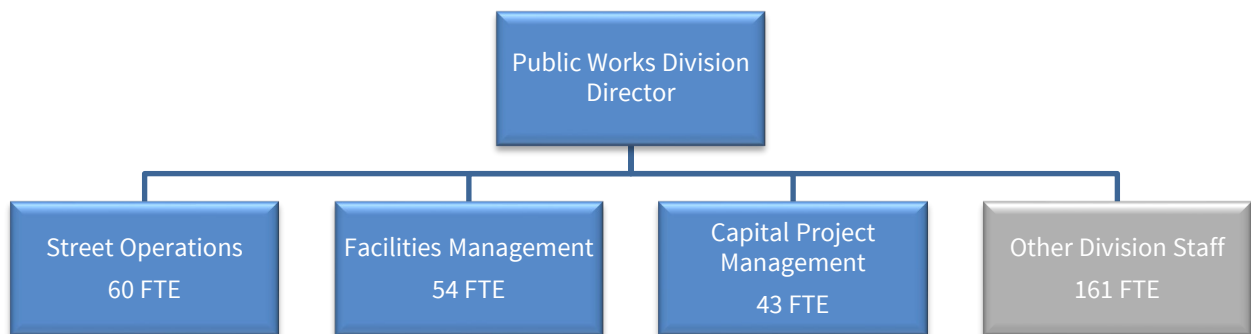
The Public Works division is responsible for repairing and maintaining City-owned physical infrastructure. This audit reviews the condition assessment processes for several areas of City public infrastructure, including bridges, garages, sidewalks, streetlights, parking lots, and stormwater drainage assets. However, pavement condition assessments were previously reviewed in Audit Report No. 1704 *Pavement Operations* and building infrastructure assessments in Audit Report No. 1608 *Preventative Maintenance and Repair*. Water and sewer infrastructure, which are managed separately by the Water division, were also not included in this audit.

As summarized on page 4, within Public Works, the Street Operations department currently inspects and maintains most of the infrastructure assets reviewed in this audit, while the Facilities Management department is responsible for the City's parking garages.

Street Operations	Facilities
Bridges and Culverts	Parking Garages
Drainage Assets	
Sidewalks	
Streetlights	
Parking Lots	

These departments are within the Public Works division, as shown in Figure 2.

Figure 2. Public Works Division Organization Chart



Note: “Other division staff” includes Fleet Management, Solid Waste, and Transportation, which are not directly involved in infrastructure condition assessment.

SOURCE: Auditor analysis of division organizational structure.

Infrastructure Asset Condition Management

As part of the annual City Council-adopted comprehensive financial policies, policy #25 requires, in part, that proposed capital projects will prioritize prevention of existing infrastructure deterioration before the addition of new infrastructure (see textbox).

Further, best practice indicates that preventing deterioration through effective asset management can also minimize an asset’s total life cycle cost while maintaining its desired condition. For example, the Federal Highway Administration Bridge Preservation Guide states cost-effective cyclical and condition-based maintenance and repair activities can prolong the service life of bridges and delay the need for rehabilitation or replacement.

“Proposed capital projects will be reviewed and prioritized by a cross-divisional team regarding accurate costing (design, capital, and operating), prevention of existing infrastructure deterioration before the addition of new infrastructure and overall consistency with the City’s General Plan and City Council’s goals and objectives.”

