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# **CITY OF SAN ANTONIO**

## **OFFICE OF THE CITY AUDITOR**



Audit of Public Works Department

Pavement Condition

Project No. AU20-038

May 12, 2021

Kevin W. Barthold, CPA, CIA, CISA  
City Auditor

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## Executive Summary

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As part of our annual Audit Plan approved by City Council, we conducted an audit of the Public Works Department, specifically the pavement condition of the City's street network. The audit objectives, conclusions, and recommendations follow:

**Determine if the City's street conditions are improving and if funding is made based on need.**

We determined that the City's street pavement conditions are improving, and that funding is determined based on need by City council district. The average pavement condition index (PCI) score of the City's street network increased by approximately three PCI points to 74.16 from 2016 to 2019. At the district level, the PCI scores increased for all but one City council district. Additionally, many streets in 2016 that were in a poor or failed condition have been repaired. Finally, Public Works has developed a methodology to allocate street maintenance funding to City council districts in an equitable manner based on the size and condition of their street network.

We make no recommendations to Public Works; consequently, no management responses are required. Management's acknowledgement of these results is in Appendix C on page 9.

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## Background

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The City's Street Maintenance Program (SMP) is a five-year rolling program developed as a part of the Infrastructure Management Plan (IMP). It is developed by the Public Works Department and is approved each year by City Council as a part of the annual budget process. As it is a five-year rolling program, new projects are added to the fifth year of the program and existing scheduled projects are adjusted annually as needed based on the current budget. Historical budgeted street maintenance funding for fiscal years (FY) 2016 – 2021 is presented in the table below.

Historical Street Maintenance Funding			
Fiscal Year	Budgeted Amount	Adjustments	Final Budgeted Amount
FY 2016	\$ 64,609,773	\$ 2,490,227	\$ 67,100,000
FY 2017	\$ 64,089,010	\$ 410,990	\$ 64,500,000
FY 2018	\$110,000,000	\$ (10,500,000)	\$ 99,500,000
FY 2019	\$110,000,000	\$ 10,500,000	\$120,500,000
FY 2020*	\$110,000,000	\$ -	\$110,000,000
FY 2021	\$102,025,000	\$ -	\$102,025,000

\*Projects totaling \$42,351,892 million were deferred due to COVID-19 leaving a balance of \$67,648,108.

The goal of the SMP program is to provide a structured maintenance program for the City's street network keeping it in drivable condition. The City's street network is comprised of individual street segments. Street segments vary in length but are typically a specified block or intersection. Street segments are grouped into preservation and rehabilitation projects. Preservation projects are less expensive and focus on maintaining the condition of streets with sealants that weather-proof the surface. Rehabilitation projects are larger more expensive construction projects undertaken when a street needs more extensive work done to its asphalt or base. Preservation street maintenance work and the more extensive rehabilitation work is performed by a combination of City forces and contractors.

Every three years, Public Works obtains a pavement condition assessment of the City's street network to help in the development of the SMP. Public Works contracted with Data Transfer Solutions, LLC (DTS) to perform assessments in 2016 and 2019. DTS issued a final report for the 2019 assessment in August of 2020. As part of this process, DTS performs an analysis that assigns a pavement condition index (PCI) to each street segment. The PCI is a numerical rating of the pavement condition of the street. PCI values range from 0 to 100 with 100 representing the best possible condition. The PCI values are recorded in

Cartegraph, the Public Works asset management system. These scores reflect the current condition of the street segment. Street segment conditions are updated in Cartegraph over time as streets degrade or maintenance work is performed. The City's street network consisted of 4,166 centerline miles (CLM) as of the 2019 DTS pavement condition assessment.

Public Works allocates street maintenance funds to City council districts based on the condition and size of their street network relative to the condition and size of the entire street network of the City. Funding is split 50/50 between the condition and size of the street network. The condition of each City council district is derived from the PCI score of its street segments in Cartegraph. Public Works uses a comprehensive budget worksheet to allocate funding and select street maintenance projects for each City council district.

## Audit Scope and Methodology

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The audit scope was the City's street network condition in 2016 and 2019. Additionally, the scope included a review of the development and allocation of budgeted street maintenance funding for FY 2021 and the approved SMP.

