



CITY OF SAN ANTONIO

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March 22, 2023

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SUBJECT: Audit Report of Public Works Department Traffic Signals

Mayor and Council Members:

We are pleased to send you the final report of the Audit of Public Works Department Traffic Signals. This audit began in August 2022 and concluded in January 2023. Management's verbatim response is included in Appendix B of the report. The Public Works Department management and staff should be commended for their cooperation and assistance during this audit.

The Office of the City Auditor is available to discuss this report with you individually at your convenience.

Respectfully Submitted,

Kevin W. Barthold, CPA, CIA, CISA
City Auditor
City of San Antonio

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CITY OF SAN ANTONIO

OFFICE OF THE CITY AUDITOR



Audit of Public Works Department

Traffic Signals

Project No. AU22-038

March 22, 2023

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

Executive Summary

As part of our annual Audit Plan approved by City Council, we conducted an audit of the Public Works Department, specifically traffic signals. The audit objectives, conclusions, and recommendations follow:

Determine if Public Works Traffic Division operations are managed effectively and efficiently and controls over traffic signals are adequate.

Traffic Division operations are managed effectively and controls over traffic signals are adequate. Traffic signals are appropriately configured and monitored to prevent unsafe conditions. In addition, payments received from the Texas Department of Transportation (TxDOT) for the maintenance of State owned traffic signals are supported. Annual maintenance of traffic signals is reviewed and approved. Finally, the Kimley-Horn Integrated Traffic System (KITS) is appropriately updated and supported, and security settings are up to date.

However, the audit team identified areas in which controls could be improved over policies and procedures and annual maintenance.

We recommend that Public Works:

- Consolidate and organize existing policies and procedures that cover the management and maintenance of the City's traffic signal network and continue developing new policies and procedures, as needed.
- Review the preventative maintenance schedule to ensure it is complete, establish a process for ensuring the preventative maintenance schedule is updated periodically, and ensure maintenance is completed on the eight signals we identified as not being on the schedule.

Public Works Management agreed with the audit findings and has developed positive action plans to address them. Management's verbatim response is in Appendix B on page 6.

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Background

The Public Works Department is responsible for the installation, maintenance, and monitoring of traffic signals. The Transportation Systems Management & Operations (TMSO) Program of the Traffic Division is the group within the Public Works Department that develops, monitors, and maintains the City's traffic signal system. At the time of the audit, the Traffic Division maintained a total of 1,454 signalized intersections and monitored traffic daily for safety and efficiency. This total includes more than 175 signalized intersections owned by the Texas Department of Transportation (TxDOT) along highways throughout the City of San Antonio that are monitored and maintained by the Traffic Division. The City is reimbursed at a flat rate for maintenance plus costs for repairs by TxDOT on these signals. Performance for the division is measured by improvements to traffic flow within specific high traffic corridors in San Antonio.

In addition, the Transportation & Infrastructure Management Center (TIMC) is staffed with Senior Electronics Technicians and Customer Service Specialists who respond to community concerns received through 311/Customer Service. The resolution of these calls may require dispatching maintenance crews to resolve reported issues either immediately or within agreed upon timelines depending upon the severity of the issue. TIMC staff also receive real-time alerts from electronic intersection controllers regarding potential issues. This can include signals that are flashing red, loss of connection, or pedestrian signal malfunctions. Alerts are received through the Kimley-Horn Integrated Traffic System (KITS). KITS is an advanced transportation system which is utilized to monitor and maintain the City's traffic signal network. It provides real-time information on system conditions including the status of traffic and pedestrian signals communicated to KITS via a wireless connection.

Each intersection is equipped with a traffic signal controller cabinet which houses the traffic controller, network switch, conflict monitor, and other supporting devices that control and manage traffic flow. A typical signalized intersection can cost up to \$400,000 to construct.

Traffic signal maintenance crews in the Traffic Division perform both scheduled maintenance and inspections and respond to requests that require dispatching maintenance personnel to investigate and resolve. Annual scheduled maintenance is performed on all traffic lights throughout the City of San Antonio on a year-round rotating basis. Maintenance crews and TIMC staff are also on call to respond to emergencies that may impact safe traveling along COSA roads.

Audit Scope and Methodology

The audit scope included Traffic Division operations, system controls, physical access controls, and performance standards during fiscal years (FY) 2021 and 2022.

To obtain an understanding of traffic signal operations, we performed interviews with relevant department personnel; performed walkthroughs of daily operations, maintenance activities, and system controls; and reviewed relevant documentation. The primary criteria for this audit included COSA Administrative Directives, contract agreements, and the Texas Manual on Uniform Traffic Control Devices.

We assessed internal controls relevant to the audit objective. This included a review of third-party contracts, department policies, administrative directives, service level agreements, and SAP reports. In addition, as part of our testing procedures we reviewed policies and procedures for adequacy, determined if performance measures are properly supported, and reviewed system configurations to determine if traffic signal conflict monitors are operating as intended. Further, we reviewed maintenance activities to confirm if service requests are completed within agreed upon timelines and annual maintenance is conducted. Additionally, we reviewed TxDOT billings to determine if payments from TxDOT for maintenance are supported. Finally, we reviewed the KITS system to determine if general and application controls are adequate.

We relied on computer-processed data in the KITS system to validate user access settings. Our reliance was based on performing direct tests on the data. The audit team performed limited testing of application controls over data back-ups, vulnerability scanning and patching, and software updates.

