GARLAND

INTERNAL AUDIT

Pothole Repair Operations

August 16, 2016

Report 201608

City Auditor:

Jed Johnson, CIA, CGAP

Major Contributor:

Christy Rodriguez, CPA
Senior Auditor

Contents

Overall Conclusion

Pothole repair is one aspect of the City of Garland's street maintenance program. The City is doing an excellent job of responding to pothole repair requests in a timely manner. However, there are improvements that can be made with relation to the efficiency of the current processes. The current pothole repair strategy is primarily reactive rather than proactive. The number of pothole repair requests the City receives is lower in comparison to other cities in the surrounding area. Standard criteria are not consistently applied to the recording and tracking of pothole repairs throughout the City. In addition, the data that is collected may not always be sufficient to accurately respond to all repair requests. The current pavement management system does not have the capabilities to do advanced tracking and monitoring.

Authorization

We have conducted an audit of Pothole Repair Operations. This audit was conducted under the authority of Article VII, Section 5 of the Garland City Charter and in accordance with the FY2016 Annual Audit Plan approved by the Garland City Council.

Objectives

The objectives of the audit include the following:

1) Analyze the effectiveness and efficiency of current pothole repair processes.

2) Determine the accuracy and reliability of key performance metrics related to pothole repair.

Scope and Methodology

IA 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.

The scope of the audit was from October 1, 2014 – May 5, 2016.

To adequately address the audit objectives and to describe the scope of our work on internal controls, IA performed the following:

- Attended ride along with members of the pothole repair crew to observe and document their process (Obj. 1)

- Conducted multiple interviews with members of the Street Department (Obj. 1)
- Reviewed best business practices related to the repair of potholes (Obj. 1)
- Inquired how pothole requests are received, documented and fulfilled (Obj. 1)
- Conducted surveys with neighboring cities to inquire about their process for pothole repair (Obj. 1)
- Reviewed the annual process for determining the needs of the city as it related to street rehabilitation (Obj. 1)
- Researched other risks as identified in prior pothole repair audits done by other municipalities (Obj. 1)
- Analyzed data to determine the time and efficiency of pothole repairs (Obj. 1)
- Reviewed job-costing information to determine if materials are billed appropriately (Obj. 1)
- Performed a trend analysis on information in the Pavement Management System (Obj. 2)
- Inquired how data related to materials and labor and equipment hours is input and tracked by the Street Department (Obj. 2)

To assess the reliability of reports produced by the Pavement Management and Finance Systems, IA reviewed reports from the e-Assist program, interviewed multiple individuals at the Streets Department regarding their processes and reviewed source documents (invoices, P-card receipts). As a result of our testing, IA determined that all of the above data was sufficiently reliable for the purposes of this report.

Based on the audit work performed, any deficiencies in internal control that are significant within the context of the audit objectives are stated in the Opportunities for Improvement section on page 7.

Background

The City of Garland's Street Department is in charge of all pothole repairs, as well as reconstruction of city streets. The City also aggressively conducts a crack-sealing program, which is a proactive street rehabilitation program to fill in cracks before they turn into large potholes. This process is a best practice for pavement maintenance. Crack-sealing seals up minor cracks to prevent water from eroding the subgrade beneath the road, which leads to the formation of potholes. The City has a blanket order to purchase crack sealant from Crafco - Texas.

There are approximately 2,351 lane miles of streets and 332 lane miles of alleys within the City of Garland. [2] The majority of Garland's roads were built in the 1970-80s. Since the average useful life of asphalt and concrete is 30-50 years, it is clear that there is a large need for street repair and reconstruction that will not grow smaller over time. In FY2015 and FY2016, the City spent approximately $1,500,000 each year on maintaining our streets [1]

and $12,783,823 in the current year reconstructing/rehabilitating concrete streets. [5] While this is a large number, the current needs per the Street Department's pavement management system for the City in order for a contractor to repair all streets and alleys amounts is approximately $370,000,000. [3] Full-depth replacements were beyond this scope of this audit, but would cost as much as 5 times more than repairs. [1]

