



Audit of Roadway Quality Management Audit

Follow-Up Review

The Streets Division has developed and has generally implemented processes to improve roadway construction quality assurance.

In addition, the Division has improved its usage of the work order system through training and correction of some system update errors. Finally, all procurement concerns have been corrected.

Audit Team

City Auditor

Madison Rorschach, CIA, CGAP

Audit Staff

Amber Jackson, MBA, CFE

Table of Contents

Follow-Up at a Glance	3
Introduction	4
Management Responsibility	4
Audit Objectives, Scope, and Methodology	4
Recommendation Status Update	6
Roadway Rehabilitation Quality Cannot Always be Assured	6
Changes to Street GO Bond Administration Could Further Enhance Transparency	7
Data Issues Impede Pavement Monitoring Effectiveness	9
Potential Cost Savings May Exist in the Purchasing Process	11
Current Management Structure Indicates Redundancy	12
Appendix A: Roadway Maintenance & Improvements Terminology.....	14

Follow-Up at a Glance

Why we did this Follow-Up:

This report is intended to provide information on what changes have been made in response to the Audit of Roadway Quality Management issued in October 2019. The original audit evaluated the City's ability to safeguard and improve the City's roadway network. This follow-up review was included on the City's fiscal year 2020-21 Annual Audit Plan as approved by the City Council.

What we Found:

The Streets Division has developed and has generally implemented processes for approving street rehabilitation design adjustments, inspecting in-house roadway rehabilitations, and retaining quality assurance documentation. In addition, the Division has generally improved its usage of the work order system through training and correction of some system update errors. Finally, all procurement and Division structure issues identified in the original audit have been corrected. The status of each recommendation is summarized below:

Recommendation	Mgmt. Response	Status
1. Develop standardized process for recording/approving street rehabilitation design adjustments.	Concur	In Progress
2. Develop a record retention system for inspections & geotechnical reports.	Concur	Implemented
3. Require Streets Field Supervisors to submit periodic inspection reports.	Concur	In Progress
4. Consider including street connectors in bond program proposals in the future.	Concur	Implemented
5. Develop a process to document street segments in each project.	Concur	Implemented
6. Consider accounting for each GO bond series in a separate fund.	Partially Concur	Implemented
7. Include up-to-date installed date info in Cartegraph.	Partially Concur	Implemented
8. Consider adjusting the amount of OCI points added for street overlays.	Partially Concur	Implemented
9. Provide training for crew leaders entering WO info into Cartegraph.	Concur	Implemented
10. Check for HUBs when obtaining applicable quotes.	Concur	Implemented
11. Contract for the rental of signs and barricades.	Concur	Implemented
12. Revise the Streets Operations Manager & Streets & Traffic Superintendent job descriptions.	Concur	Implemented

Introduction

The Internal Audit Department is responsible for providing: (a) an independent appraisal¹ of City operations to ensure policies and procedures are in place and complied with, inclusive of purchasing and contracting; (b) information that is accurate and reliable; (c) assurance that assets are properly recorded and safeguarded; (d) assurance that risks are identified and minimized; and (e) assurance that resources are used economically and efficiently and that the City's objectives are being achieved.

The Internal Audit Department has completed a follow-up review of the Audit of Roadway Quality Management issued in October 2019. 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.

Management Responsibility

City management is responsible for ensuring that 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.

Audit Objectives, Scope, and Methodology

This report is intended to provide a progress update on recommendations from the [Audit of Roadway Quality Management \(October 2019\)](#), which evaluated the City's ability to safeguard and improve its roadway network.

Audit fieldwork was conducted during September 2021. The scope of review varied depending on the procedure being performed. The following list summarizes major procedures performed during this time:

- Reviewed documentation from the original audit to develop criteria including industry standards, best practices, policies, procedures, and the issued report;
- Analyzed Streets Division work orders completed since October 2019 to determine if they contained complete information;

¹ The City of Denton's Internal Audit Department is considered structurally independent as defined by generally accepted government auditing standard 3.56.

- Evaluated 15 rehabilitation work orders² to determine if quality assurance documentation was appropriately retained;
- Examined Streets Division purchase orders issued during fiscal year 2019-20 as well as streets bundle bid plans finalized since October 2019 and the signs and barricades rental contract executed in June 2019;
- Interviewed City staff from the Finance Department, Public Works Department, and Engineering & Capital Improvement Projects Department; and
- Reviewed select Streets Division job descriptions as well as the City's fiscal year 2020-21 general pay plan.

² Rehabilitation work orders include roadway reconstructions and roadway overlays; see Appendix A for additional information on the types of roadway maintenance and improvements performed by the Streets Division.

