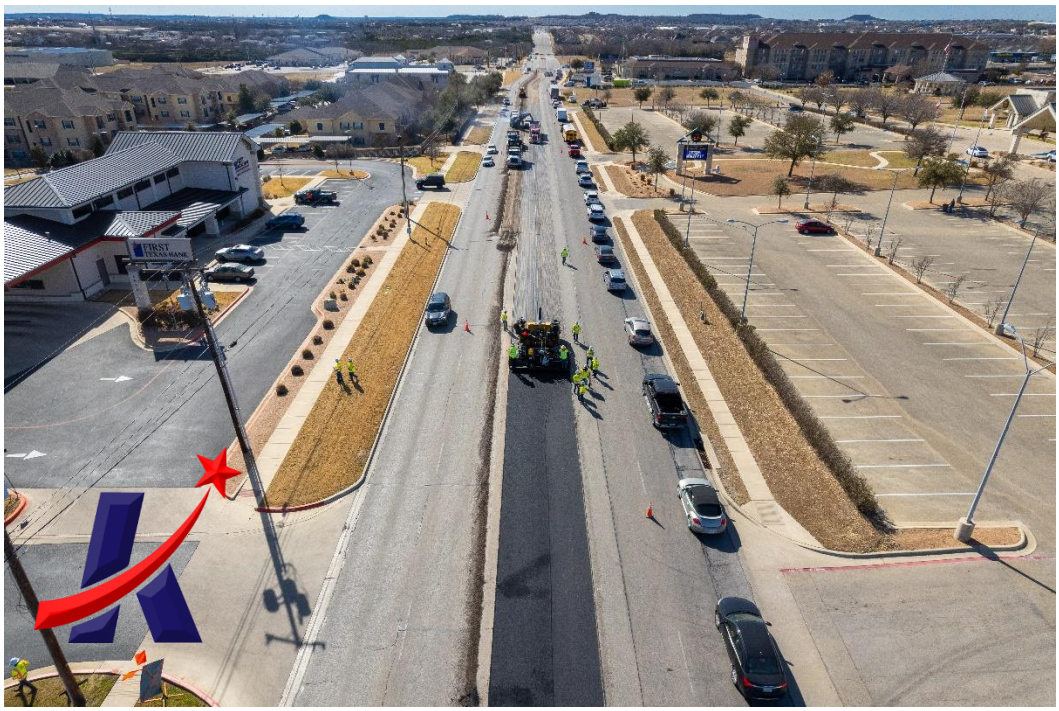

CITY OF KILLEEN

STREET MAINTENANCE
SPECIAL REVENUE FUND AUDIT:
Mill and Overlay Program

Audit Report #23-02

A Report to the City of Killeen Audit Committee

Committee Chair	Riakos Adams
Committee Members	Debbie Nash-King
	Ken Wilkerson
	Jack Ralston
	Bob Blair

Prepared by

The Internal Audit Department
Matthew Grady, City Auditor
March 2023

EXECUTIVE SUMMARY

AUDIT REPORT HIGHLIGHTS

Why Was This Audit Conducted?

The City Auditor proposed this audit to the Audit Committee, in accordance the requirements of Ordinance 21-055, which states that the "Street Maintenance Special Revenue Fund shall be audited twice annually, once by the city's internal auditor and once by the external auditor."

The City Auditor appreciates the cooperation of Public Works and Finance staff in the completion of this audit.

Street Maintenance Special Revenue Fund Audit

Mayor and Council,

I am pleased to present this audit of the Street Maintenance Special Revenue Fund.

Audit Objectives

The objectives of the audit were to (1) review Street Maintenance Fee Special Revenue Fund revenues and expenditures for FY 2021 and FY 2022; and (2) review street maintenance activities. The scope of audit included some activity in FY 2023, but did not include reconstruction projects, which will be reviewed in the next Street Maintenance Special Revenue Fund audit.

Audit Results

FY 2022 marked the introduction Mill and Overlay work as an ongoing Fee-funded program. Prior to the FY 2021 Street Maintenance Fee increase, limited resources had restricted the Transportation Division primarily to the best practice of "keeping good roads, good" through preventative maintenance. While cost-effective in terms of center lane miles treated, the absence of a robust Mill and Overlay program had nonetheless left the City's wide swath of deteriorated streets largely unaddressed. Under the enhanced Street Maintenance Fee structure, expenditures for Mill and Overlay treatments have averaged about $2.5 million or approximately 60 percent of the Division's $4.3 million annual street maintenance budget. The current budget for street maintenance is based on the City's FY 2019 pavement condition assessment, which predated Winter Storm Uri, and therefore did not consider the estimated $40 million in damages inflicted by the storm. While the City has made good progress in addressing Uri-affected thoroughfares under the current budget, management should continue to work closely with the Transportation Division to identify other Uri-affected streets in need of timely Mill and Overlay intervention. If the need is warranted and funds are available, management should consider the benefits of expanding the Mill and Overlay program.