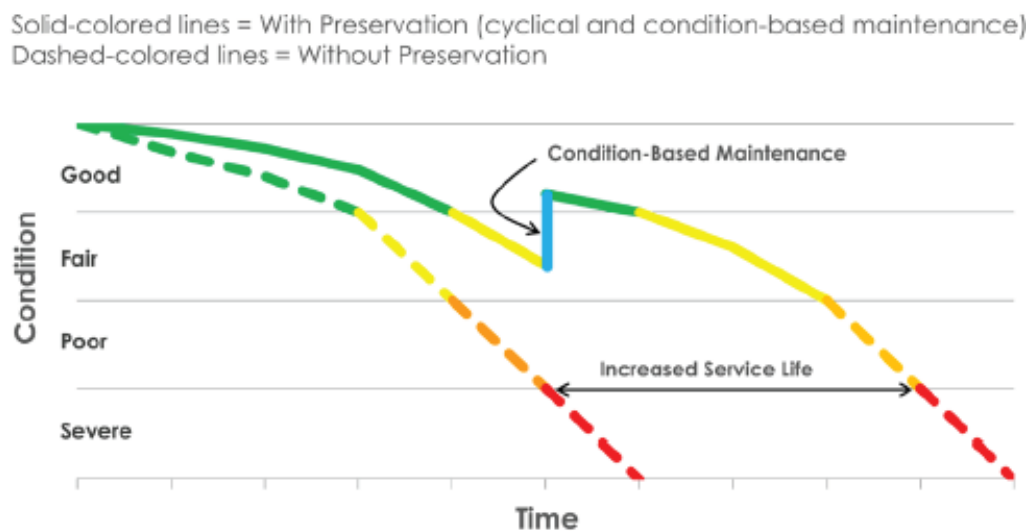
SOURCE: Comprehensive Financial Policies and Governing Guidance, adopted February 2019.

The Federal Highway Administration identifies asset preservation best practices that include:

- A needs identification method that is uniform, specific, and repeatable.
- Commitment by management to asset preservation.
- Resource allocation determined by condition goals.
- A process for categorization and/or prioritization.
- Verification and feedback on work completed.

As shown in Figure 3, preservation activities can extend an asset's service life.

Figure 3. Comparison of Asset Condition with and without Preservation Efforts



SOURCE: Federal Highway Administration Bridge Preservation Guide.

Bridge Inspections

Under the National Bridge Inspection Standards (NBIS), the Arizona Department of Transportation (ADOT) is required to inspect all highway bridges located on public roads, with some exceptions.¹ To require NBIS inspections, a bridge must meet the following criteria:

- 1) Be a structure erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads,
- 2) Measure longer than 20 feet along the center of the roadway, and
- 3) Be located on a public road.

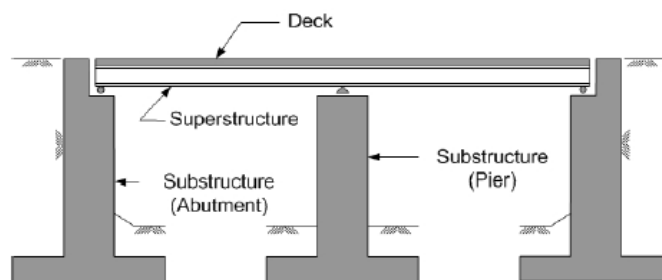
NBIS requirements do not apply to pedestrian and railroad structures or tunnels.

¹ The Federal Highway Administration implemented NBIS in coordination with the American Association of State Highway and Transportation Officials, under 23 Code of Federal Regulations 650 subpart C.

Through an Intergovernmental Agreement, Scottsdale authorizes ADOT to perform NBIS inspections on applicable bridges owned or controlled by the City. ADOT sends its completed bridge inspection reports to the City's Street Operations department, which is responsible for handling the recommended maintenance and repair items.

Based on the NBIS, ADOT inspects bridges every 2 years and culverts every 4 years. The inspection results in a condition rating for 3 main bridge components, as pictured in Figure 4: the deck (driving surface), the superstructure (immediately beneath the driving surface), and the substructure (foundation, supporting posts and piers). Culverts are given a culvert condition rating.

Figure 4. Bridge Components



SOURCE: FHWA Bridge Inspector's Reference Manual.

In 2018, ADOT's inventory of Scottsdale bridges listed 231 bridges and culverts, with examples illustrated in Figure 5 on page 7.

(continued on next page)

Figure 5. NBIS Bridge and Culvert Examples



SOURCE: Auditor analysis of ADOT inspection report photos.

The inspection reports also provide a general bridge condition rating of Good, Fair, or Poor, as shown in Figure 6, based on the component ratings.

Figure 6. NBIS Bridge Rating Scale

9	8	7	6	5	4	3	2	1	0
Good			Fair		Poor				
All bridge components rated good.			The lowest rated bridge component is fair		One of the bridge components is rated poor				

SOURCE: ADOT Initial Transportation Asset Management Plan, September 2018.

