

**Performance Audit 20-05:  
City Wide Services Pothole  
Repairs**

**March 2021**

**City Auditor**

Stan Sewell, CPA, CGFM, CFE

**Senior Auditor**

Lisa Culver, CFE





# OFFICE OF INTERNAL AUDIT

## Stan Sewell, City Auditor

March 3, 2021

To: Mayor Andy Berke  
City Council Members

Subject: City Wide Services Pothole Repairs Audit (Report #20-05)

Dear Mayor Berke and City Council Members:

The attached report contains the results of our audit of Public Works Department City Wide Services Division (CWS) pothole repair operations. The audit found CWS management should increase monitoring of pothole repairs to ensure timely and quality repairs are performed. In addition, accurate pothole repair data is needed to help make informed decisions on pavement conditions so paving projects can be adequately planned. In order to address the noted areas for improvement, we recommended actions to ensure quality and timely repairs are performed, and develop a plan to ensure city streets are routinely inspected for needed pothole repairs.

We thank the management and staff of the CWS, GIS, and Fleet Divisions, the Office of Performance Management (OPMOD) and Transportation Department (CDOT) for their courtesy, cooperation and assistance during this audit.

Sincerely,

Stan Sewell, CPA, CGFM, CFE  
City Auditor

Attachment

cc: Audit Committee Members  
Kerry Hayes, Chief of Staff  
Maura Sullivan, Chief Operating Officer  
Bill Payne, Public Works Administrator  
Ricky Colston, Director of City Wide Services  
Blythe Bailey, Transportation Administrator  
Jim Arnette, Tennessee Local Government Audit

## TABLE OF CONTENTS

AUDIT PURPOSE.....	2
BACKGROUND.....	2
Statistical Information.....	2
FINDINGS AND RECOMMENDATIONS .....	3
CWS should ensure quality repairs are performed.....	3
Pothole repairs need to be completed more timely.....	6
Accurate pothole repair data is needed to make informed decisions.....	7
Written policies need updating.....	9
APPENDIX A: SCOPE, METHODOLOGY AND STANDARDS .....	10

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## AUDIT PURPOSE

This audit was conducted in accordance with the Office of Internal Audit's 2020 Audit Agenda. The objectives of this audit were to determine if:

- CWS has an effective process to support timely pothole repairs; and
- CWS documents and performs quality pothole repairs.

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## BACKGROUND

Potholes can pop up at any time anywhere, especially in wet and wintery weather. The response to potholes is considered a stop-gap measure to keep streets serviceable. The quality of the repair and timeliness will determine if the repair will improve the pavement condition until permanent paving is performed.

CWS is responsible for routine maintenance of pothole and distressed segment road repairs. CWS has assigned two patch trucks each with two crew workers who perform the pothole repairs. Each day the crews are given a daily route of pothole service requests to complete. In addition to patching potholes, the crews assist CWS street repair crews on projects when needed.

Public Works (PW) and CDOT have verbally agreed to share responsibility for preventive road maintenance. PW is responsible for preventive road maintenance that requires less than three days to complete. CDOT is responsible for preventive road maintenance that requires more than three days to complete and/or requires CDOT Engineering involvement.

### Statistical Information

Exhibit 1 represents data resulting when a citizen submits a pothole service request through 311. The service request is closed by the pothole repair crew when it is filled, not found, or assigned to another department for a more permanent repair. The pothole repair crews count the number of potholes filled per day and report them on the *Daily Patching Worksheet*.

## Exhibit 1: Annual Pothole Data

Calendar Year	2018	2019	2020
Completed 311 Service Requests	2,739	2,845	2,257
Total number of potholes filled	7,844	11,538	10,045
Sources: 311 Statistical Reports, CWS Daily Patching Worksheets			

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**FINDINGS AND RECOMMENDATIONS**
**CWS should ensure quality repairs are performed.**