Recommendation Status Update

This report summarizes the Audit of Roadway Quality Management's recommendations, management responses, and the Internal Audit Department's follow-up findings, which describe to what extent City management has implemented Internal Audit's recommendations since publication of the original report in October 2019.

Roadway Rehabilitation Quality Cannot Always be Assured

1. **Develop a standardized process for recording and approving design adjustments to in-house street rehabilitation projects.**

Management Response: Concur

Staff will implement process controls for deviation from recommendations. This will include written documentation escalated and signed by management to approve the deviation. SOPs (standard operating procedures) will be created and all employees will be trained on the process.

Audit Follow-Up Finding: In Progress

The Streets Division has developed a change order form that they intend to use to document requests and approvals of changes to street rehabilitation projects; however, the Division has not had an opportunity to use this form since its creation during the summer of 2021. A standard operating procedure was implemented in October 2021 to formalize this change order process.

2. **Develop a record retention system to store inspection reports and geotechnical reports for each street rehabilitation project according to the Texas State Library and Archives Commission's regulations.**

Management Response: Concur

Staff will establish SOPs (standard operating procedures) for record retention. Cartegraph, our internal work order system, can be structured so that all pertinent documents to the specific job are stored in the system and reports can be run to retrieve the data.

Audit Follow-Up Finding: Implemented

The Streets Division adopted a standard file folder format for their rehabilitation projects in 2019. Based on a review of eight reconstruction projects completed since October 2019, the file folders for five of the projects appear to align with the adopted format. In addition, six of these projects had appropriate subgrade testing documentation that was retained and could be found. While two projects did not have retained subgrade testing documentation, these projects were completed in 2019.

Projects completed since then generally appear to have adequately retained subgrade testing documentation.

3. Require Streets Field Supervisors to submit periodic inspection reports as part of the quality acceptance decision-making process for street rehabilitation projects.

Management Response: Concur

Standardized inspection documentation will be created and implemented. These documents will be specific to the work being performed, (mill and overlay, micro seal, reconstruction, etc.), archived in the Cartegraph system, and tied to the work order. SOPs (standard operating procedures) will be created and all employees will be trained.

Audit Follow-Up Finding: In Progress

Based on discussions with staff from the Streets and Public Works Inspections Divisions, Streets has worked with Public Work Inspections to design an inspections process for Streets in-house rehabilitation projects.

Under this process, the Streets Division would request an inspection through the City's construction management software. The inspection would then be performed by Public Works Inspections staff using standardized inspection checklists that are also used for the City's capital improvement projects. The results of these inspections would then be retained in the construction management software.

While this process appears to be designed effectively, Public Works Inspections has not begun performing inspections for Streets' in-house projects. These inspections are scheduled to begin in early fiscal year 2021-22.

Changes to Street GO Bond Administration Could Further Enhance Transparency

4. Consider including street connectors³ in bond program proposals in the future to better estimate costs and provide greater transparency to residents.

Management Response: Concur

³ Street connectors are those street segments near or in between street segments with a low overall condition index – or OCI – score that have higher OCIs that would typically indicate the street segment does not need to be rehabilitated.

Staff will recommend implementing this practice to the Bond committee. The ultimate decision is left up to the committee. Staff will follow Bond Committee and City Council direction.

Audit Follow-Up Finding: Implemented

After completion of the original audit, the City held an election in November 2019 for citizens to vote on the issuance of new general obligation bonds.⁴ Some of this funding was intended to be used to rehabilitate street segments with low overall condition index – or OCI – scores.⁵ Once the issuance of these general obligation bonds was approved, this set of street segments was known as the 2019 Street Bond Program.

According to the Streets Division, they worked with the City's utilities to identify street segments that would need to be replaced soon due to utility work that were near low OCI segments identified as part of the 2019 Street Bond Program. The City has since awarded two solicitations for rehabilitation of street bundles – or several street segments in the same area – to begin completing construction on the 2019 Bond Program.

Based on review of the construction plans included in these solicitations, both street bundles included connector street segments as identified by the Streets Division.

5. Develop a process to consistently document the street segments included in each project.

Management Response: Concur

Staff will restructure the intake portion of the workorder system to more efficiently tie street segments together on larger jobs. SOPs (standard operating procedures) will be created and all employees will be trained in the new process.

Audit Follow-Up Finding: Implemented

The Streets Division has identified a way to link different work orders together under one project in their work order system and are currently in the process of completing the first project using this methodology. Once this project is complete, they plan to formalize this process in a standard operating procedure and use it for projects going forward.

⁴ General obligation bonds are a common type of municipal bond that is secured by a local government's pledge to use legally available resources, including tax revenues, to repay bond holders.

⁵ The overall condition index score is an indicator of a streets condition based on visible pavement distresses, road roughness, and structural integrity.