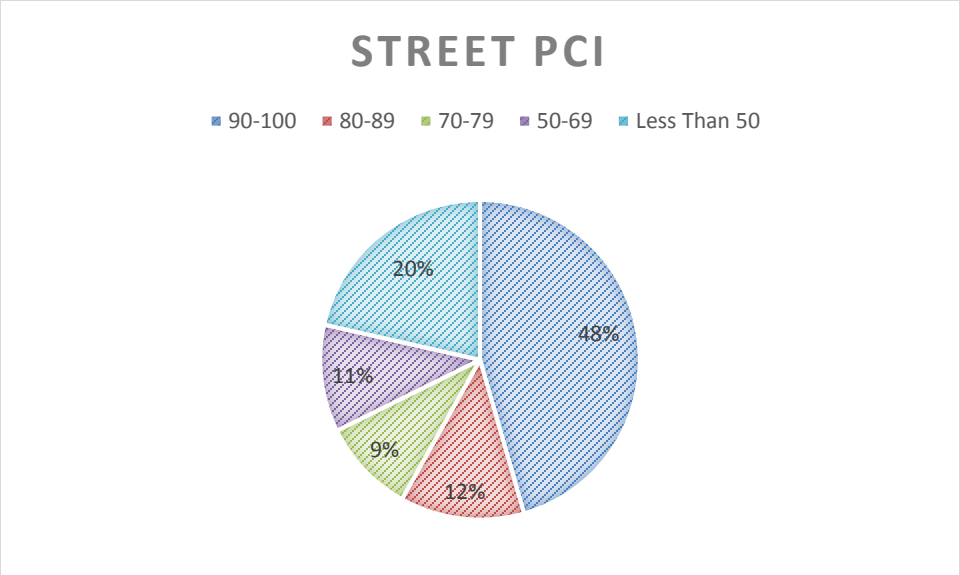
The Street Department coordinates with various City departments as well as outside utility companies in order to efficiently and effectively dig into and repair streets. While an annual and 3-year plans exist for the repair and reconstruction of City streets, all repair requests are reviewed and/or responded to as they are reported. City Council is informed on the status of this 3 year plan.

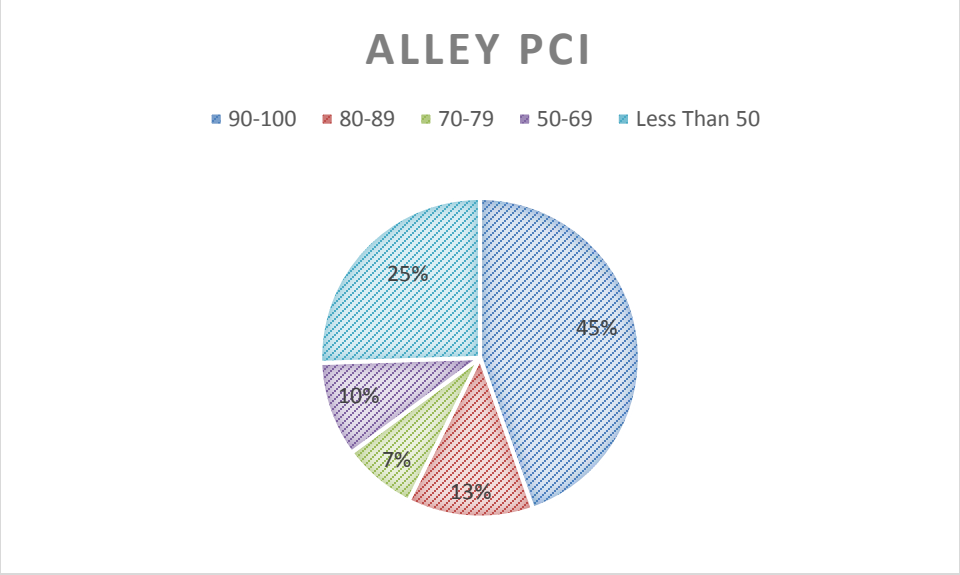
The Street Department has an inspector that drives around the roads daily to report on street conditions and request repairs as needed. However, the primary way that the Street Department is notified of areas that need repair is through citizen requests. Citizens can report potholes by email, phone or through the City's version of the 311 application, e-Assist. These are then added to the Street Department's work order management system.

