



CITY OF RICHMOND
CITY AUDITOR

DATE: August 27, 2018

TO: Selena Cuffee-Glenn
Chief Administrative Officer

FROM: Louis Lassiter
City Auditor

SUBJECT: Department of Public Utilities / Utility Cut Repairs Audit

The City Auditor's Office has completed the Utility Cut Repairs audit and the final report is attached.

We would like to thank the staff in DPU for their cooperation and assistance during this audit.

Attachment

cc: The Richmond Audit Committee
The Richmond City Council
Mr. Robert Steidel, DCAO of Operations
Mr. Calvin Farr, Director of DPU

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2019-02
Department of Public Utilities
Utility Cut Repairs

City of Richmond, VA
City Auditor's Office
August 27, 2018



Executive Summary.....	i
Background, Objectives, Scope, Methodology	1
Findings and Recommendations	5
Address Locations	Appendix A
Management Responses.....	Appendix B

Highlights

Audit Report to the Audit Committee,
City Council, and the Administration

Why We Did This Audit

The Office of the City Auditor conducted this audit as part of the FY18 audit plan approved by the Audit Committee.

This audit focused on the Utility cut repairs performed by an outside contractor for the City.

What We Recommend

- *The Trades Superintendent establish an oversight process to ensure the inspectors only approve restorations that meet DPW's quality standards.*
- *The Gas Works and Lights Deputy Director have all permanent asphalt repairs still under warranty re-inspected to determine the quality of repairs. For those identified as poor quality, the Deputy Director should have the contractor repair them according to DPW's quality standards at no cost to the City.*
- *The Trades Superintendent ensure the Street Restoration contractor does not perform Street Restoration work when the ambient temperature is below the desired temperature for asphalt and that inspectors are present when repairs are done.*

We also issued other recommendations related to internal controls.



Department of Public Utilities

Utility Cut Repairs

Background

During gas and water leak emergencies, the Department of Public Utilities (DPU) has to make cuts in the streets, sidewalks, and alleys to repair the underground infrastructure. Once leaks are addressed, these cuts are temporarily patched using a cold mix asphalt material to ensure the roads are safe for vehicular and foot traffic until they can be permanently repaired. Permanent repairs are made by removing the temporary asphalt and replacing it with a hot mix asphalt material. If the road surface is not asphalt, the contractor restores the patch using the appropriate materials (i.e. cobblestone, brick).

DPU entered into an annual \$5 million dollar contract to restore the temporary patches to their permanent state. The Paving Unit within DPU is responsible for overseeing the permanent repairs performed by the contractor.

Commendations

Coordination with the Department of Public Works

- DPU has monthly and bimonthly meetings to coordinate cuts and paving work with the Department of Public Works (DPW). They also send out daily emails to notify DPW where repairs are being made.

Contractor Payments

- Payments to the contractor tested were found to be in agreement with contract pricing and properly supported.

Needs Improvements

Finding #1 - Repairs Quality

- 10 of 25 permanent repairs reviewed were not according to standards repairs (dips, not squaring, etc.). One of the five temporary repairs reviewed was bad.
- The City could be paying approximately \$1.2 million per contract year for poor repairs that will have to be repaired again in the near future.

Finding #2 – Accountability

- Some Inspectors did not sign the paving tickets. Without signatures, the City's exposure to financial loss due to inappropriate repairs increases.
- A list of warranty inspections could not be provided as the Paving Unit did not maintain documentation demonstrating warranty inspections were conducted.

Finding #3 - Bad Weather Repairs

- 263 permanent repairs were either done in bad weather or on weekends/holidays without an inspector being present.

Finding #4 - Repairs Timeframe

- 22% (1,006) of the paving tickets were not completed by the due date. Of those, 54% were completed more than 30 calendar days after the due date.

Finding #5 - Paving Tickets Backlog

- The Paving Unit had a backlog of 592 restoration tickets. 44% (263) of the open tickets were past their due date and 56% (329) had not reached their due date.

Management concurred with 6 of 6 recommendations. We appreciate the cooperation received from management and staff while conducting this audit.

BACKGROUND, OBJECTIVES, SCOPE, METHODOLOGY, MANAGEMENT RESPONSIBILITY and INTERNAL CONTROLS

This audit was conducted in accordance with the Generally Accepted Government Auditing Standards promulgated by the Comptroller General of the United States. 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 the audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on the audit objectives.