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INTRODUCTION

The City Auditor conducted this performance audit of the Street Maintenance Special Revenue Fund pursuant to Article III, Chapter 40 of the City Charter, as Amended May 11, 2013, and in accordance with the City Auditor's Annual Audit Plan, approved by the Audit Committee on June 4, 2020, and amended January 13, 2022.

This audit was conducted in accordance with City Ordinance 21-055, which states that the "Street Maintenance Special Revenue Fund shall be audited twice annually, once by the city's internal auditor and once by the external auditor." The objectives of the audit were to (1) review Street Maintenance Fee Special Revenue Fund revenues and expenditures for FY 2021 and FY 2022; and (2) review street maintenance activities funded by the Special Revenue Fund. The scope of this audit did not include planned reconstruction projects, which are in the design phase and will be reviewed in the next Street Maintenance Special Revenue Fund audit.

Background

In December 2018, City Council approved the establishment of a Street Maintenance Fee to fund maintenance and repair projects on City streets. The initial fee of $1.70 per "single family equivalent" was projected to generate about $1.7 million in revenues annually. In the initial ordinance, Street Maintenance Fee revenues were restricted in use for maintenance and repair activities, only and were not authorized for use on road reconstruction.

Pavement Condition Assessment

In April 2019, City Council authorized a professional services agreement with Transmap Corporation to conduct a pavement condition assessment of the City's 539 center lane street miles.[1] Transmap's study assessed the City's overall Pavement Condition Index (PCI) rating at 76. This was a decline of 8 points from the PCI rating of 84 assessed in the previous study conducted in FY 2013. The assessment also projected a further decline in the City's overall PCI rating to 67 over the next five years based on the City's $1.7 million street maintenance budget. Transmap recommended that management increase annual funding for street maintenance to $4.3 million to maintain the City's 76 PCI rating.

[1] As of March 1, 2022, total center lane miles were 664.

Winter Storm Uri

In February 2021, Winter Storm Uri inflicted widespread damage to the City's transportation infrastructure. Damages inflicted, estimated at $40 million were most severe in those streets already in a deteriorated state, where the freezing conditions further undermined the integrity of the streets, as was the case for Gateway Drive, Trimmier, Elms Road, and W.S. Young among others.

Source: Transportation Division/Communications Department

In March 2021, City Council authorized the one-time transfer of $3 million from fund balance reserves in the General and Capital Improvement Funds to help fund emergency Mill and Overlay repairs to several of the City's more heavily trafficked, storm-damaged roadways, including W.S. Young, Trimmier, Elms Road and Gateway Drive.

Source: Communications Department

Street Maintenance Fee Increase

In September 2021, in the aftermath of Winter Storm Uri, City Council approved Ordinance 21-055, increasing the Street Maintenance Fee to $10 per "single family equivalent." The estimated $9.6 million in annual fee revenues projected would allow the City to increase annual funding for street maintenance to $4.3 million, in accordance with Transmap's recommendation. In addition, the ordinance expanded the scope of the Street Maintenance Fee program to allow fee revenues to be used for road reconstruction, as well as for debt service on bonds issued to fund road reconstruction.

Pavement Management – Street Maintenance

Street maintenance refers to pavement treatments designed to either preserve or rehabilitate paved roads, depending on the condition of the road. In terms of the Pavement Condition Index, street maintenance generally applies to roads with PCI ratings ranging from 41 to 100. Once a road deteriorates beyond "poor condition" into the 0-to-40 PCI range, it generally enters the realm of reconstruction, as shown in the chart below.

PCI Range	Class	Pavement Treatment	Funding Source
85-100	Good	Preventative	Street Maintenance Fee
71-85	Satisfactory		
56-70	Fair	Rehabilitative	Street Maintenance Fee
41-55	Poor		
25-40	Very Poor	Reconstruction	Street Maintenance Fee/ Bond Issuance
10-24	Serious		
0-10	Failed		

Source: Internet

Preventative Pavement Treatments

Preventative maintenance is aimed at "keeping good roads good" and is the most cost-effective approach to street maintenance. It generally applies to streets with PCI ratings between 71 and 100. Preventative pavement treatment typically involves the application of seal coats designed to prevent oxidation by protecting the asphalt from the elements. The sooner pavement treatments are applied, the greater the benefit in terms of adding years to the life of a road and forestalling the need for more costly rehabilitative treatments.