The condition of the streets is measured by the Pavement Condition Index (PCI). Annually, members of the Street Department will go and assess the streets throughout the City, giving them a score according to this index:

90 - 100	Excellent
80 - 89	Good
70 - 79	Fair
50 - 69	Poor
Less than 50	Fail

The average PCI for streets in the City is 77.8. The average PCI for alleys in the City is 69.1. [4] However, it is clear that there are a large percentage that are failing – 19.7% of streets and 25.5% of alleys. [2]



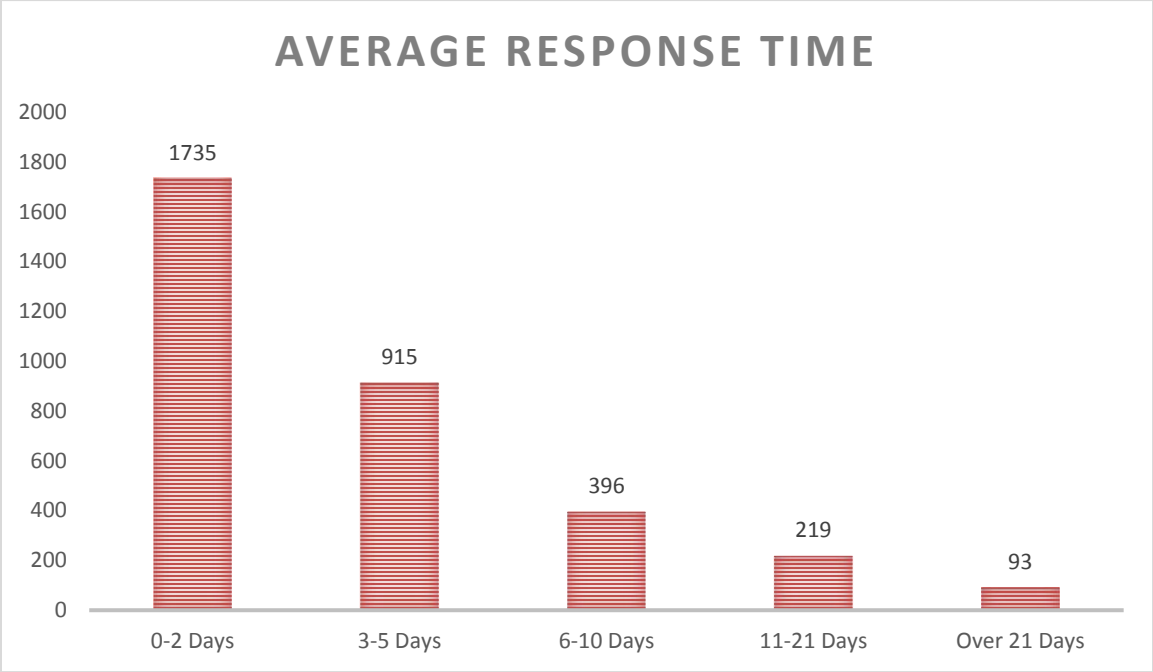


Pothole repair is a major portion of the City's preventative maintenance process. A pothole is defined as a depression or hollow in a road surface caused by wear and erosion of rock, especially by action of water. Potholes, as defined by street management, are 3 ft. x 3 ft. areas; however, during Internal Audit's "ride-alongs" with the repair crews, we noted that a large portion of the day was spent patching entire sections of streets and alleys. It was also noted during our "ride-alongs" with the repair crews that there was no standard criteria used to distinguish pothole sizes.

The goal of the Street Department is to repair all requests within 48 hours of the complaint. During our scope, there were 3,358 potholes repair requests. This does not encompass all work done during this time as multiple potholes can be filled for each request. Emergency requests are also not included in this number. Internal Audit was not able to determine how

many potholes were filled during the time period as there is no standard criteria (size, depth, etc.) applied by crews and supervisors.