BACKGROUND

Overview

During gas and water leak emergencies, the Department of Public Utilities (DPU) makes cuts in the streets, sidewalks, and alleys to repair the underground infrastructure. Once leaks are addressed, if the cut is on the street, these cuts are temporarily patched using a cold mix asphalt material to ensure the roads are safe for vehicular and foot traffic until they can be permanently repaired.

DPU entered into an annual \$5 million dollar contract with a contractor to restore the temporary patches to their permanent state. The Paving Unit within DPU is responsible for overseeing the permanent repairs performed by the contractor. Permanent asphalt repairs are made by removing the temporary asphalt and replacing it with a hot mix asphalt material.

Staffing

The Paving Unit for the permanent patches is comprised of a Trades Superintendent and three Construction Inspectors. The Unit is overseen by an Operations Manager.

Process

The initial emergency cuts and temporary patches are done by a contractor or City crews. Once a

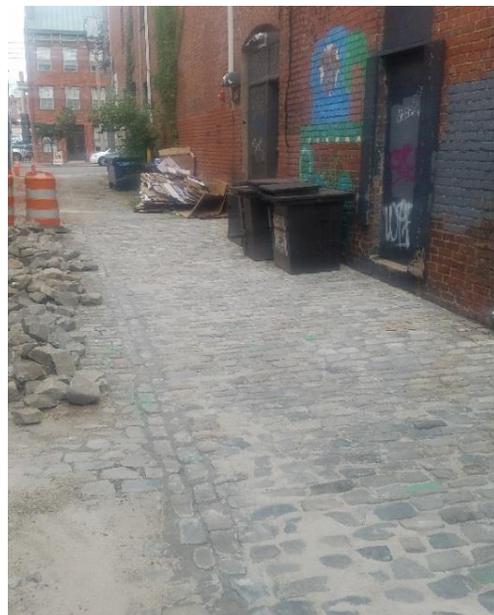
temporary patch is in place, the contractor and City crews submit a daily report of their work to DPU. DPU staff keys the daily work into the Customer Information System (CIS) requesting the permanent repair be conducted.

A DPU inspector identifies the weekly workload and submits it to the restoration contractor. The paving ticket (work order) notes the size of the cut, the contractor/City crew who performed the cut, the date, and the location of the patch. The restoration contractor has 30 working days (42 calendar days) in which to complete the repairs. If the weather is not conducive to conduct their work, a day is added to the due date for each bad weather day.

The DPU inspectors map out the sites where the restorations (permanent patches) are to be performed. They lay out the work parameters before the contractor performs the repairs. Once the permanent restoration is made, the contractor submits the tickets to the inspector. Once received, the inspector closes the work order in CIS.

Below are some pictures (before and after) taken by the auditors during the audit.

Cobblestone Repair Before (Left) and After (right)



Asphalt Repair Before (left) and After (right)



Concrete Repair Before (left) and After (right)



OBJECTIVES

The objective of this audit was to determine whether cut repairs are completed in an effective and timely manner to minimize safety impacts to the public and in accordance with contract provisions.

SCOPE

All functions, expenses, inspections, repairs, and actions in relation to the utility cut repairs for calendar year 2017 and the current environment.

METHODOLOGY

The auditors performed the following procedures to complete this audit:

- Interviewed management and staff;
- Reviewed and evaluated relevant policies and procedures and tested for compliance;
- Reviewed hard copy files and tested expenditures; and
- Performed site visits and other tests, as deemed necessary.

MANAGEMENT RESPONSIBILITY

City management is responsible for ensuring resources are managed properly and used in compliance with laws and regulations; programs are achieving their objectives; and services are being provided efficiently, effectively, and economically.

INTERNAL CONTROLS

According to the Government Auditing Standards, internal control, in the broadest sense, encompasses the agency's plan, policies, procedures, methods, and processes adopted by management to meet its mission, goals, and objectives. Internal control includes the processes for planning, organizing, directing, and controlling program operations. It also includes systems for measuring, reporting, and monitoring program performance. An effective control structure is one that provides reasonable assurance regarding:

- Efficiency and effectiveness of operations;
- Accurate financial reporting; and
- Compliance with laws and regulations.

Based on the audit test work, the auditors concluded that internal controls for the utility cut repairs process need improvement. Improvements are needed within the ticket approval and inspection processes, which are discussed throughout the report.