We interviewed staff and management regarding the development of the SMP including the funding allocation to City council districts and building and selecting individual SMP projects. Additionally, we reviewed the Citywide pavement condition assessment conducted by DTS in 2019. We also reviewed policies and procedures, funding allocation tables, budget development spreadsheets, and the final report and raw data from the 2019 pavement condition assessment.

We compared PCI data of the street network for 2016 and 2019 to determine if the condition of the street network improved. Additionally, we reviewed the City council district funding allocation table to determine if it accurately established a funding percentage based on the size and condition of the individual district street networks. Finally, we reviewed the budget development worksheet to determine its accuracy allocating street maintenance funding based on City council district funding percentages. This included taking a random sample of 25 street maintenance projects to determine if they were appropriately included in the approved SMP.

We assessed internal controls related to the objective. This included interviews with staff and management, review of policies and procedures, and analysis of the 2019 PCI data. We determined that significant internal control components and principles include the following: assessment of the City's street network condition by an independent third-party, creation of an equitable basis for allocation of street maintenance funding to City council districts, and development of an IMP approved annually by City Council.

We relied on street network PCI data provided by DTS included with its 2019 Pavement Condition Report. To determine the street network PCI, DTS uses the American Society for Testing and Materials (ASTM) D6433-11 "Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys," an industry standard for determining the surface condition of pavement.

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.

## Audit Results and Recommendations

### A. City Street Network Condition

The pavement condition of the City's street network is improving. We compared the average PCI score of the City's street network from 2016 to 2019 and determined it had increased by approximately three PCI points from 71.75 to 74.16. Public Works target PCI score for the City's street network is 70. Additionally, the percentage of street segments in excellent condition increased from 25% in 2016 to 37% in 2019 while the percentage of streets in poor and failed condition decreased from 28% to 25% during the same period (see the table below).

City Street Network Condition Assessment					
		2016		2019	
Condition	PCI Score	Centerline Miles*	Percentage	Centerline Miles	Percentage
Excellent	86 - 100	1,010.87	25%	1,522.29	37%
Good	71 - 85	1,212.85	30%	1,138.14	27%
Fair	61 - 70	597.07	15%	458.56	11%
Poor	41 - 60	791.41	19%	617.67	15%
Failed	0 - 40	384.57	9%	396.34	10%
Not Yet Rated		68.43	2%	32.52	1%
TOTAL		4,065.21	100%	4,165.52	100%
Citywide Average PCI Score		71.75		74.16	