ADOT’s August 2018 bridge inventory for Scottsdale included 2 bridges with a “Poor” condition rating (including the 68th Street canal bridge that has subsequently been rebuilt and a culvert near Shea and

120th Street that has recently been referred to Capital Project Management for further evaluation). This bridge inventory also included 79 structures with a “Fair” rating and 150 with a “Good” rating.

ADOT also assesses a bridge “sufficiency rating” to indicate a bridge’s sufficiency to remain in service. For example, a bridge may be determined to be “functionally obsolete” if its design is no longer adequate for current traffic needs or “structurally deficient” if one or more of the bridge components need monitoring or rehabilitation. However, according to ADOT’s website information, neither rating means that the bridge is unsafe.

Parking Garage Assessments

After structural issues were identified at two City-owned parking garages in 2013, the Facilities Management department initiated a structural assessment program for the City’s parking garages. Prior to this, the department had not routinely inspected the garages. Facilities Management identified 8 City-owned parking garages, including 6 used for public parking in downtown Scottsdale. Since 2015, the department has contracted with engineering consultants for assessments of 5 of the 8 parking garages.

Stormwater Drainage Infrastructure

While Stormwater Management within the Planning and Development Services department handles drainage planning and construction plan review processes, it has limited involvement in maintenance and condition assessment of existing infrastructure.

Instead, Street Operations is responsible for keeping storm drains, catch basins, inlets, outfalls, and other City-owned drainage infrastructure functioning and clear of debris. The department performs routine inspections and maintenance of these drainage assets citywide.

The drainage inspection and maintenance program also supports the Stormwater Management Program, which is required for the City’s Arizona Pollutant Discharge Elimination System (AZPDES) permit.²

² The Arizona Department of Environmental Quality issues AZPDES permits to authorize stormwater discharge into “waters of the United States.” The Stormwater Management Program is required to be designed to reduce pollutant discharges from the City’s system to the maximum extent practicable and to protect water quality.

OBJECTIVES, SCOPE, AND METHODOLOGY

An audit of construction contracts was included on the City Council-approved fiscal year (FY) 2018/19 Audit Plan; *Infrastructure Condition Assessment* was selected for the specific audit topic. The audit objective was to evaluate the management processes and controls, including contracts, relating to condition assessments of City infrastructure.

To gain an understanding of the Public Works division's infrastructure asset inspection and maintenance programs, policies and practices, we interviewed the Street Operations and Facilities Management department directors, the City Engineer, and inspection staff. We also interviewed Stormwater Management program staff to gain an understanding of their involvement in drainage infrastructure management. Additionally, we interviewed the CIP Budget Manager and the City Engineer to gain an understanding of the capital budget planning process, including how proposed projects are identified and prioritized.

To further understand bridge condition assessments, we reviewed the City's intergovernmental agreement authorizing the Arizona Department of Transportation (ADOT) to perform required inspections of bridges owned or controlled by the City (contract 2010-032-COS). We also interviewed an ADOT representative to understand ADOT's bridge inspection program.

To evaluate condition assessment programs and resulting maintenance and repair actions, we reviewed:

- The City's asset inventory lists for bridges, parking garages, streetlights, sidewalks, and stormwater drainage assets.
- ADOT inspection reports for City bridges from 2012 through 2018. Inspection reports for the Drinkwater and 68th Street bridges were reviewed back to 2006.
- Street Operations stormwater drainage asset inspection records.
- Street Operations work orders for repair work of City bridges and drainage assets.
- Facilities Management's parking garage assessment reports that were prepared by consultant engineers for City parking garages.
- Facilities Management's work orders related to City parking garages.

We reviewed the ADOT and consultant reports for bridge and parking garage inspections for identified repair and maintenance recommendations. We then searched for any related work orders to evaluate their existence, completion and timeliness.

We also interviewed the Street Operations Systems Integrator regarding the availability and reliability of work order data system reports. To address potentially incomplete work order data, we asked department management to provide any additional maintenance and repair work documentation.