Examples of preventative treatments include Crack Seal, Slurry Seal, and HA5 High Density Mineral Bond, which are described below:

Pavement Treatment	Description	
Crack Seal	Crack seal is a hot sealant applied to pavement cracks to prevent water intrusion. The rubberized treatment seals cracks, while staying flexible with pavement's movement.	
Slurry Seal	Slurry seal is a mixture of water, asphalt emulsion, aggregate, and other additives designed to seal cracks and restore lost flexibility to a pavement surface.	
HA5 High Density Mineral Bond	Typically applied to streets with an 80 PCI rating or higher, HA5 High Density Mineral Bond has been embraced by industry experts for its ability to significantly extend road life by preventing the oxidative effects from both UV rays and moisture.	

Source: Internet

Rehabilitative Pavement Treatments

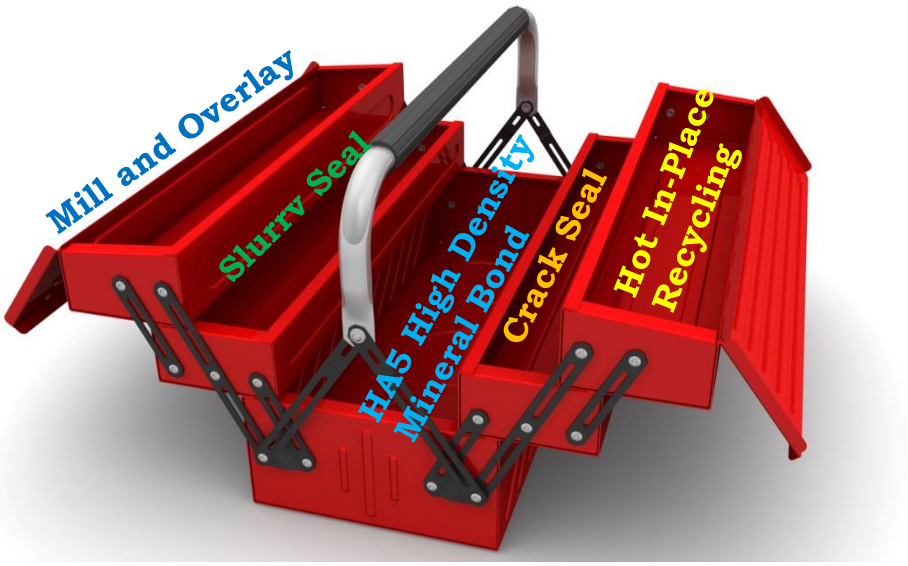
Rehabilitative treatments seek to reverse the effects of deterioration where preventive maintenance is no longer an option. The treatment is applicable, in general to streets falling within a PCI range between 40 and 70. The more aggressive treatments involve removing and replacing the damaged top layers of a road. Examples of rehabilitative pavement treatments include the following:

Pavement Treatment	Description	
Mill and Overlay	The Mill and Overlay process involves the use of a milling machine to remove of the top layer of a street, usually 2 inches, but sometimes as much as 6 inches, followed by an overlay of new asphalt.	
Hot In-Place Recycling (HIR)	HIR is similar to the Mill and Overlay process except that the milled layer of asphalt is treated with additives rather than replaced, and the rejuvenated asphalt is then used to repave the street.	
Cold In-Place Recycling (CIR)	Similar to HIR, but without the heating step, the CIR process is typically used on highways due to the size and weight of the vehicles used, and the depth of asphalt layers removed.	

Source: Internet

The Pavement Manager's Toolbox

Industry consultants sometimes refer to a pavement manager's "toolbox" as metaphor for a comprehensive approach to pavement management. The toolbox in this case refers to pavement treatment options, the idea being to have an expanding array of possible pavement treatments to choose from when executing a pavement management plan.



One industry expert refers to "filling one's toolbox" as the key to executing a successful pavement management plan. Another encapsulates the need for maintaining a broad array of options, as having "the right treatment, on the right road, at the right time." In "filling one's toolbox," experts stress the need for a proactive approach to pavement management that focuses on innovation in seeking out the most beneficial and cost-effective pavement treatments on the market.