FINDINGS and RECOMMENDATIONS

What Works Well

Coordination with the Department of Public Works

Prior to performing cuts, two different meetings occur to coordinate the efforts of the teams/contractors making cuts and those that are paving. One is the Utility Coordination Meeting where the attendees discuss planned street cuts. This meeting occurs on a bi-weekly basis. Some of the attendees include representatives from Dominion Power, Comcast, VCU, Verizon, DPU and DPW. The other meeting is the Paving Coordination Meeting, which occurs monthly. During this meeting DPW lays out their paving schedule and runs it by DPU to see if they have any conflicts with cuts that are forthcoming. These two meetings are to coordinate for all planned cuts in the streets.

The repairs reviewed for this audit were mainly restoration of unplanned/emergency cuts. DPU coordinates patching work with DPW via daily emails. The email is sent to both DPU and DPW staff noting the repairs for the day.

Contractor Payments

When paving tickets are completed and turned in, the inspectors add the ticket information to their tracking system to include ticket number, who repaired it, and the line item totals based on the contract. During the audit scope, they switched from tracking the completed ticket

information in excel to Access in order to run reports for payment. The contractor submits an invoice for their work and they are paid on a monthly basis. The Paving Unit prints the paving reports which generates an estimate and compares the totals. If they match, they are approved and paid.

The auditors reviewed the paving report details for two months and noted:

- The contractor's invoices matched DPU's cost calculations,
- All line item prices matched the contract, and
- The invoice amounts matched the payments in RAPIDS.

To verify DPU's calculations, the auditors traced all 264 paving tickets for one of the tested months with a value of \$741,234 to their actual tickets to verify the work was performed and documented on the tickets. The auditors found no exceptions.

In addition, the auditors reviewed the paving tickets with matching addresses (349) and tested those with duplicates in:

- cut dates,
- request/repair dates,
- cost codes, and
- work descriptions.

The auditors found that 10 tickets (5 pairs) were potential duplicates. After further review, four pairs were determined not to be duplicates. The remaining pair was a duplicate but was properly noted on the paving ticket and was not paid by DPU.

Needs Improvement

Finding #1 - Repairs Quality

During the period of January 2017 through May 2018, DPU completed 3,177 asphalt cut repairs (this total includes some driveways, alleys, ditches, etc.). The auditors tested the quality of 25 asphalt street repairs. The auditors also selected five open temporary cut repairs (out of 228 as

Richmond City Auditor's Report# 2019-02
Department of Public Utilities – Utility Cut Repairs
August 27, 2018

of July 2018). The samples selected were geographically diverse and covered multiple areas within the City. **See Appendix A**

The auditors conducted physical observations of the sites selected for testing noting whether the repairs were:

- Squared,
- Even with the road,
- Enveloped, and
- Of good quality.

Of the 25 permanent repairs selected, 15 were deemed to be good repairs and 10 were deemed bad and not meeting contract standards. For the bad repairs, the auditors noted some that were not even with the road, had 1/4 to 3/4 inch holes in the edges, and were not squared. The auditors also noted a concrete street was repaired incorrectly with asphalt. The chart below depicts the observations identified:

Observation Identified	Number of Cuts per Observation
Not Squared	5
Not Leveled with Road	2
Cracking/Holes at Edges	3
Wrong material	1

**More than 10 as one cut was poor quality for multiple reasons.*

Source: Auditor Prepared

Below are some pictures of poor quality repairs:



Concrete street restored with Asphalt, not squared.



Marks from where temporary was dug up creating $\frac{1}{4}$ inch dips in road.



$\frac{3}{4}$ inch deep at the corner of the repair made in February 2018.

Source: Photos Taken by the auditors



Not even with the road. Between $\frac{1}{4}$ and $\frac{1}{2}$ inch.

In addition, five of the permanent repairs deemed as good, need improvement. These repairs were not enveloped as required by DPW's standards. This means that the structure of these repairs could become compromised as they may retain water in the space between the two asphalt materials and reduce the life of the patch leading to additional potholes within the City.

For the temporary patch observations, the auditors noted four were good quality patches. The auditors observed one repair in an alley which was of poor quality as it had tire marks in it and too much asphalt was applied.