The audit found that the Public Works division did not have processes in place to review bridge inspection reports and address ADOT repair and maintenance recommendations. As well, a bridge inspection and maintenance program was not yet in place for those bridges not inspected by ADOT. While a parking garage inspection program has started, recommended repairs and maintenance had not been addressed. In addition, Public Works had not yet inspected all stormwater drainage assets, and the inspections did not consistently identify needed repairs and maintenance. Further, inventories

have not been reconciled or completed and condition assessment and maintenance programs established for streetlights, sidewalks and parking lots.

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 work took place from January to May 2019.

FINDINGS AND ANALYSIS

1. Inspections of City bridges have not been consistently monitored, and recommended repairs and maintenance have not been completed.

The Street Operations department does not have processes in place to review and monitor bridge inspection results and recommended work, and in the past 7 years, these repair and maintenance recommendations have not been consistently completed. Further, new bridge construction has not been reported to ADOT and the existing bridge inventory does not appear complete. Also, the department needs to identify all non-NBIS bridges and establish a process for assessing them.

- A. Annually, Street Operations receives the ADOT bridge inspection reports for the bridges inspected during the year and is responsible for evaluating and addressing the recommended maintenance and repairs. However, the department does not have processes in place to review and address bridge inspection results, and the ADOT repair and maintenance recommendations have not been consistently completed in the past 7 years.

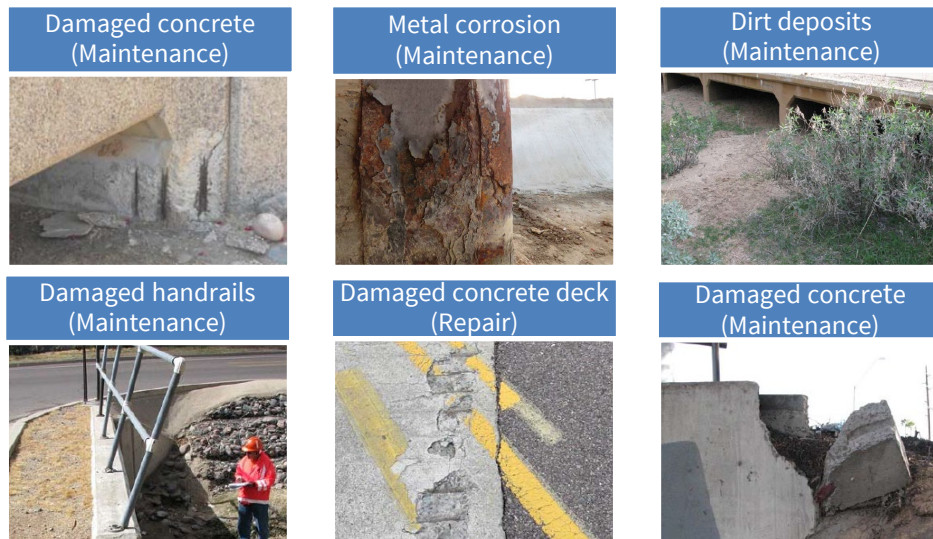
ADOT – Arizona Department of Transportation.

NBIS – National Bridge Inspection Standards. Applies to bridges longer than 20 feet located on public roads.

Non-NBIS – Structures not covered by the NBIS.

As shown in Figure 7, the ADOT repair and maintenance recommendations include repair work for damaged or deteriorating concrete, asphalt, or metal, sediment buildup or erosion, and lighting.

Figure 7. Example Repair and Maintenance Issues



SOURCE: Photos from ADOT inspection reports for City of Scottsdale bridges.

As shown in Table 1, over the last seven calendar years, ADOT has completed 614 NBIS inspections of Scottsdale bridges, which resulted in 284 repair and maintenance recommendations for 100 of the 231 bridges. Of the 284, approximately 6% are repair recommendations, which generally identify safety or structural integrity concerns. The remaining maintenance recommendations identify less critical matters that need attention.

Table 1. ADOT Bridge Inspection Recommendations and Related Street Operations Work Orders

	ADOT Inspections	ADOT Recommendations			Work Orders	
	Number of Inspections	Repair	Maintenance	Total	Created	Completed
2012	105	2	40	42	41	10
2013	91	2	10	12	12	2
2014	103	1	46	47	43	7
2015	12	0	0	0	0	0
2016	108	5	82	87	0	0
2017	89	0	25	25	0	0
2018	106	6	65	71	0	0
Total	614	16	268	284	96	19

SOURCE: Auditor analysis of ADOT bridge inspection reports and related Street Operations work orders.