\*2016 DTS Pavement Management Services Final Executive Summary

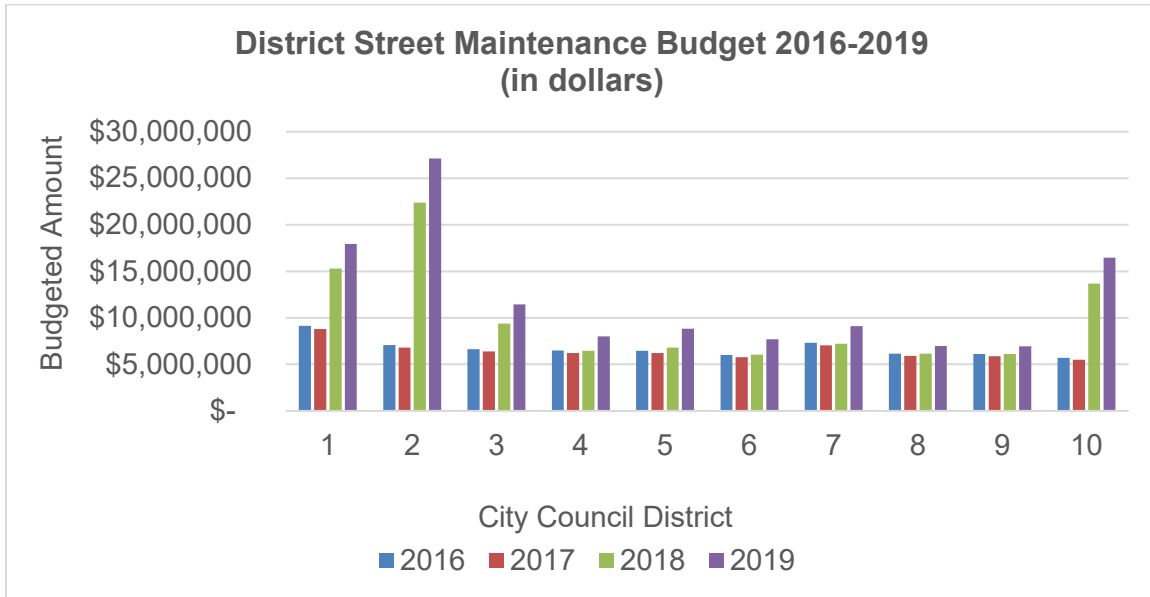
### Recommendations

None

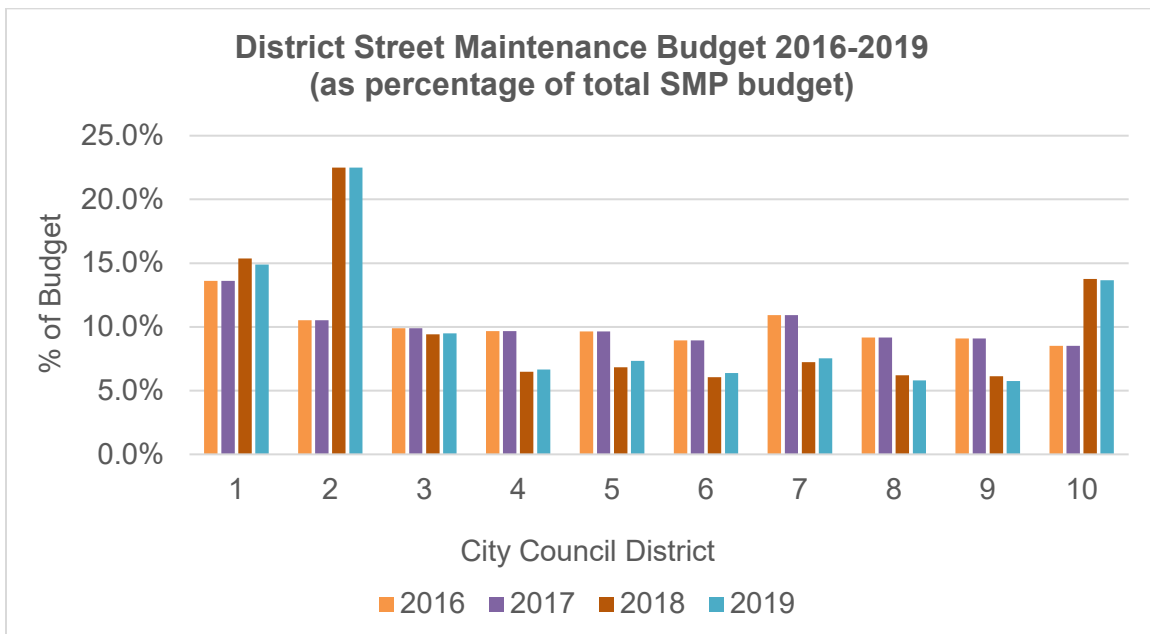
### B. Street Maintenance Funding

Public Works allocates street maintenance funding to City council districts on a size and needs basis. We reviewed the Public Works street maintenance funding methodology and determined that funding is accurately allocated based on the size and condition of the individual City council district street networks relative to the size and condition of the City's entire street network. This results in City council districts receiving funding on a needs basis since funding increases as street conditions deteriorate.

The graph below shows a significant difference in street maintenance budget allocation for some City council districts which for FY 2018 and 2019 was based on size and needs, compared to FY 2016 and 2017 when the budget allocation was based on rough proportionality. Even though the allocation model changed, dollar amounts by district have remained steady or increased since the overall budget has increased.