Statement of Compliance with Audit Standards

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. Those standards also require that we, as internal auditors, meet the criteria for independence. We believe that we met those independence standards, and that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

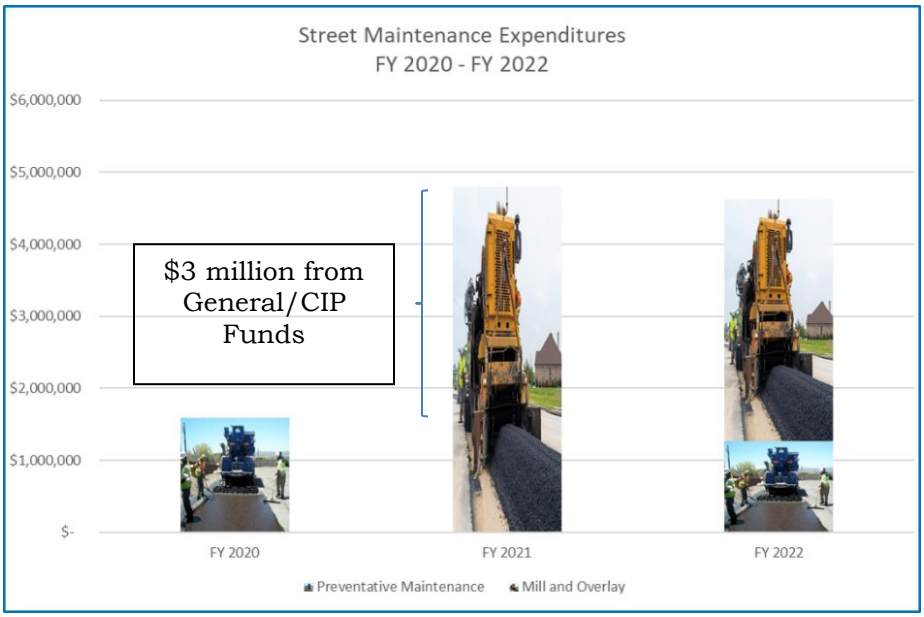
FINDINGS AND RECOMMENDATIONS

Enhanced revenue from the FY 2021 Street Maintenance Fee increase paves the way for the City's newly implemented Mill and Overlay program.

FY 2022, the first full year of the increased Street Maintenance Fee saw the introduction of Mill and Overlay work as part of the Transportation Division's annual Street Maintenance program. Prior to City Council's approval of the fee increase, maintenance activity for nearly a decade had consisted primarily of preventative treatments in the form of Slurry Seal, Crack Seal, and most recently HA5 High Density Mineral Bond (HA5). While the use of limited resources for preventative maintenance does in fact align with the industry best practice of "keeping good roads, good," the lack of resources in years past had nevertheless left the City's wide swath of deteriorated streets largely unaddressed. In FY 2022, Mill and Overlay activity comprised approximately $2.8 million or 65 percent of the Division's $4.3 million budget for street maintenance and resulted in the completion of 10.14 center lane miles of rehabilitative work. This is a positive step, and the City has made good progress in addressing the main thoroughfares affected by Winter Storm Uri. The City's five-year forecast for street maintenance is projected to remain at $4.3 million through FY 2027, in accordance with Transmap's FY 2019 pavement condition assessment, which will allow Mill and Overlay work to continue at its current pace. To ensure that the City's inventory of deteriorated streets is addressed in a timely manner, management should continue to work closely with the Transportation Division to identify other Uri-affected streets, in particular those streets at risk of failure, and if warranted and funds are available, allocate additional resources to the Mill and Overlay program.