1. From 2012 to 2014, ADOT identified 101 repair and maintenance needs, including 5 repair recommendations. Public Works staff created work orders to direct work crews to complete the needed repair or maintenance for 95% of the recommendations. However, only 20% of these work orders were completed. Further, 14% of the work orders were completed more than two years after being created.
2. From 2015 to 2018, ADOT identified 183 repair and maintenance needs, including 11 repair recommendations. However, work orders were not created for any of these ADOT recommendations, and the department did not provide any indication that they have been addressed. Additionally, no bridge-related repair or rehabilitation projects have been proposed through the CIP planning process.
3. More proactive review and monitoring of these bridge inspection reports may have alerted Public Works to some issues earlier. Also, interdepartmental coordination could improve inspection effectiveness.
 - ADOT inspection reports noted evidence of water leaking, concrete spalling, and broken light fixtures at the Drinkwater bridge for more than 10 years. Yet City staff did not initiate additional assessments until after public complaints of lighting outages for the boulevard under the bridge.

In 2014, Street Operations responded to the complaints by requesting a structural investigation, which Capital Project Management (CPM) coordinated through an on-call engineering contract. The engineering consultant’s report identified structural repairs needed and recommended a more detailed structural study be performed. However,

no repairs or additional review was initiated until December 2016, following complaints about falling concrete under the bridge.

Management indicated that there was initially some question regarding which City department had responsibility and how repairs would be funded. Portions of the bridge serve as public park and event space as well as a boulevard overpass, and were maintained by Facilities Management, Parks & Recreation, and Street Operations.

- ADOT bridge inspection reports from 2012 to 2018 indicated that prior to 2018 significant portions of the substructures and superstructures, which are major bridge components, were not inspected for 12 of the 17 canal bridges due to water in the canal.³ Careful evaluation of the bridge inspection reports may have identified the lack of these component inspections. In 2018, ADOT began inspecting all canal bridges using kayaks to view underneath the bridge.
4. Besides the 68th Street bridge in 2018, ADOT has rated three other Scottsdale bridges as “Structurally Deficient” since 2014. There is no evidence Public Works has taken any steps to further evaluate the structural integrity of these bridges or to apply the ADOT-recommended treatments. A 2013 ADOT web communication indicated the classification of “Structurally Deficient” does not mean that the bridge is unsafe, but it signifies that one or more components need to be closely monitored or rehabilitation is needed.

Each of the past three ADOT inspections identified concerns with structural components on these three bridges, including metal pipe settling and metal corrosion as shown in Figure 8. For the structure with metal pipe settling, ADOT noted the wooden post supports but recommended replacement of this culvert. For the other two structures, each of which provides access over a drainage channel to a pair of houses, ADOT identified metal fatigue in the main supports, recommending corrosion treatment for one bridge and noting that the past treatment was not effective on the other bridge. ADOT also rated these two structures as requiring high priority of replacement.

Figure 8. ADOT Bridge Inspections with “Structurally Deficient” Classifications



SOURCE: ADOT inspection report photos.

³ SRP schedules, by sections, canal dry-ups every 7 years to allow for repairs and construction.

Since our audit inquiry, the Street Operations Director has requested that CPM, which has engineers on staff, review the ADOT inspection reports to help identify areas of concern and prioritize work needed. As well, the department has referred the bridge with the damaged metal pipe (photo 1 in Figure 8) to CPM for further evaluation.

B. The bridge inventory does not appear complete and accurate.

To facilitate the state inspection program, Public Works is responsible for notifying ADOT of all new or existing structures that may meet the NBIS bridge definition. However, according to management, there have been no related communications with ADOT in recent years. As a result, new bridges have not been added, and the existing bridge inventory has not been reviewed and updated.

- The last Scottsdale bridge reported to ADOT was built in 2013. However, changes have occurred since that time. For example, a Scottsdale Road bridge constructed over a wash in 2014, part of a construction contract that we previously audited, had not yet been reported. Both Street Operations and CPM were unclear about how bridges were added to the ADOT inventory; each believed the other was responsible for notifying ADOT.