The paving restoration contract is worth \$5 Million per year of which approximately 60% or \$3M is asphalt. The auditors noted 40% of the sampled asphalt restoration repairs were not acceptable to DPW's standards. This means the City is spending money on repairs that in time will need to be repaired again due to their poor quality. All of the asphalt repairs reviewed were performed within a year of the visit by the auditors and are still under warranty (1 year warranty). As this is not a statistical sample, it cannot be said that 40% of the cuts are bad across the population. But if it were representative of the entire population of asphalt repairs, then the City could be getting approximately \$1.2 million ($\$3M \times 40\%$) per contract year of poor repairs that will eventually have to be repaired again in the near future.

According to the Department, the Paving Unit inspects all restorations once completed. However, based on the auditors' observations, either the inspectors did not inspect the quality of the repairs or did not visit the sites after completion of the repairs. In addition, better oversight of the inspection process is needed.

Recommendations:

- 1. We recommend the Trades Superintendent establish an oversight process to ensure the inspectors only approve restorations that meet DPW's quality standards.*
- 2. We recommend that the Gas Works and Lights Deputy Director have all permanent asphalt repairs still under warranty re-inspected to determine the quality of repairs. For those*

identified as poor quality, the Deputy Director should have the contractor repair them according to DPW's quality standards at no cost to the City.

Finding #2 - Accountability

During the audit scope, some inspectors did not sign the paving tickets. The auditors noted the paving tickets exhibited slashes across the page to note their approval. The Trades Superintendent did not require the inspectors to sign/initial the paving tickets. When approving documentation that supports payment to the contractor, an employee should sign or initial the paperwork to demonstrate that the work performed has been inspected and performed according to DPW's quality standards. Without signatures, the City's exposure to financial loss due to inappropriate repairs increases.

In addition, according to the restoration contract, the work performed by the contractor is guaranteed for one year. As a result, DPU established procedures to inspect these repairs nine months after completion. The auditors requested a listing of these inspections conducted during the scope of the audit. However, this could not be provided as the Paving Unit did not maintain any documentation to demonstrate the number of warranty inspections conducted.

Recommendations:

- 3. We recommend the Trades Superintendent ensure that inspectors sign/initial the paving tickets to demonstrate the permanent patches have been inspected and meet DPW's quality standards.***
- 4. We recommend the Gas Works and Lights Deputy Directors establish documentation procedures to track 9-12 month final inspections (warranty) to enable management to monitor the inspectors' work load.***

Finding #3 - Bad Weather Repairs

Permanent restorations are dependent on ambient temperature. For example, asphalt repairs should not be performed when the temperature is below 50 degrees. When temperatures are too low, the materials cool quicker and may fall apart.

The auditors analyzed the dates the contractor performed the work and compared those days with the ambient temperature to determine if patches were placed when the weather was below the desired temperature. The auditors reviewed some hard copy paving tickets to verify whether the completion date in the CIS system was accurate, and noted 263 repairs were completed on bad weather days or on weekends/holidays without an inspector present. The Department stated the contractor should not work on days an inspector is not present.

Recommendation:

- 5. We recommend that the Trades Superintendent ensure the Street Restoration contractor does not perform Street Restoration work when the ambient temperature is below the desired temperature for asphalt and that inspectors are present when repairs are done.***

Finding #4 - Repairs Timeframe

According to the Restoration Contract, the contractor must complete each paving ticket within 30 working days (42 calendar days). If the ambient temperature is not conducive to perform the repairs, days are added and a new due date is established.

In order to obtain a due date reflective of bad weather, the auditors obtained weather data for Richmond from the National Climatic Data Center (NCDC). The auditors went through and conservatively removed bad weather days and established a new due date for each work order based on the ambient temperature. The auditors also removed City Holidays and weekends for the calculation.

Based on this removal, the auditors analyzed the completion time for each paving ticket completed from January 2017 to May 2018 (4,600) and found that the contractor only completed 78% (3,594) of the paving tickets by the revised due date. Of the 1,006 that were not completed on time, 54% were completed more than 30 calendar days after the revised due date.

Finding #5 - Paving Tickets Backlog

The auditors noted, as of May 2018, the Paving Unit had a backlog of 592 restoration tickets. After updating the due dates for bad weather, 44% (263) of the open tickets were past their due date and 56% (329) had not reached their due date.