6. Finance should consider accounting for each general obligation bond series in a separate fund.

Management Response: Partially Concur

The consolidation of bond funds was implemented in 2014 to streamline the tracking of project costs and expenses of bond proceeds. Among other benefits, consolidation limits the number of funds necessary to account for project construction costs. The City's Bond Counsel approved of consolidation, and the City's annual external audits have approved capital project expenditures related to bond related projects.

Following the approval of a new bond program, staff will consider all options for bond fund accounting.

Audit Follow-Up Finding: Implemented

The City is currently accounting for 2012 and 2014 general obligation bond revenues in one fund as identified in the original audit; however, general obligation bond revenues associated with the 2019 Bond Program are being accounted for in a separate fund. Table 1 summarizes allocated general obligation bond program revenues for street reconstruction.

Table 1: Summary of Street Reconstruction GO Bond Funding (Millions)

Bond Series	Allocated Bond Amount	Revised Project Cost	Spent Amount
2012	\$20.0	\$22.8	\$25.9
2014	\$24.0	\$32.8	\$28.9
2019	\$70.0	\$70.0	\$5.2
All:	\$114.0	\$125.6	\$60.0

Data Issues Impede Pavement Monitoring Effectiveness

7. Include up-to-date installed date⁶ information in the Cartegraph system.

Management Response: Partially Concur

Staff will work with IT to update the installed date for older infrastructure pulling information from GIS. While the install date is important it is not vital. With regular pavement studies the street condition is evaluated at that time and a maintenance plan is established on the current condition.

Audit Follow-Up Finding: Implemented

⁶ The install date is when the road was constructed and put into service.

As part of the City's periodic OCI update process, the Streets Division asked the consultant to estimate the install date for all of the City's roadways. This estimated information will be entered into the City's work order system along with the updated OCI. Similarly, the install date for all newly constructed street segments is recorded in the work orders system.

In addition, the Streets Division appears to have corrected an issue in the work order system that now allows a street segment's replace date to be updated when a reconstruction work order is completed. Based on review of eight reconstruct projects completed since October 2019, all had a reasonable replacement date.

8. Consider adjusting the amount of OCI points added to a street segment for overlays.

Management Response: Partially Concur

Staff will discuss the recommendation with the Pavement survey contractor. All performance curves and OCI adjustments are completion of work is a base line set by pavement analysis company. This company will be conducting another survey in the next fiscal year and will reevaluate at that time.

Audit Follow-Up Finding: Implemented

The Streets Division has been working with a consultant to inspect all City roadways to update each street segment's OCI. This reinspection process generally occurs every five years to ensure that the City is effectively monitoring the condition of its roadway network.

As part of the current reinspection process, Streets plans to discuss the amount of OCI points added to a street segment for overlays, however, a decision has not yet been made. While the process for updating OCI after an overlay has not necessarily been changed, periodically reevaluating this with the consultant adequately addresses the identified risk.

9. Provide training for crew leaders entering work order information into the Cartegraph system.

Management Response: Concur

Staff will create SOPs (standard operating procedures) and all employees will be trained on the process of work order entry.

Audit Follow-Up Finding: Implemented

The original audit found that there were some consistency issues in the information that was being entered into the Streets Division's work order system. Specifically, there were:

- Redundancy issues in the work order activity codes;

- Missing construction start dates from completed work orders; and
- Missing cost information from completed work orders.

According to Streets Division staff, Streets crews were trained in June 2020 on how to create and update work orders. While trainings were temporarily halted due to the COVID-19 Pandemic, they have begun again as of August 2021. The Division has also developed a list of acceptable work order activities in an effort to reduce redundancy.⁷

Based on an analysis of work orders, between fiscal year 2019-20 and fiscal year 2020-21, the percentage of work orders used by the Street Division that were on the acceptable activities list increased from 87.5 percent to 91.2 percent, indicating that consistency has increased. Similarly, the percentage of work orders missing start dates and cost information has significantly decreased as shown in Table 2.

Table 2: Work Order Information Completion Comparison

	FY2019-20	FY2020-21
Total Work Orders	2,049	2,911
Percent Acceptable Activity	87.5%	91.2%
Percent Missing Start Date	8.0%	0.9%
Percent Missing Cost Info	9.0%	1.8%

While the June 2020 training appears to have corrected most of the data issues, Streets should continue to ensure that field crew staff receive training on work order information entry completion to ensure these data issues do not return. According to Division management, they acquired a training program from the work order system company, which will be used to help train administrative and field staff in the future.

Potential Cost Savings May Exist in the Purchasing Process

10. **Check the Texas State Comptroller's website for related historically underutilized businesses when obtaining quotes for purchases between \$3,000 and \$50,000.**

Management Response: Concur

Staff has been trained on the correct process for properly quoting jobs. Continued education will continue as other Purchasing procedures are updated.