An ADOT representative stated new bridge construction should be reported when the bridge design phase is 60% complete so that ADOT can assign a structure number. When bridge construction is completed, the final As-Built plans should be sent to ADOT so that an initial inspection can be scheduled within 3 months. Similarly, bridge reconstructions, such as 68th Street bridge, and expansions, such as the recent Pima Road bridge widening project, also require notification, new plan submittal and an inspection upon completion.

- The Public Works departments have not yet reviewed the existing ADOT bridge inventory for Scottsdale for non-NBIS bridges. We noted two privately-owned pedestrian structures included on the inventory as belonging to the City. While ADOT does a limited review of pedestrian bridges over public roads, the ADOT representative stated that privately-owned bridges should not be on the City's inventory. With these structures being on the City's inventory, any ADOT recommendations would be transmitted to the City rather than the actual property owner.
- A culvert bridge that appears to have been built more than 30 years ago is not listed on the ADOT bridge inventory and has not been inspected.⁴ While reviewing Street Operation's bridge inventory, ADOT's bridge inventory, and the City's Land Information System (LIS) maps, we noticed this bridge shown in LIS that was not listed on either inventory. This culvert, which is over a natural wash, is also not included on the City's drainage asset list for drainage inspection.

C. The Public Works departments have not yet established an inspection or maintenance program for Scottsdale's non-NBIS bridges.

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⁴ This culvert bridge appears to have been built by Maricopa County in 1985, but the area has since been annexed into Scottsdale city limits.

Certain bridge structures, such as those measuring less than 20 feet along the center line and pedestrian bridges, do not fit the NBIS criteria and ADOT is not required to inspect them. According to an ADOT representative, ADOT does a limited inspection of pedestrian bridges that cross public roads, such as verifying appropriate vertical clearances. While observed maintenance and repair needs are noted on the inspection reports, the pedestrian structures are not given sufficiency ratings as bridges are.

According to Street Operations management, the department was aware that bridges less than 20 feet in length were not inspected by ADOT but assumed ADOT was inspecting pedestrian bridge structures. The department had not inventoried these non-NBIS bridges, such as the pictured Soleri pedestrian bridge, and established a program to routinely inspect them.



Soleri Bridge – Constructed in 2010, a pedestrian bridge crossing the Arizona Canal in downtown Scottsdale

SOURCE: Image from www.scottsdalepublicart.org

Recommendations:

The Public Works Division Director should require policies and procedures be developed and implemented to ensure that the City’s bridge conditions are assessed and the bridges maintained. Specifically, these policies and procedures should require staff to:

- A. Create work orders for the ADOT inspection recommendations, then prioritize and complete the work orders timely.
- B. Report bridge construction and rehabilitation projects to ADOT in accordance with the bridge inspection program requirements and review ADOT’s City of Scottsdale bridge inventory to properly identify any privately-owned bridges on the list.
- C. Inventory Scottsdale’s non-NBIS bridge structures and establish a program for regularly inspecting, maintaining and repairing them.

2. The management of other infrastructure assets’ condition assessments could be improved.

The Public Works division also manages other infrastructure assets, such as parking garages, stormwater drainage assets, streetlights, sidewalks and parking lots. However, condition assessments are not consistently performed, and needed repairs and maintenance have not been completed.

- A. The City’s parking garage inspection program has started, but the resulting recommended repairs and maintenance have not been addressed.

Beginning in 2015, Facilities Management contracted with a structural engineering firm to conduct structural assessments of the City’s parking garages. Table 2 on page 16 summarizes the parking garage assessments and the primary areas identified as needing repair or maintenance. Facilities Management’s garage-related work orders did not show any work

orders have been created to perform the identified maintenance and repairs, and the department did not provide any indication that they had been addressed.

Further, the department's stated goal is to assess each garage once every five years. However, in the program's first five years, only 5 parking garages have been assessed. At the current pace, nine years may pass before re-inspections are completed.