	Open Cuts	Past Due	Not Yet Due
Asphalt	294	111	183
Concrete	103	35	68
Cobblestone/Brick	46	25	21
Top Soil Gravel	149	92	57
	592	263	329

Source: Auditor Prepared from CIS Data

Of the 263 past due tickets, 11% (30) were at least 30 days past due. The Department experiences a constant backlog of paving tickets as the contractor cannot perform the work during certain months of the year due to bad weather. In addition to the bad weather, emergency cuts and temporary repairs done during the winter add to their backlog. The auditors noted the Department increased the contract amount in an attempt to address the contractor's backlog. The increase will assist in the contractor adding another crew to address the timeliness of repairs. The Gas Works and Lights Deputy Director stated he runs weekly reports to monitor outstanding cut repairs in order to prioritize the workload.

Recommendation:

- 6. We recommend that the Gas Works and Lights Deputy Director continue to monitor the backlog and apply additional resources (additional crews/contractors) as funding is available.*

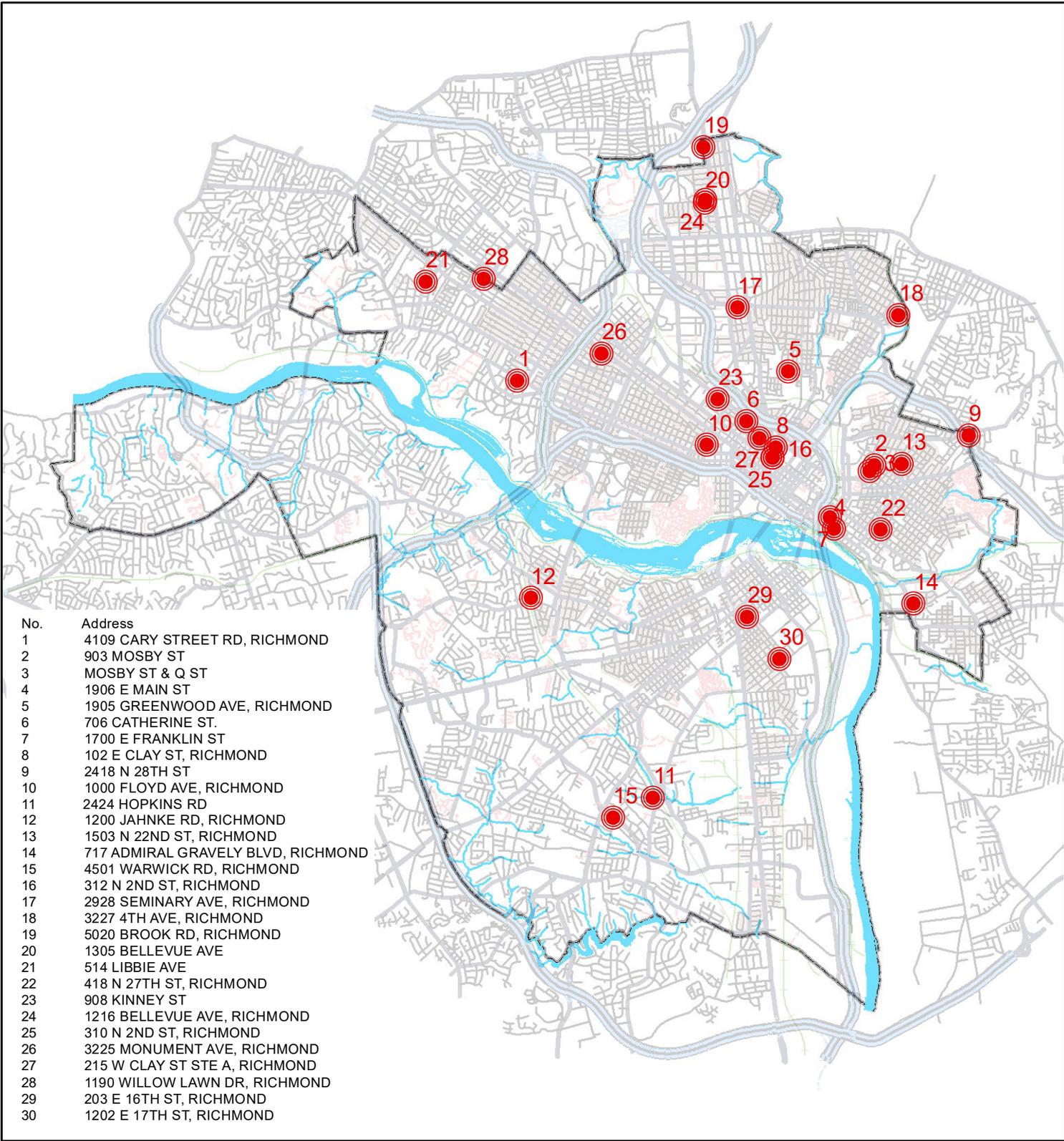
Other Information

ArcGIS

DPU and DPW are working towards using the ArcGIS data system for utility cut repairs. The system is based on GIS data that pinpoints the exact location of the work performed. The inspector/contractor will be able to add information such as type of cut/repair and update its status. It will give real time results as to the status of repairs. When DPU or DPW view the map,