Best practices for pothole repairs are to ensure stability and quality of asphalt used for repairs. The asphalt should be heated while moving from site to site. The next step is to mark the pothole and remove the failed debris to ensure a strong patch. Successive layers of patching material should not be more than three inches deep. A layer of tack coat should be applied to the new base and sides which provides a bond for the asphalt. The patch should be leveled by raking. Finally, for smaller repairs the patch can be hand tamped. The patch must be compacted to obtain a required density and to seal the asphalt. For the best results, patches should have the same density and should shed water as effectively as the surrounding area.<sup>1</sup>

CWS appears to follow best practices for pothole repairs. Hot mix is used to fill the holes during warmer months of the year. The pothole repair crew removes loose debris from the hole, sprays a coat of tack to ensure the hot mix sticks to the side of the hole, and then fills the hole with hot mix. They hand tamp each patch to ensure it is compacted properly. The crews are provided training on the equipment, asphalt usage, and safety on a regular basis. Each crew usually has one crew member experienced in pothole repair.

To ensure the quality of the pothole repairs, CWS has established DPW Policy 24 Section 24.9 that states all road repair work, including potholes, shall be inspected prior to and after the service request is completed. According to the Street Maintenance Manager, he tries to go out and inspect some of the repairs every two weeks. However the Street Maintenance Manager is responsible for employees in street paving and repairs, pothole repairs, street cleaning, mowing and leaf removal totaling approximately 65 individuals. Some of these divisions have supervisors; however, the pothole repair crew's supervisor position is not filled currently. CWS management does go out and check on potholes as requested.

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<sup>1</sup> [Civilblog.org/2015/12/04/how-to-repair-a-pothole-in-road-surface-using-cold-mix](http://Civilblog.org/2015/12/04/how-to-repair-a-pothole-in-road-surface-using-cold-mix)

CWS does not inspect potholes prior to filling them. They rely on citizens to report potholes. A pothole service request is set as a high priority in the 311 system. If the reported pothole is not filled or not filled properly the citizen will often report it again.

CWS has the ability to monitor the work performed by the pothole repair crews and has access to the truck's GPS data to track the location and time at sites. CWS requires the pothole repair crews to complete a *Daily Patching Worksheet* which shows the driver, truck number, miles logged, and materials used. The crew must write down all activity performed and amount of time at the site. The crews include service request numbers, location and number of potholes filled on the sheet as well. CWS management uses the *Daily Patching Worksheet* to provide a quick review of the pothole crew's activity for the day.

Without regular monitoring of the pothole repairs, CWS management is not fully aware of the repair quality or if the repair is even completed. During our audit, we chose ten random closed pothole service requests to verify if they were completed properly. We found one closed service request where the driver stated the pothole could not be located. However, we located the pothole at the address provided by the citizen.

We reviewed *Daily Patching Worksheets* and GPS data for November 9 to November 16, 2020 for truck W575c which was the only truck in service for this period. We noted the data captured on the *Daily Patching Sheets* was not reliable and did not include all activity performed by the crew for the day. We also noted on three separate days the last activity reported on the *Daily Patching Worksheet* was prior to 1:30 p.m. However, GPS data for these same days shows the truck ending the normal work day at 3:30 pm. The truck GPS data shows it was in motion for these unreported times but the actual activity performed was not listed on the *Daily Patching Worksheet*. According to the Street Maintenance Manger, when the crew completes all of the daily service requests, they should go to other assigned streets that are in need of pothole repairs to complete the work day.

During our observation of pothole repair crews, the crews filled additional potholes they found while working on service requests in the area. These potholes were not associated with a service request. When reviewing the *Daily Patching Worksheet* for this day, the potholes filled that were not associated with a service request were not listed on the *Daily Patching Worksheet*.

DPW SOP Road Repair states operators will perform post-trip inspection of their trip sheet and turn in the completed trip sheet along with the completed service requests to their supervisor. The supervisor reviews the trip sheets and completed service requests, addresses problems with the drivers, and audits operator performance.

CWS management does not have the ability to easily monitor the performance of the crews. They lack staffing to routinely monitor the completed service request and the data reported on *the Daily Patching Worksheets* is unreliable. While they do have access to the truck's GPS data to monitor the crews' location and idle time, the review of this data can be tedious and time consuming.

Further, CWS lacks a systematic method to ensure the pothole crews are covering all the city streets in need of repair. Crews are only addressing citizen's requests and when time permits work on other designated city streets in need of repair. There could be areas of the City that are never repaired due to this process.