The average response time over the scope of the audit was 6 days. The potholes that took longer than this average to repair were typically not "potholes" and required more coordinated repair efforts with outside agencies, such as TxDOT and DART. The detailed breakdown of average response time is noted below:



Source: Pavement Management System from 10/1/2014 through 5/2/2016

Potholes can be repaired with either concrete or asphalt (hot mix or cold mix). Asphalt is more cost-effective and it adheres to the street better than concrete. In addition, asphalt's setting time is less than concrete's. For this reason, the City primarily uses hot mix asphalt. Cold mix asphalt can also be used when there is rainy weather or when the asphalt plants shut down due to cold weather. The City has a blanket order to purchase both hot and cold mix from any of the various APAC – Texas plants in the Metroplex. The City owns 3 pothole patching trucks, 2 of which are typically in use at a time. The City has a blanket order to purchase bags of concrete mix from Crafco - Texas.

Vehicle damage claims by citizens with regards to potholes are typically not the responsibility of the City. Per the Texas Civil Practice and Remedies Code, Chapter 101.021 (also known as the Texas Tort Claims Act), "property damages can be recovered only where the wrongful act, omission, or negligence involves the operation or use of a motor-driven vehicle." It specifically addresses the fact that "a governmental entity has no liability for property damage resulting from driving through a pothole, but is liable for personal injuries suffered in an accident caused by driving through a pothole." Per discussion with the

Insurance and Claims Coordinator for the City, during the 6 years they have been with the City, there has not been paid a claim related to pothole damage.

Sources:

(1) 2015 – 2016 City of Garland Annual Operating Budget

(2) Street Department lane miles from the Street Department's Pavement Management System as of 6/9/2016. City Property is not considered as a part of this number. As a note: lane length (in feet) is multiplied by the number of lanes to determine lane feet. This is then divided by 5,280 to arrive at lane miles.

(3) Street Department projected repair/replacement costs from the Street Department's Pavement Management System as of 6/9/2016. City Property is not considered as a part of this number. As a note: Needs for Streets and Alleys with a PCI over 70 are calculated at the price it would cost a contractor to ***repair.*** *Those under 70 are calculated at the price it would cost a contractor to* ***replace.***

(4) Street Department PCI from the Street Department's Pavement Management System as of 6/9/2016. City Property is not considered as a part of this number. As a note: The average PCI is calculated by taking the lane feet from each streets and alleys and dividing by 10 (the slab length). This gives you the total number of possible distresses to the area. Dividing the number of actual distresses noted by the pavement crew by the possible distresses gives you the average PCI.

(5) The $12,783,823 is made up of both the construction costs for Street Replacement from the 2015 – 2016 City of Garland Annual Operating Budget of $8,777,823 and the 2016 CIP of $4,006,000.

Management Accomplishments*

The Street Department has taken three significant steps that have had direct or indirect benefit to our pothole patching operations. These steps are:

1. In FY13/14, we instituted an aggressive proactive crack-sealing program. As part of that program, we have completed crack-sealing of all residential concrete streets that have a PCI of 70 or greater and have crack-sealed 40% of arterials streets. The final phase of this program, which will start when the arterial streets are complete, consists of crack-sealing collector and industrial streets. Crack-sealing streets greatly reduces the amount of water that penetrates into the paving subgrade, which significantly reduces the number of potholes that form.

2. In March 2013, we purchased equipment and established a crew to level lift streets. Lifting streets eliminates standing water problems and pavement slab separations. By lifting several pavement locations, it eliminates the need to patch hose same locations with asphalt.

3. In February 2015, the Street Department purchased a third pothole patching truck. Having three patch trucks ensures that at least two trucks can be out on the street patching potholes at any one time. Currently, we have all three patch trucks operating approximately 40% of the time. Operating all three trucks improves our response time to repair potholes.

4. During the evaluation period, the Street Department's records indicate that we repaired 26,141 potholes.

*Please note that "Management Accomplishments" are written by the audited entity and that Internal Audit did not audit or verify its accuracy.

Opportunities for Improvement

During our audit we identified certain areas for improvement. Our audit was not designed or intended to be a detailed study of every relevant system, procedure, and transaction. Accordingly, the Opportunities for Improvement section presented in this report may not be all-inclusive of areas where improvement might be needed.