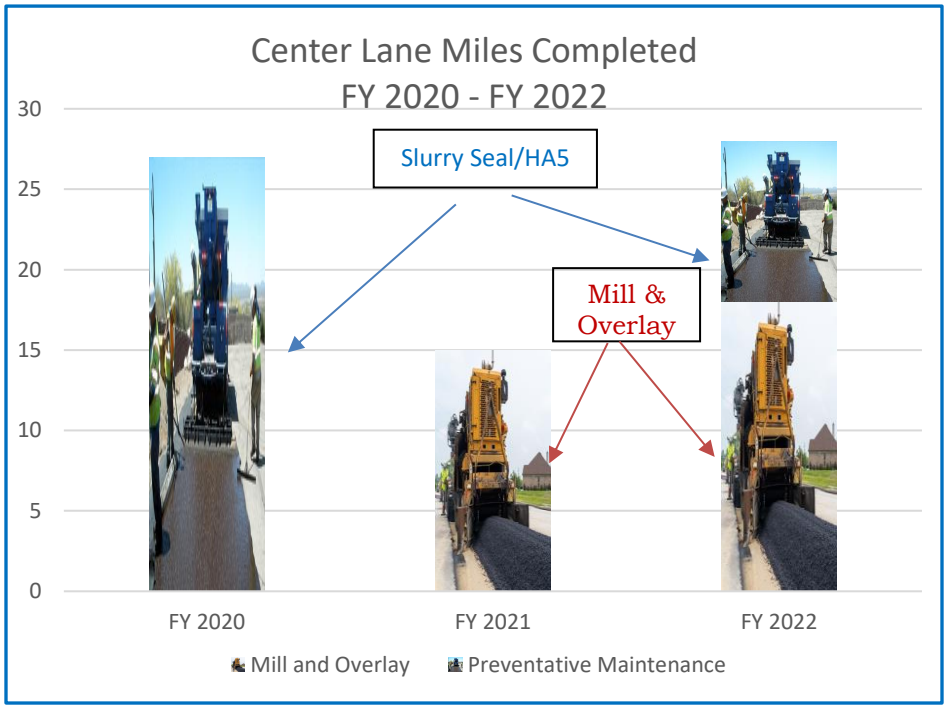
Street Maintenance Fee: By the Numbers

Street Maintenance Fee revenue, from the first full year of implementation in FY 2020 through the implementation of the fee increase in FY 2022 grew from approximately $1.8 million in FY 2020 to just over $9 million in FY 2022. This does not include the one-time transfer of $3 million from the General and Capital Improvement (CIP) Funds in FY 2021 for post-Uri Mill and Overlay repairs.



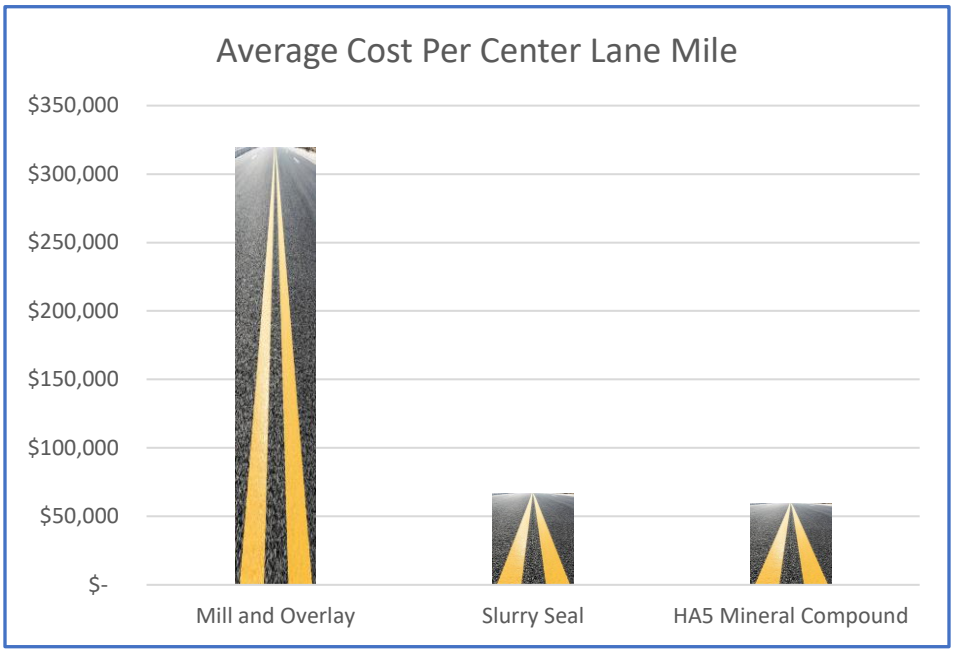
Source: Transportation Division

From FY 2020 through FY 2022 the Transportation Division completed street maintenance projects covering 71 center lane miles. This included 26 miles of Mill and Overlay, 23 miles of Slurry Seal, and 22 miles of HA5 High Density Mineral Bond treatments.



Source: Transportation Division

As shown below, the average cost per center lane mile for Mill and Overlay, Slurry Seal and HA5 was $319,000, $67,000, and $60,000, respectively. It should be noted that the Transportation Director indicated a recent increase in the cost of HA5 has for now made Slurry Seal the most economical pavement treatment available for preventative maintenance. It should also be noted that the cost for one center lane mile of Mill and Overlay would typically have exceeded the entire annual street maintenance budget in years past, prior to enactment of the Street Maintenance Fee ordinance.