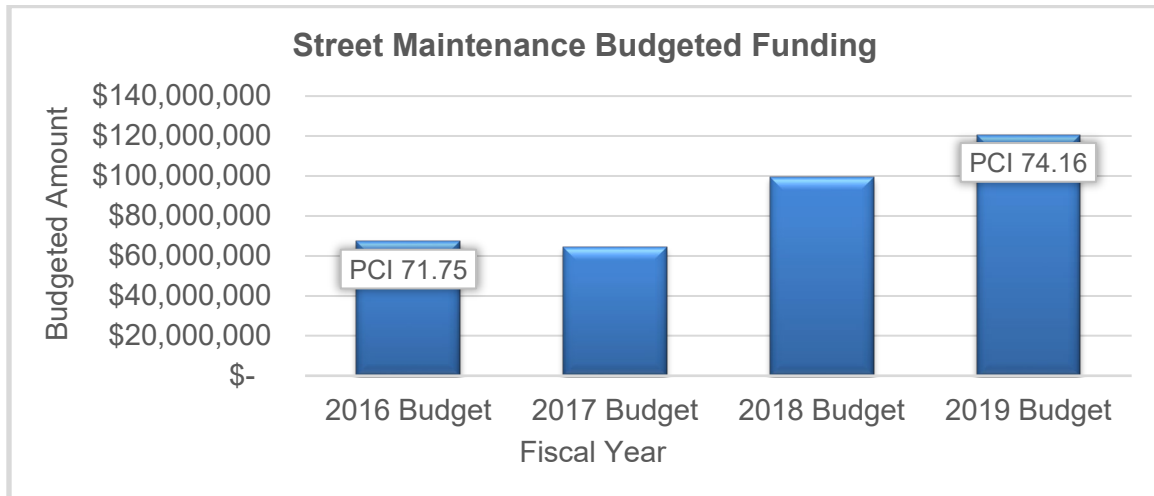


The graph below shows the street maintenance budget allocation percentage by City council district for FY 2016 through 2019. Those districts with the lower PCI scores in 2016 began receiving a higher percentage of the overall budget.





There is also a positive relationship between the amount of street maintenance funding and the condition of the City's overall street network. As shown in the graph below, as street maintenance funding increased, the PCI score of the City's street network improved.



The impact of the budget increases for the lower scoring districts generally led to the greatest increases in PCI scores from the 2016 to 2019 studies as shown in the table below.

District	2016 PCI Score	Average % of SMP Budget 2016-2019 <sup>1</sup>	Change in PCI score 2016 – 2019	2019 PCI <sup>2</sup> Score
1	67.79	14.4%	3.37	71.16
2	64.74	16.5%	4.04	68.78
3	67.82	9.7%	3.68	71.50
4	72.89	8.1%	-2.63	70.26
5	69.39	8.4%	3.28	72.67
6	77.79	7.6%	1.92	79.71
7	71.46	9.2%	1.52	72.98
8	76.47	7.6%	5.46	81.93
9	78.05	7.5%	7.19	85.24
10	68.70	11.1%	4.08	72.78

## Recommendations

None

<sup>1</sup> Annual percentages shown in Appendix A.

<sup>2</sup> 2019 PCI scores are as of July 2019.

## Appendix A - Supplemental Information

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The below table provides the annual SMP budget percentage from FY 2016 through FY 2019 by City council district.




<b>% of SMP Budget by Council District 2016-2019</b>				
<b>District</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018</b>	<b>FY 2019</b>
1	13.6%	13.6%	15.4%	14.9%
2	10.5%	10.5%	22.5%	22.5%
3	9.9%	9.9%	9.4%	9.5%
4	9.7%	9.7%	6.5%	6.6%
5	9.6%	9.6%	6.8%	7.3%
6	8.9%	8.9%	6.1%	6.4%
7	10.9%	10.9%	7.2%	7.5%
8	9.2%	9.2%	6.2%	5.8%
9	9.1%	9.1%	6.1%	5.8%
10	8.5%	8.5%	13.8%	13.7%

## **Appendix B – Staff Acknowledgement**

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Mark Bigler, CPA-Utah, CISA, CFE, Audit Manager  
Douglas Francis, CIA, Auditor in Charge  
Javier Castillo, IT Auditor

## Appendix C – Management Acknowledgement

	<b>CITY OF SAN ANTONIO</b> SAN ANTONIO TEXAS 78203-3999
April 19, 2021	
Kevin W. Barthold, CPA, CIA, CISA City Auditor San Antonio, Texas	
RE: Management's Acknowledgement of its Review of Public Works Pavement Condition Audit	
Public Works has reviewed the audit report and provided its comments to the auditors. As there are no recommendations for management, no management responses are required.	
Public Works	
<input checked="" type="checkbox"/> Fully Agrees	
<input type="checkbox"/> Does Not Agree (provide detailed comments)	
Sincerely,	
 Razi Hosseini, P.E. Director/City Engineer Public Works	<u>4/19/2021</u> Date
 Roderick Sanchez, Assistant City Manager City Manager's Office	<u>4/19/21</u> Date