FINDING # 1 – EFFECTIVENESS AND EFFICIENCY (OBJ. 1)	
CONDITION (THE WAY IT IS)	1. While there were 3,358 potholes repairs requested during our scope, there were only 275 pothole repair requests through the e-Assist online platform since its inception (February 1, 2015 - May 5, 2016). Citizens can still call or email in repair requests; however, the move to the online platform was done in order to increase citizen interaction with the different city departments, including the Street Department. 2. Pothole repairs may not always address all needs in an area. IA submitted a pothole repair request and noted that only 1 small section of a street was fixed, leaving multiple other potholes in the area immediately surrounding the repair. During IA's ride along observations, we noted: 3. Between 6.5 - 8 hours of total driving and downtime noted within 16 working hours. • Incorrect addresses communicated by crew leaders • Equipment and truck malfunctions/breakdowns • Necessary materials not available • Pothole repairs are not scheduled based on location 4. Multiple potholes were passed en route to other repair locations.
CRITERIA (THE WAY IT SHOULD BE)	1. While there is a street inspector who monitors street and alley conditions on a daily basis, per discussion with Street Department management, they rely heavily on citizen requests in order to repair potholes. In contrast, the City of Richardson stated that since the beginning of

	2016, they have already received 1,700 repair requests through their online platform. 2. In order to maximize the number of potholes and improve efficiency of repairs, all repairs should be viewed in advance by the team leads in order to formulate a plan for each pothole as well as an efficient strategy for each day. These team leads should communicate the plan to the crew members timely. Formulating a daily strategy would also enable the incorporation of the 10 ton dump truck, when appropriate. While this truck is not heated, it could help reduce the number of trips to the asphalt plant. 3. While vehicle breakdowns are unplanned, necessary functioning tools and materials should be maintained on each of the trucks used for pothole repairs.
CAUSE (DIFFERENCE BETWEEN CONDITION & CRITERIA)	1. The functionality of the e-Assist application has not been sufficiently promoted to the citizens of Garland in relation to the submission of pothole repair requests. 2. The current pothole repair strategy is primarily reactive rather than proactive. There is too much emphasis on the goal of completing potholes within 48 hour upon notification set by the Street Department. 3. The current work order management system does not prioritize or set up daily work assignments in an efficient/logical manner. 4. Not all potholes repair requests are viewed prior to the dispatch of repair crews. A plan may not be in place with relation to the size and scope of each repair. Therefore, communication between team leaders and members regarding the expectations was not always consistent. 5. While the policy of the department is to fill potholes noticed by repair crews along their route, this is not regularly communicated to crews. Discussions with the crew revealed that potholes are not filled unless they were assigned by crew supervisors. 6. The 10 ton dump truck is not regularly used to reduce downtime/repeated trips to the asphalt plants. While

	this truck is not heated, it can be still be utilized to reduce the number of trips to the asphalt plant. 7. A vehicle arm broke down during the middle of the shift. Additionally, last-minute changes lead to necessary tools and materials not being available on the trucks. Crews spent time waiting on these tools and materials in order to proceed with their repairs. 8. The asphalt plant is a 90 minute drive round-trip. The 2 asphalt trucks may make this trip multiple times each day. Crews must wait on the hot asphalt mix in order to patch potholes.
EFFECT (SO WHAT?)	1. The City may not be informed of all potholes that are in need of repair. 2. The City is spending significant time and money each year in order to repair City streets; however, we may not always be using this time and money in the most efficient manner.
RECOMMENDATION	Street Department management should: 1. Promote e-Assist to the citizens of Garland. This could be accomplished by including more information specific to making pothole repair requests within the Garland City Press newsletter, CGTV, and including more information on the Street Department's City of Garland website. 2. Develop a repair strategy based on requests, location, and current street condition, in order to be more proactive before sending out repair crews to the site. 3. Increase the use of 10 ton truck for obtaining asphalt, where possible. 4. Ensure that each crew has the appropriate, functioning tools and equipment necessary to perform requested repairs. Street Management, with the assistance of the IT Department, should consider transitioning to a new system that would allow for greater monitoring of street repairs and planning for daily repair activities.