Source: Transportation Division

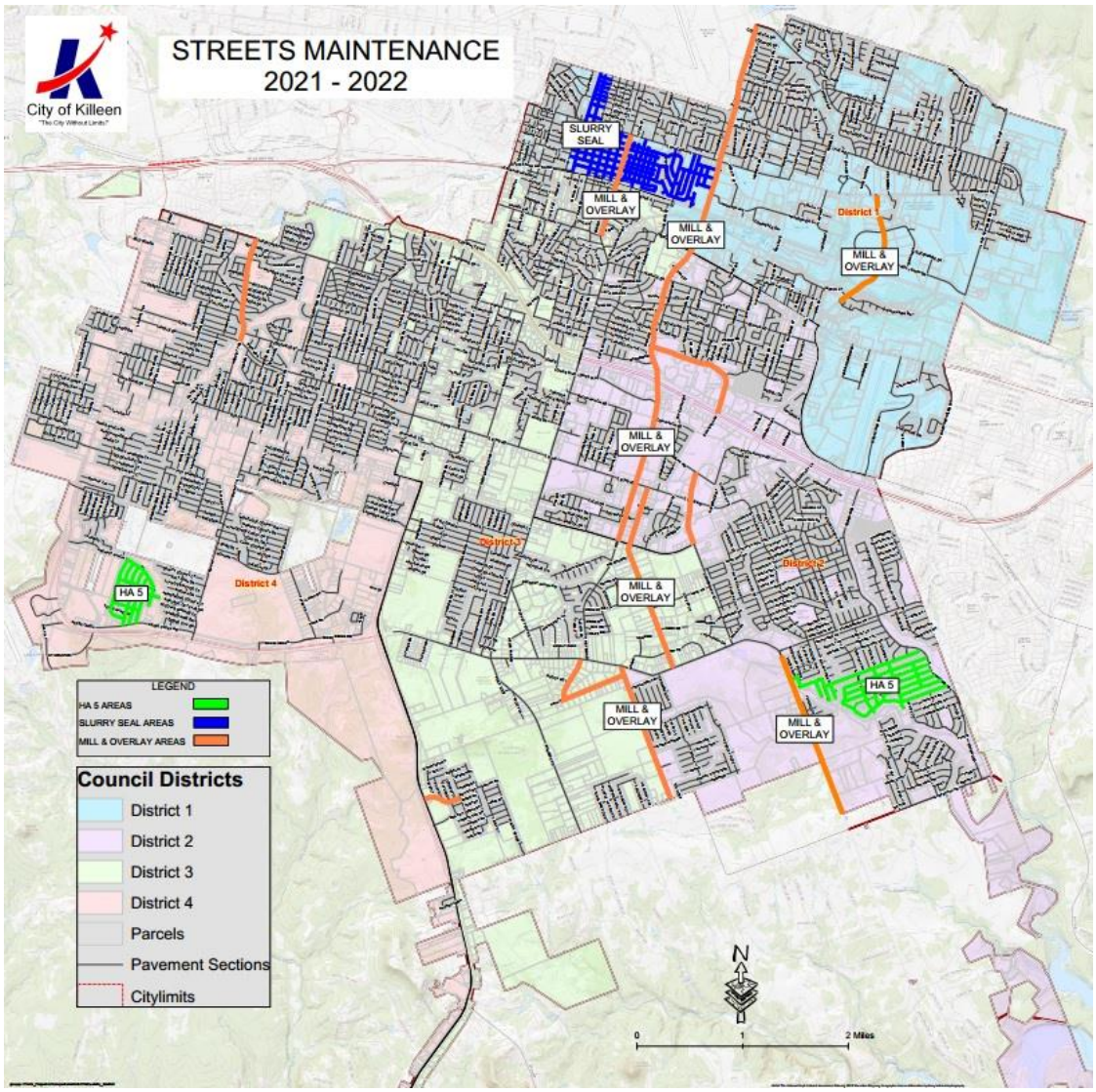
Mill and Overlay: Expanding the Toolbox

FY 2022 was the first year since FY 2014 that the Transportation Division conducted Mill and Overlay work as part of its annual street maintenance regimen. As previously mentioned, the Division did conduct Mill and Overlay work in FY 2021; however, that was the result of an emergency one-time transfer from the General/CIP Funds in response to Winter Storm Uri, and not part of an ongoing program.