### **Recommendation 1:**

We recommend Public Works take steps to ensure the quality of pothole repairs by following DPW Policy 24.

*Auditee Response: We concur with the audit finding and recommendation.*

### **Recommendation 2**

We recommend Public Works develop a methodology to ensure pothole crews routinely inspect all city streets for needed pothole repairs. This could be accomplished by following the set routes of the garbage trucks or street sweepers which cover the majority of the city's streets.

*Auditee Response: We concur with the audit finding and recommendation. Currently, we have numerous vacancies which would deter the full implementation of this recommendation. However, we will work on developing a plan and implementing it once we have staffing available.*

### **Recommendation 3:**

We recommend Public Works implement a process requiring the pothole repair crews take before and after pictures of the repair. These photos would be provided to CWS staff who could review the pictures for quality compliance.

***Auditee Response:*** We concur with the audit finding and recommendation. We will work on training the available staff for this process. However, we have a limited number of experienced staff available to fully implement this recommendation at this time.

#### **Recommendation 4:**

We recommend Public Works provide training on how to properly fill out the *Daily Patching Worksheet* to ensure the data is complete and accurate. Further, we recommend Public Works periodically review the *Daily Patching Worksheets* to ensure its accuracy and completeness. The review would include obtaining the truck's GPS data and comparing it to the entries on the Daily Patching Worksheet.

***Auditee Response:*** We concur with the audit finding and recommendation.

#### **Recommendation 5:**

We recommend Public Works develop a process to ensure they are collecting the *Daily Patching Worksheet* for each day.

***Auditee Response:*** We concur with the audit finding and recommendation.

**Pothole repairs  
need to be  
completed more  
timely.**

When moisture seeps into the pavement, it expands when it freezes and contracts when it thaws. This flexing of the pavement combined with the melted water and stress of vehicles, causes pavement to deteriorate and potholes to form. Citizens submit service requests for pothole repairs through the City's 311 system. The service requests are processed in the Accela system. Each City department has established a service length agreement (SLA) for each type of service request to be completed. The completion time is set to satisfy the citizen's request within a reasonable amount of time. CWS management stated their SLA is five days. However, the SLA set in Accela is four days and PW standard operating procedures have set a six day SLA for pothole repairs.

DPW Policy 24 Section 24.8 states to ensure service level agreements and customer service expectations are met consistently, the Department's standard is to complete 95% of all service requests on time within the established service level agreements.

Pothole repair crews are not performing at the set performance levels. During the audit, we compared the completed pothole repair service requests for FY18, FY19, and FY20, and found the time to complete the requests increased from 3.48 to 5.29 days. This is based upon



approximately the same number of requests completed each year. In addition, the number of service requests completed late increased from 5.6% in FY18 to 27.48% in FY20.

CWS management is aware of the slower response time of the pothole crews. According to the Street Maintenance Manager, his crews get pulled off for special requests by Council or Administration and so service requests aren't handled timely. During the majority of last year, there was only one truck in service due to staffing levels. This is due partially to the loss of experienced staff and turnover. In addition, pothole crew drivers are reassigned to high priority areas such as garbage routes when vacancies arise.

### **Recommendation 6:**

We recommend Public Works review the pothole repair process and set a time that is acceptable to address citizen's safety and service requests. Consideration should be given to adopting completion times similar to Knoxville which has comparable lane miles and patch trucks in service and have a set response time of 48 hours.

*Auditee Response: We concur with the audit finding and recommendation.*

### **Recommendation 7:**

We recommend Public Works update all written procedures manuals with the same SLA requirement. CWS staff should be provided the updated SOP's and this should be documented.

*Auditee Response: We concur with the audit finding and recommendation.*

### **Recommendation 8:**

We recommend Public Works ensure they are meeting the performance measurements as stated in DPW 24 Section 24.8 which sets an on-time completion rate of 95% on pothole repair service requests.