⁷ Work orders not on the acceptable activities list are not necessarily inappropriate for Streets crews to perform, but are similar to or part of activities on the acceptable list.

Audit Follow-Up Finding: Implemented

During fiscal year 2019-20, the Streets Division issued a total of \$8.2 million in purchase orders. About \$8.1 million was covered under a contract. The remaining \$121,411 were spent as shown in Table 3.

Table 3: Non-Contracted Streets Improvement Fund Purchases

Commodity	Compliant?	Total Purchases
Concrete Road Construction	Quotes Needed	\$36,428
Asphalt	Yes	\$30,000
Guard Rails	Yes	\$30,000
Backhoe Rental	Yes	\$12,328
Skid Steer Loader Rental	Yes	\$10,545
Professional Service	Exempt	\$2,110
All:		\$121,411

Based on review of the available purchasing documentation, all but one of these purchases appear to have been procured in accordance with Texas procurement regulations.

That being said, this purchase for concrete road construction was procured with a vendor that had a contract for similar work; however, it was not clear if this purchase was under this contract based on the documentation available in the City's financial system.

11. Contract for the rental of signs and barricades to mark road construction sites.

Management Response: Concur
Contract was approved by City Council June 18th.

Audit Follow-Up Finding: Implemented

The City entered into a contract for the rental of signs and barricades in June 2019. The City has spent \$314,266 under this contract to date.

Current Management Structure Indicates Redundancy

12. Revise the Streets Operations Manager and Streets & Traffic Superintendent job descriptions to more accurately reflect current job responsibilities.

Management Response: Concur
Duplicate level of supervision was eliminated with the retirement of the Streets Superintendent.

Audit Follow-Up Finding: Implemented

The Streets & Traffic Superintendent position has been eliminated and is no longer on the City's pay plan. The Streets Operations Manager job description adequately covers the responsibilities of both of the previous positions' job descriptions.

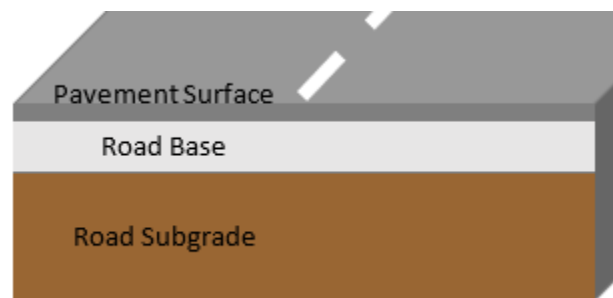
Appendix A: Roadway Maintenance & Improvements Terminology

No matter how well constructed, a roadway will deteriorate over time due to the effects of traffic loads and the environment. Roadway maintenance and improvements are used to slow down or reset this deterioration process. Generally, there are three different classifications of roadway maintenance and improvements that are further described below. Each of these maintenance and improvement techniques are useful at different points in the pavement's life cycle and typically cost decreasing amounts of money from rehabilitative to corrective to preventative techniques.

Rehabilitative improvements repair portions of an existing pavement to reset the deterioration process. The City uses asphalt overlays and concrete panel replacements to rehabilitate the pavement surface of a road. An overlay involves milling away the existing pavement surface and then laying new asphalt to repave the roadway. Similarly, a panel replacement removes the existing concrete pavement and replaces it with a new panel.

The reconstruction of a roadway involves the stabilizing and compacting of the naturally occurring material, called the subgrade. Additionally, a base layer, typically made of compacted aggregate material, may be added on top of the subgrade to further improve the structure's integrity. Finally, the pavement surface is laid to protect these underlying pavement layers (see Picture 1).

Picture 1: Simplified Roadway Cross Sections



Corrective maintenance helps to slow the rate of deterioration by repairing localized failures of the underlying layers. Specifically, the City repairs potholes, utility cuts, and base failures through the use of patching and level ups. Patching and level ups involve replacing an area of the pavement surface with new material after repairing an underlying deficiency. While patching is a maintenance technique, it weakens the pavement's surface and cannot fully replicate the integrity of the original road's structure. These weaknesses can only

be corrected through rehabilitative improvements such as milling and overlay techniques.

Preventative maintenance and improvements help to slow the rate of deterioration by addressing minor deficiencies on the pavement surface caused by the passage of time. Specifically, the City utilizes crack sealing and micro sealing techniques to prolong the useful life of a pavement. Crack sealing is the process of individually filling cracks along the pavements surface to prevent the entry of water, weeds, rocks, etc.; a similar technique, called joint sealing, may be used for concrete pavements. These techniques help to prevent the deterioration of the roads underlying layers. Micro sealing is the process of adding a thin layer of asphalt to an existing pavement surface, extending the useful life of that surface; this technique is also considered a roadway improvement.