The City's creation of its Mill and Overlay program brings it in line with other cities' multi-pronged approach to street maintenance. The City of Arlington, for example, launched its own Mill and Overlay program in FY 2022, devoting $10.8 million of their Street Maintenance Sales Tax revenue to initiate the program. The City of Georgetown's Hot In-Place Recycling (HIR) program dates back more than a decade. As

noted in the introduction, HIR is a close cousin to Mill and Overlay, the exception being that in-place recycling removes the top layer of asphalt, rejuvenates it with additives then reapplies the rejuvenated asphalt, rather than replacing it.

The City collected approximately $9.3 million in Street Maintenance Fees in FY 2022, $4.3 million of which was budgeted for street maintenance projects. Of that $4.3 million, approximately $2.8 million or 65 percent was spent on Mill and Overlay projects, which was used to complete 14 separate projects for a combined total of 10.14 center lane miles. This was in addition to the 15.44 center lane miles of Mill and Overlay work completed post-Uri in FY 2021 with the help of General Fund resources. Total Mill and Overlay projects for the two-year period are denoted by the orange segments in the map below.



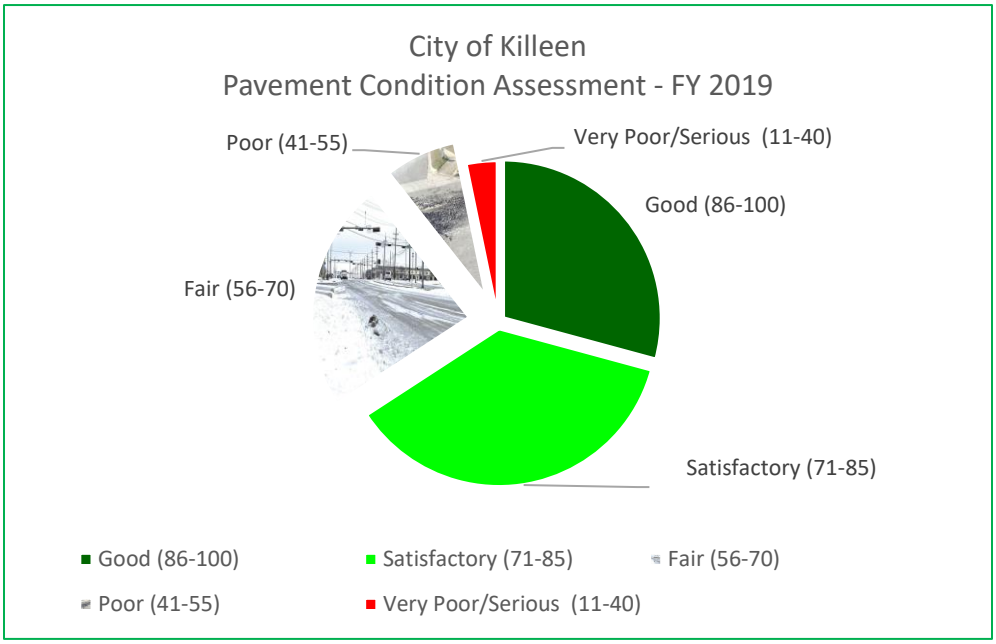
Source: Transportation Division

The introduction of the Transportation Division's Mill and Overlay program is a positive step in addressing the long-deferred maintenance needs of the City's inventory of deteriorated streets. Further, the Division has made good progress on addressing the main thoroughfares affected by Winter Storm Uri. Nevertheless, the budget for these rehabilitative projects is based on the FY 2019 Pavement Condition Assessment, which pre-dated Winter Storm Uri, and therefore did not factor in the considerable impact of the storm on overall street conditions.

Impact of Winter Storm Uri

The FY 2019 pavement condition assessment identified approximately 40 center lane miles of City streets with PCI ratings between 41 and 55, i.e., streets in poor condition. These are streets most at risk of failure if left to deteriorate further. It is these streets that would have been considered the primary candidates for Mill and Overlay treatments at the time the assessment was conducted.

In addition, the assessment identified 127 center lane miles of streets in "Fair" condition with PCI ratings between 56 and 70. These are streets where preventative maintenance is no longer an option due to some deterioration. In general, they would not require full rehabilitative Mill and Overlay treatments, but rather could be restored with a non-structural overlay of asphalt, typically less than two inches in depth, according to Transportation staff.