*Auditee Response: We concur with the audit finding and recommendation. Currently, we have several vacancies which affect the efficiency of the pothole crews.*

**Accurate pothole  
repair data is  
needed to make  
informed decisions.**

Geographic Information Systems (GIS) are being utilized by jurisdictions more every year. Currently, these systems have become more important as the General Accounting Standards Board continues to develop and implement accounting policies that require jurisdictions

record and monitor the value of rights-of-way infrastructure and other activities. Some jurisdictions are also taking advantage of these enhanced requirements to incorporate tracking systems within developed GIS programs to monitor maintenance activities more effectively.<sup>2</sup>

Pothole repair data should be an integral part of the information used by CDOT to accurately calculate the pavement condition index (PCI), which is the principal tool used to determine which streets should be paved. Pothole repair location, data, size, etc., are integral elements in helping to calculate the PCI of streets.

When an address is put into Accela it is geocoded. Currently, all of the pothole and distressed pavement service request GPS locations are uploaded to *CDOT's Asset Management Web Map*. This provides CDOT and CWS a view of where the potholes are occurring and they can use this information to setup paving projects and adjust the PCI.

However, not all pothole requests become filled potholes. To provide a more accurate picture of the condition of the streets, only the filled potholes requests should be provided to CDOT. Also, when the pothole repair crews fill potholes not associated with a service request, these locations are not, but should be, captured in the system.

Nashville uses an iPhone app from NuOrigin for their pothole repair crews to use in the field. When the crew arrives at the pothole repair location they use the app to pinpoint their location. They take before and after pictures of the pothole. These pictures, along with the geocoded location of the pothole repair, are sent to the Paving Department. The Paving Department uses the pictures to code the repair for a more permanent fix such as an infrared repair or base failure etc. They use the GPS location of the repairs to continually update pavement conditions and plan future paving projects.

Currently, the City's Fleet Director has procured a new on board vehicle system that will be implemented soon. This system will include navigation, and GPS tracking as well as other features. The system will be available to all City departments. This system may have features that could be used by CWS to provide accurate location of pavement repairs.

## **Recommendation 9**

We recommend Public Works consider investing in new technology or utilize currently available technology to accurately identify the location of pavement repairs, provide navigation, as well as, other

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<sup>2</sup> Federal Highway Administration Utility Cuts - Design

features to help in the efficiency and safety of the pothole repair crews. Further, we recommend Public Works ensure accurate digital pothole repair data is available to CDOT.

***Auditee Response:** We concur with the audit finding and recommendation.*

**Written policies need updating.**

The CWS procedures are not comprehensive and do not include step-by-step instructions for the pothole repair employees. The procedures should be updated to match current practices. This is especially true because CWS management has been using crew workers from other divisions to fill in for the pothole repair crew's vacancies. It makes it difficult for new employees to perform job duties properly without up-to-date written procedures.

DPW SOP Road Repair provides some detailed steps of the pothole repair process. However, the policy has outdated language and doesn't cover some of the current practices such as:

- Using Accela to process service requests.
- Pothole repair crews using a tablet to close out the service requests in Accela as the potholes are filled.
- The use of the *Daily Patching Worksheet* and how it should be filled out properly

**Recommendation 10:**

We recommend Public Works update written Standard Operating Procedures on pothole repair operations and ensure the receipt of the revised policies be documented for each employee.

***Auditee Response:** We concur with the audit finding and recommendation.*

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## APPENDIX A: SCOPE, METHODOLOGY AND STANDARDS

Based on the work performed during the preliminary survey and the assessment of risk, the audit covers of the operations of CWS pothole repairs from July 1, 2019 to November 13, 2020. When appropriate, the scope was expanded to meet the audit objectives. Source documentation was obtained from CWS, Human Resources, Fleet, GIS and CDOT. Original records as well as copies were used as evidence and verified through physical examination.

To develop our recommendations, we reviewed City Code, Public Works policies and procedures, and industry best practices.

To achieve the audit's objectives, reliance was placed on computer-processed data contained in the Accela system. We assessed the reliability of the data contained in the system and conducted sufficient tests of the data. Based on these assessments and tests, we concluded the data was sufficiently reliable to be used in meeting the audit's objectives.

We conducted this performance audit from September 15, 2020 to February 4, 2021 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.

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