Table 2. Parking Garage Structural Assessments

	Assessment*	Concrete spalling	Cracks in walls, slab or concrete	Displaced bearing pads	Water-related damage	Add'l review of drainage	Worn joint sealant
One Civic Center	2/19/2015	x	x	x	x	x	
5th Ave Garage/Restroom	10/13/2016	x	x	x		x	
Main Street	1/18/2018	x	x			x	
Civic Center Library/Mall	3/6/2019	x	x				x
2nd & Brown ("Livery Stable")	3/6/2019	x	x		x	x	x
North Corp Yard	FY 2019/20						
2nd & Wells Fargo	FY 2019/20						
Southbridge	FY 2020/21						

* Dates noted for actual assessments; fiscal year (FY) noted for future assessments.

SOURCE: Auditor analysis of consultant's garage assessment reports.

B. The Street Operations department is responsible for maintaining the stormwater drainage infrastructure in functional condition to facilitate effective stormwater drainage. Also, because the City's stormwater system drains into state waterways, the City is required to obtain a pollutant discharge elimination permit from the Arizona Department of Environmental Quality. To obtain this permit, the City is required to develop a stormwater management program to routinely inspect the stormwater system components to reduce pollutant discharges, and in that program has set an inspection goal of every five years. However, the department's drainage inspection and maintenance processes need improvement.

1. The Street Operations department maintains an inventory of the stormwater drainage system assets within the City but has not inspected all these assets as required by the water quality permit.

The stormwater system asset inventory includes stormwater drainage system assets within the City, including bridges, culverts, catch basins, field screening points, and various other related assets. Department staff inspect these assets, recording the inspections in the City's Land Information System.

During the past 5 years, department staff has inspected only 69% of the approximately 7,900 stormwater drainage assets. The department does not have policies and procedures or a planned and monitored schedule for the drainage asset inspection program.

2. The department's stormwater drainage asset inspections do not consistently identify needed repairs and maintenance that have been reported with supporting photographs in ADOT bridge inspections of drainage-related structures.

From 2012 through 2018, ADOT identified repair and maintenance needs for 58 bridges with channels, stormwater pipes, and other drainage features, as illustrated in Figure 9. Department staff assigned to drainage inspections subsequently inspected 17 of these bridges to assess their condition and maintenance needs. These subsequent inspections only reported a maintenance concern with one of these bridges, a culvert with both sides partially filled with sediment. However, after confirming these maintenance needs in November 2017, department staff did not create a work order until May 2019, and there is no indication of work performed to clear the culvert.

Figure 9. Maintenance Needs Not Identified in City Drainage Asset Inspections



SOURCE: ADOT inspection report photos.

- C. The Street Operations department has not yet developed complete streetlight and sidewalk asset inventories, making any condition assessments incomplete. In addition, although the departments have a parking lot inventory and assessment goal, condition assessments have not been conducted.
 1. The Street Operations department has an inventory listing approximately 14,000 streetlights and is in the process of verifying which streetlights are City-owned and which are APS-owned. Due to differences with streetlight counts in APS billings, Public Works staff and APS began reconciling the streetlight ownership recorded on their inventory lists in

March 2019.⁵ However, Street Operations does not formally conduct streetlight condition assessments for maintenance or replacement purposes.

2. The Street Operations department does not have an inventory of City-owned sidewalks. Street Operations estimates about 880 miles of City sidewalk, but some sidewalks may be owned by private developments. Street Operations plans to have staff review development agreements to determine which sidewalks are owned by the City. Repairs of sidewalk issues have been done on a reactionary basis, and no condition assessments of City sidewalks have been completed.
3. The Street Operations department also maintains City-owned parking lots and has identified about 160 parking lots for routine inspection of pavement condition. The department's stated goal is to inspect each parking lot every 2 years. However, the documentation provided showed that only 25 parking lots had been assessed in the last 2 years. Department staff indicated that parking lot paving has been low priority for management. According to the former Street Operations Director, the department has prioritized street pavement and wants to reach its pavement condition index goal before allocating resources to parking lots.