Source: Transmap FY 2019 Pavement Condition Assessment

For streets in these two categories, Winter Storm Uri acted as an accelerant in the deterioration process. Streets in "Fair" condition that were previously candidates for simple overlays were pushed into the Mill and Overlay category. Similarly, streets in "Poor" condition were pushed further to the brink of failure, thereby heightening the need for timely intervention, as was the case for Gateway Drive. City staff estimated damages inflicted by Winter Storm Uri at $40 million. The full extent of the damages will not be known until the next citywide pavement condition assessment, which is planned to begin in FY 2024. However, anecdotal evidence suggests that the lingering legacy of Winter Storm Uri was an increase in the inventory of streets in need Mill and Overlay pavement treatments.

Five-Year Street Maintenance Fund Forecast

In FY 2022, the City adopted its five-year forecast for the Street Maintenance Fund, which includes Transmap's recommended annual street maintenance operating budget of $4.3 million through FY 2027.

Street Maintenance Fund Five Year Forecast					
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Street Maintenance Fee Revenues	$ 9,769,036	$ 9,879,164	$ 9,990,746	$ 10,103,901	$ 10,218,631
Street Maintenance Operating Budget	(4,300,000)	(4,300,000)	(4,300,000)	(4,300,000)	(4,300,000)
Debt Service for Reconstruction Bonds	(1,347,650)	(1,533,590)	(1,536,136)	(1,537,287)	(1,537,045)
Set Aside for Reconstruction Projects	4,121,386	4,045,574	4,154,610	4,266,614	4,381,586
Carry Forward from Prior FY	4,887,283	9,008,669	13,054,243	17,208,853	21,475,467
Reserve Balance for Reconstruction Projects	$ 9,008,669	$ 13,054,243	$ 17,208,853	$ 21,475,467	$ 25,857,053

Source: Finance Department

Although the recommended budget is based on a pre-Uri assessment or road conditions, the Transportation Division has nonetheless made good progress in addressing Uri-affected streets, focusing first on the City's main thoroughfares. As of the beginning of the second quarter of FY 2023, the Transportation Division had spent most of its Mill and Overlay budget of $2.8 million completing work on Old FM 440, Twin Creek Drive, W.S. Young, and Brandy Loop, among others.

As noted in the five-year budget forecast, total Street Maintenance Fee revenues are made of three components: (1) The Street Maintenance Operating Budget, (2) Debt Service for Reconstruction Bonds, and (3) Set Asides for Reconstruction Projects.

The set aside for reconstruction projects was approximately $4 million at the beginning of FY 2023 and is projected to grow to nearly $26 million by the end of FY 2027. Most of these funds have already been assigned to help fund scheduled reconstruction projects, including but not limited to Gilmer Street, Bunny Trail and Stagecoach. To the extent that funds do become available; however, management should consider the benefits of an expanded Mill and Overlay program. In particular, this would pertain to Uri-affected streets where timely intervention may preclude the need for costly reconstruction down the road.

Recommendation:

The City Auditor Recommends that the Public Works Executive Director:

1. Work with the Transportation Division to identify Uri-affected streets at risk of failure, and if warranted and funds are available, request additional resources for the Mill and Overlay program.

VIEWS OF RESPONSIBLE OFFICIALS

Copies of the draft report were provided to the Executive Director of Public Works, the Director of the Transportation Division, and Principal Secretary for the Transportation Division for review and comment. They agreed with the report's findings and recommendation and their input is reflected throughout this report.

APPENDIX

OBJECTIVES, SCOPE AND METHODOLOGY

Objectives

The objectives of the audit were to (1) review Street Maintenance Fee Special Revenue Fund revenues and expenditures for FY 2021 and FY 2022; and (2) review street maintenance activities funded by the Special Revenue Fund. The scope of this audit did not include planned reconstruction projects, which are in the design phase and will be reviewed in the next Street Maintenance Fee audit.

Scope and Methodology

The audit focused on Street Maintenance Fee activity from October 2020 through September 2022, but also included some activity through the first quarter of FY 2023.

To address the audit objectives, the City Auditor:

- Spoke to key personnel, including the Director of Transportation, Principal Secretary, the Executive Director of Public Works, the Executive Assistant for Public Works, the Budget Director, and the Executive Director of Finance.
- Conducted research on pavement treatments and mill and overlay programs in other municipalities.
- Obtained and reviewed budget data related to the Street Maintenance Special Revenue Fund.
- Obtained and analyzed results of FY 2019 Transmap pavement condition assessment.
- Obtained and reviewed workload data on street maintenance activities.
- Reviewed revenue and expenditure activity in the financial management system.

Statement of Compliance with Audit Standards

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. Those standards also require that we, as internal auditors, meet the criteria for independence. We believe that we met those independence standards, and that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.