MANAGEMENT RESPONSE	Concur
ACTION PLAN	1. We will work with Customer Service and Media Affairs to publicize the e-Assist app. 2. A new maintenance crew supervisor was promoted on June 20, 2016. The new supervisor, working with the Street Construction Manager, is evaluating all of our processes to ensure that they are operating efficiently. He is also working on improved communication on the crew. 3. The Street Department submitted a request to implement a new Asset and Work Management software system in FY15/16, but it was not approved by the ITB. The requested was submitted again for implementation in FY16/17, but it was rejected again. We will submit another request in the FY 17/18 budget process.
IMPLEMENTATION DATE	1. Immediate and Ongoing 2. Immediate and Ongoing 3. Pending IT approval

FINDING # 2 – ACCURACY AND RELIABILITY OF DATA (OBJ. 2)	
CONDITION (THE WAY IT IS)	Data Entry 1. Pothole requests are gathered through a variety of methods. This data is not always consistent and/or sufficient. Internal Audit made requests for pothole repairs through e-Assist and noted that the amount of information included in the original request was not passed along to the work management system. Data Analysis 2. Standard criteria are not consistently applied to the recording and tracking of pothole repairs throughout the City. 3. The current functionality of the pavement management system makes it extremely difficult to track and monitor how many times a certain area has been repaired. This system is not currently being backed up by the City; however the Department is backing up the data in a report format on the City's G:\ Drive quarterly.
CRITERIA (THE WAY IT SHOULD BE)	1. Information obtained should be detailed enough that crews are able to accurately respond to all repair requests. 2. Standard criteria should be used to uniformly record data between department staff to ensure consistency. 3. Data should be useful in the planning and organization of maintenance and repair operations. Information should be backed up on a regular basis in order to ensure that information is not lost in the event of a system malfunction.
CAUSE (DIFFERENCE BETWEEN CONDITION & CRITERIA)	1. There are multiple ways in which the Streets Department is informed of pothole repair requests. Each of these methods results in different types and amounts of information obtained. For example e-Assist has certain suggested fields, while those requests submitted by phone or through email may not be as detailed. 2. Establishing standard criteria was not considered. In addition, the department has applied for Work and Asset

	Management software that could assist with calculating standard criteria once installed. 3. The current work order management system is a home-grown system that has evolved over time. It does not have the capabilities to do advanced tracking and monitoring.
EFFECT (SO WHAT?)	1. Crews may not have necessary information in order to respond to Citizen's requests in a timely and efficient manner. 2. The City is spending significant time and money each year in order to repair City streets; however, we may not always be using this time and money in the most efficient manner. 3. Without standard criteria, there is not a way to reliably and consistently note the number of potholes repaired by the Street Department. 4. The Department may have to manually reenter years of historical data regarding pavement condition and repairs if the system malfunctions.
RECOMMENDATION	Street Department Management should: 1. Ensure that information gathered from e-mail and phone is sufficient. Ask for more information or call requestor for more detailed information if necessary. 2. Consider adding in required fields to the E-Assist application related to: • Name and phone number of requestor • Nearest cross street • Size of pothole • Depth of pothole • How dangerous the pothole may be 3. Establish standard criteria in order to reliably and consistently note the number of potholes repaired by the Street Department.

	Street Management, with the assistance of the IT Department, should consider: 1. Transitioning to a new system that could help aggregate data to assist with the development of the annual and 3-year street repair and construction plans. 2. Performing regular backups of this new system.
MANAGEMENT RESPONSE	Concur
ACTION PLAN	1. We have spoken with the call takers to ensure they obtain complete information. 2. We will work with Customer Service to modify the e-Assist app. This should be completed by September 1, 2016. 3. We will work with the maintenance crew to ensure that every crew member measures the number and size of potholes on a consistent basis. 4. Per the previous note, the Street Department has submitted requests for new Work and Asset Management software in FY15/16 and FY16/17, but they were rejected both years by the ITB. Any change in that status would have to come from IT.
IMPLEMENTATION DATE	1. Immediately 2. September 1, 2016 3. Immediately 4. Pending IT approval