they can easily see where cuts are being made/repared and their current status. This will also increase accountability over the contractors' work. As the street quality responsibility belongs to DPW, they can send their inspectors to check the quality of some of the repairs. They will know who performed the repairs and who to notify of any bad repairs.

Address Locations



July 31, 2018

1 inch = 8,855 feet

APPENDIX B: MANAGEMENT RESPONSE FORM

2019-02 DPU Utility Cut Repairs Audit

#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
1	We recommend the Trades Superintendent establish an oversight process to ensure the inspectors only approve restorations that meet DPW's quality standards.	Y	The Trades Superintendent & Operations Manager will train the Paving Inspectors to DPW's paving & restoration standards. DPW Right of Way Management will be invited to assist with the training.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Trades Superintendent & Operations Manager		15-Sep-18
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
			Each Inspector and contractor will receive a copy of DPW's Paving & Restoration Standards. Once the training has been completed the inspectors will only approve restorations which meets DPW's standards.
#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
2	We recommend that the Gas Works and Lights Deputy Director have all permanent asphalt repairs still under warranty re-inspected to determine the quality of repairs. For those identified as poor quality, the Deputy Director should have the contractor repair them according to DPW's quality standards at no cost to the City.	Y	Once the Deputy Director receives a list of all utility cuts from the Auditors office which the quality of repairs were identified as poor, the Deputy Director & Operations Manager will review them and the contractor will repair in accordance with DPW's standards.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Deputy Director II & Operations Manager		30-Sep-18
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
			The Deputy Director II & Operations Manager will review and analyze each utility cut identified by the Auditors a poor quality restoration to determine whether the repairs do not meet DPW's paving & restoration standards, and the contractors will restore the cuts at no cost to the city. The cuts we deem do meet with DPW's standards Richmond Gas Works will request a conference with the Auditors and DPW Right of Way Management to discuss.
#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
3	We recommend the Trades Superintendent ensure that inspectors sign/initial the paving tickets to demonstrate the permanent patches have been inspected and meet DPW's quality standards.	Y	Construction Inspectors are signing each paving & restoration workorder indicating the permanent restoration patch has been inspected.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Trades Superintendent		Immediately
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
			Paving & Restoration Inspectors are required to sign each paving ticket to demonstrate the permanent patch have been inspected.

APPENDIX B: MANAGEMENT RESPONSE FORM
2019-02 DPU Utility Cut Repairs Audit

#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
4	We recommend the Gas works and Lights Deputy Directors establish documentation procedures to track 9-12 month final inspections (warranty) to enable management to monitor the inspectors' work load.	Y	Construction Inspectors will re-inspect all utility cuts within 9 months prior to the warranty running out, the Inspector will sign all warranty tickets. Construction will inspect final inspection warranty tickets on rain days when the contractor is not working.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Deputy Director II & Operations Manager		15-Sep-18
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
5	We recommend that the Trades Superintendent ensure the Street Restoration contractor does not perform Street Restoration work when the ambient temperature is below the desired temperature for asphalt and that inspectors are present when repairs are done.	Y	Richmond Gas Works will review the auditors investigation for any and all asphalt restoration performed at temperatures below 40 degrees.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Trades Superintendent		31-Oct-18
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
			Asphalt restoration for temperatures below 40 degrees will not be allowed.
#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
6	We recommend that the Gas Works and Lights Deputy Director continue to monitor the backlog and apply additional resources (additional crews/contractors) as funding is available.	Y	Deputy Director II will continue monitoring the backlog of all utility cuts, once Richmond Gas Works is able to hire a third Paving Restoration Inspector, the contractor will be required to add an additional restoration crew.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Deputy Director II		31-Jan-19
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
			Deputy Director II will add a third asphalt Construction Inspector to the Paving Department.