Recommendations:

The Public Works Division Director should require staff to:

- A. Reassess the parking garage assessment program to evaluate the five-year inspection goal based on current observed conditions. Also, require staff to create, prioritize and timely complete work orders for the parking garage structural assessment recommendations.
- B. Ensure that the City's drainage assets are properly inspected and maintained. In particular, require staff to create, prioritize and timely complete maintenance work orders for concerns identified by ADOT inspection reports.
- C. Complete the streetlight inventory reconciliation and the sidewalk inventory and establish appropriate condition assessment and maintenance programs. As well, require staff to establish an appropriate parking lot condition assessment and maintenance program.

⁵ The City pays electricity and maintenance costs for city-owned streetlights and pays electricity costs and a maintenance fee for APS-owned streetlights.

MANAGEMENT ACTION PLAN

1. Inspections of City bridges have not been consistently monitored, and recommended repairs and maintenance have not been completed

Recommendations:

The Public Works Division Director should require policies and procedures be developed and implemented to ensure that the City's bridge conditions are assessed and the bridges maintained. Specifically, these policies and procedures should require staff to:

- A. Create work orders for the ADOT inspection recommendations, then prioritize and complete the work orders timely.
- B. Report bridge construction and rehabilitation projects to ADOT in accordance with the bridge inspection program requirements and review ADOT's City of Scottsdale bridge inventory to properly identify any privately-owned bridges on the list.
- C. Inventory Scottsdale's non-NBIS bridge structures and establish a program for regularly inspecting, maintaining and repairing them.

MANAGEMENT RESPONSE: Agree

PROPOSED RESOLUTION: City Engineer will review most recent ADOT inspection report. Street Ops Director will work in conjunction with City Engineer to identify a work plan to address recommendations. Actions will each be identified for inclusion in a capital project request, completion through a Street Ops work order, or as an item for continued monitoring.

City Engineer will establish a procedure to require project managers to report new or rehabilitated bridges to ADOT for inclusion in the NBIS database or to Street Ops for inclusion in the City's non-NBIS database.

Street Ops Director will inventory non-NBIS bridge structures and establish an inventory to be included in the Street Ops asset database. Street Ops Director will establish a program for periodic inspection of non-NBIS bridges.

RESPONSIBLE PARTY: PW Director

COMPLETED BY: 12/1/2020

2. The management of other infrastructure assets' condition assessments could be improved

Recommendations:

The Public Works Division Director should require staff to:

- A. Reassess the parking garage assessment program to evaluate the five-year inspection goal based on current observed conditions. Also, require staff to create, prioritize and timely complete work orders for the parking garage structural assessment recommendations.

- B. Ensure that the City's drainage assets are properly inspected and maintained. In particular, require staff to create, prioritize and timely complete maintenance work orders for concerns identified by ADOT inspection reports.
- C. Complete the streetlight inventory reconciliation and the sidewalk inventory and establish appropriate condition assessment and maintenance programs. As well, require staff to establish an appropriate parking lot condition assessment and maintenance program.

MANAGEMENT RESPONSE: Agree

PROPOSED RESOLUTION: Facilities Director will assess the parking garage assessment program. If necessary, PW Director will request additional funding for contracted garage condition assessments to maintain the appropriate schedule. City Engineer will review garage assessments as they are completed. Facilities Director will work in conjunction with City Engineer to identify a work plan to address recommendations. Actions will each be identified for inclusion in a capital project request, completion through a Street Ops work order, or as an item for continued monitoring.

Public Works Director will request additional FTE's to adequately address stormwater inspection and maintenance requirements in the FY 2020/21 budget cycle. Pending this request, with existing resources Street Ops Dir will continue to prioritize inspections for NPDES compliance issues, safety and adequate conveyance capacity of stormwater structures. Maintenance efforts will continue to prioritize safety and adequate conveyance.

Street Ops Director will continue efforts to verify the inventory of City-owned streetlights, streetlights in City ROW owned by other entities, and maintenance responsibilities associated with each. Street Ops Director will establish a recurring inspection program for streetlights for which the City has responsibility.

Street Ops Director will add parking lots and paved alleys to the paving maintenance database and model. PW Director will request additional funding in the FY 2020/21 budget cycle for parking lot and paved alley resurfacing.

Street Ops Director will continue adding ADA sidewalk ramps to the Street Ops asset management database as ramps are improved or established through the paving maintenance program.

RESPONSIBLE PARTY: PW Director

COMPLETED BY: 7/1/2021

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