In addition, the audit team relied on computer-processed data in the Monitor Key system to review conflict monitor configurations. Our reliance was based on performing direct tests on the data rather than evaluating the system's general and application controls. We do not believe that the absence of testing general and application controls had an effect on the results of our audit.

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

Overall, Traffic Division operations are managed effectively and controls over traffic signals are adequate. A conflict monitor is installed at each intersection and is responsible for monitoring and preventing any conditions that could create a traffic hazard. We reviewed various configurations for the conflict monitor and determined that traffic signals are appropriately configured and monitored to prevent unsafe conditions.

In addition, we reviewed all payments received for traffic signal maintenance from the TxDOT for FY2021 - FY2022 which totaled approximately \$800,000. We determined that support agreed to the invoices and the amounts agreed to corresponding SAP transactions.

Further, we determined that annual maintenance of traffic signals is being completed and appropriately reviewed by a supervisor. We obtained a random sample of 25 traffic signals and reviewed the associated work order and the supervisor's quality assurance report for FY2022 and determined that all maintenance had been completed and approved.

Finally, KITS is appropriately updated and supported, and security settings are up to date. Specifically, KITS is adequately supported by the vendor, backed up periodically, and appropriately scanned and patched.

However, the audit team identified areas in which controls could be improved as noted below.

A. Policies and Procedures

The Traffic Division does not have adequate documented policies and procedures for the management of the City's traffic signal network. While they do have some procedures in place, they do not address management of the traffic signals network as a whole.

The Traffic Division has three policy documents concerning general access to Traffic Division systems, operating and safety procedures for aerial lift trucks, and installation of LED signals. There are no policy documents for the management and maintenance of the traffic signal network or the programming of traffic signals.

A lack of documented policies and procedures could result in critical tasks not being completed, inconsistencies in processes, and unsafe traffic operations.

Recommendation

We recommend that the Director of Public Works consolidate and organize existing policies and procedures that cover the management and maintenance of the City's traffic signal network and continue developing new policies and procedures, as needed.

B. Annual Traffic Signal Maintenance

While traffic signal maintenance is being completed and approved, the preventative maintenance schedule is not complete.

We obtained the current preventative maintenance schedule, which tracks annual maintenance completed and due, and compared it to the listing of all traffic signals. We identified eight intersections that are in COSA's network of traffic signals but were not included on the preventative maintenance schedule.

Section 1A.05 of the Texas Manual on Uniform Traffic Control Devices Guidance states that physical maintenance of traffic control devices should be performed to retain the legibility and visibility of the device and to retain the proper functioning of the device.

We determined that the preventative maintenance schedule had not been updated in the last two years. Without a complete preventative maintenance listing, intersections may not receive regular maintenance resulting in earlier breakdowns, issues that are not identified timely, and potentially unsafe intersections.

Recommendation

We recommend that the Director of Public Works review the preventative maintenance schedule to ensure it is complete, establish a process for ensuring the preventative maintenance schedule is updated periodically, and ensure maintenance is completed on the eight signals we identified as not being on the schedule.

Appendix A – Staff Acknowledgement

Mark Bigler, CPA-Utah, CISA, CFE, Audit Manager
Douglas Francis, CIA, Auditor in Charge
Nastasha Leach, CIA, CGAP, CRMA, IT Auditor

Appendix B – Management Response



CITY OF SAN ANTONIO

SAN ANTONIO TEXAS 78283-3966

March 15, 2023

Kevin W. Barthold, CPA, CIA, CISA
City Auditor
San Antonio, Texas

RE: Management's Corrective Action Plan for Audit of Public Works Department Traffic Signals

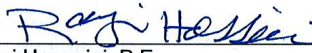
The Public Works Department has reviewed the audit report and has developed the Corrective Action Plan below corresponding to the report recommendation.

Recommendation					
#	Description	Audit Report Page	Accept, Decline	Responsible Person's Name/Title	Completion Date
1	Policies and Procedures We recommend that the Director of Public Works consolidate and organize existing policies and procedures that cover the management and maintenance of the City's traffic signal network and continue developing new policies and procedures, as needed.	3	Accept	Marc Jacobson, TSMO Program Manager	09/30/2024
Action plan: Policies and procedures for all Traffic Division functions will be organized and defined in a comprehensive manual.					
2	Annual Traffic Signal Maintenance We recommend that the Director of Public Works review the preventative maintenance schedule to ensure it is complete, establish a process for ensuring the preventative maintenance schedule is updated periodically, and ensure maintenance is completed on the eight signals we identified as not being on the schedule.	4	Accept	Marc Jacobson, TSMO Program Manager	03/31/2024

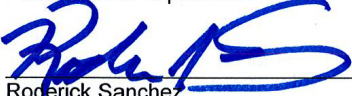
Recommendation					
#	Description	Audit Report Page	Accept, Decline	Responsible Person's Name/Title	Completion Date
	Action plan: The Public Works Department is upgrading the Cartegraph Asset and Work Management System. This system will maintain the inventory of traffic signal infrastructure and the preventative maintenance schedule. Using this system will ensure that preventative maintenance will be performed at all locations and it will improve schedule adherence. It will also improve productivity by ensuring that a preventative maintenance visit will address all pending issues at a location so multiple trips to the location are not needed.				

We are committed to addressing the recommendation in the audit report and the plan of action presented above.

Sincerely,


Razi Hosseini, P.E.
Director/City Engineer
Public Works Department

3/15/2023
Date


Roderick Sanchez
Assistant City Manager
City Manager's Office

3/15/2023
Date