
PERFORMANCE AUDIT OF THE PUBLIC UTILITIES DEPARTMENT'S WATER METER COVER REPLACEMENT PROGRAM

A Lack of Management Oversight and
Accountability—Along with Process
Inefficiencies and Limited Staffing
Resources—Significantly Delay Box and
Lid Replacement

Office of the
City Auditor

City of San Diego



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THE CITY OF SAN DIEGO

August 31, 2018

Honorable Mayor, City Council, and Audit Committee Members
City of San Diego, California

Transmitted herewith is a performance audit report on the Public Utilities Department's Water Meter Cover Replacement Program. This report was conducted in accordance with the City Auditor's Fiscal Year 2018 Audit Work Plan, and the report is presented in accordance with City Charter Section 39.2. The Results in Brief are presented on page 1. Audit Objectives, Scope, and Methodology are presented in Appendix B. Management's responses to our audit recommendations are presented after page 38 of this report.

We would like to thank staff from the Public Utilities Department for their assistance and cooperation during this audit. All of their valuable time and efforts spent on providing us information is greatly appreciated. The audit staff members responsible for this audit report are Luis Briseño, Andy Hanau, Danielle Knighten, and Kyle Elser.

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Results in Brief

The Public Utilities Department (PUD) is responsible for maintaining water meter covers (boxes and lids) throughout the City of San Diego (City). Boxes and lids are a critical component of PUD's metering system because they protect water meters from exposure and damage. There are approximately 281,500 water meters—and accompanying boxes and lids—throughout the City.¹

Quickly addressing box and lid maintenance issues is essential to meet customer expectations, reduce the City's liability for trip and fall injuries, protect water metering infrastructure, and enhance the appearance of the City's public right-of-way.

Although PUD has a goal of addressing box and lid maintenance issues within six months after they are reported, we found that this goal is rarely met. In fiscal year 2017, only 25 percent of box and lid replacements were done within PUD's six-month goal. Lids took approximately 321 days (11 months) to replace, while boxes took significantly longer, at an average of 630 days (1.7 years).

We found that PUD's delayed response to box and lid maintenance issues resulted from a lack of management oversight and accountability; a variety of process inefficiencies; and inadequate strategic planning. Specifically:

- Supervisors in the Box and Lid Group have not ensured adequate oversight and accountability and have not established performance goals for staff, allowing crews to spend an average of only 3.6 hours in the field per workday and completing far fewer box and lid replacements than could be reasonably expected;
- Trips to repair box and lid issues are frequently wasted because issues are not correctly diagnosed or sufficiently communicated (e.g. through the use of technology such as photos);
- PUD's legacy service request system, SWIM, did not have sufficient controls to prevent duplicate service requests from being created, which made prioritizing service requests and assignments difficult;

¹ This estimate is based on the number of meters PUD reported in its AMI deployment update to the City Council's Committee on the Environment in June 2017.

- Service requests are often grouped inefficiently, leading crews to spend an excessive amount of time driving between work locations;² and
- PUD did not anticipate and has not adjusted staffing resources to compensate for significantly increased box and lid workload generated by the AMI implementation project.

As a result, box and lid replacements are significantly delayed, are much more expensive than necessary, and PUD has a large backlog of approximately 25,000 box and lid maintenance service requests.³ The backlog continues to grow as the Box and Lid Group's productivity, limited by the issues described above, is insufficient to keep up with service demand. Unless these issues are corrected, it will take longer to address box and lid maintenance issues. These delays may increase the City's liability for trip and fall injuries and harm customer perception of the City's responsiveness.

The City expects departments to provide excellent customer service. According to PUD, since fiscal year 2017, several steps have been taken to improve the performance of the Box and Lid Group, including hiring a new Deputy Director to oversee the group; removing duplicates from the service request queue; improving information gathering to reduce the number of jobs that are "done on arrival;" and quickly responding to complaints submitted via the City's Get It Done app.

While these are positive steps, our audit identified many additional issues that are severely impacting the Box and Lid Group's performance. To improve the Box and Lid Group's productivity, efficiency, and response times, we recommend that management implement and enforce formal performance standards for box and lid crews, including expectations for the amount of time crews should spend in the field and the number of box and lid replacements crews should complete each day, on average. Furthermore, PUD should provide additional training and resources to other crews that refer service requests to the Box and Lid Group—such as meter readers and the water meter installation team—to ensure the Box and Lid Group can efficiently prioritize service requests and address maintenance issues on their first trip to the location.

Even with these improvements, the Box and Lid Group needs significantly more staff to keep up with service demand. We recommend that PUD conduct an analysis to determine the number

² According to PUD, the recent implementation of IAM will enable the efficient grouping of service notifications.

³ As of March 2018.

of crew members needed to meet timeline goals. This should include a re-evaluation of whether the current goal of addressing box and lid maintenance issues within six months is appropriate, given the City's emphasis on customer service. We made a total of 11 recommendations in this report, and PUD management agreed to implement all of them.

Background

What is Box/Lid Replacement?

The Public Utilities Department (PUD) is responsible for maintaining water meter covers (boxes and lids) throughout the City of San Diego. Water meter covers are a critical component of PUD's metering system because they protect water meters from exposure and damage. Water meters, in turn, are a critical component of PUD's water delivery system because they measure how much water customers use; PUD uses this information to calculate customer billings. There are approximately 281,500 water meters—and accompanying boxes/lids—throughout the City.⁴

The City's water meters are typically located in the public right-of-way—either in concrete or in dirt—and are housed within a concrete or polymer box that is covered by a lid. **Exhibit 1** provides examples of water meter covers in dirt and in concrete.

Exhibit 1

Water Meter Covers are Located in Dirt or Concrete



Source: Auditor generated.

Boxes and lids come in various sizes; lids also vary in terms of their composition, but most are made of concrete, metal, or polymer. Several variables impact the condition of a meter box/lid and whether it needs replacement. These include how old the box/lid is and where it is located. Increased pedestrian and vehicle traffic expose the meter box/lid to more wear and a greater chance of failure. Tree roots can also cause damage to the meter box.

⁴ This estimate is based on the number of meters PUD reported in its AMI deployment update to the City Council's Committee on the Environment in June 2017.

Why is Box/Lid Replacement Important?

Replacing damaged boxes/lids in a timely manner is important; since these are typically in the right-of-way, damaged boxes/lids may create hazards that can expose the City to public liability claims. PUD management perceives the box/lid replacement program as a liability-reducing program. According to PUD, a liability exists when the City is made aware of a hazardous condition, increases if PUD does not address an existing service request in a timely manner, and accelerates as duplicate service requests are created for the same reported problem. According to PUD, 16 claims related to water meter boxes/lids were paid between 2015 and June 2017, totaling \$392,776. As of October 25, 2017, there were seven open claims against the City related to meter boxes/lids totaling approximately \$50,000.⁵

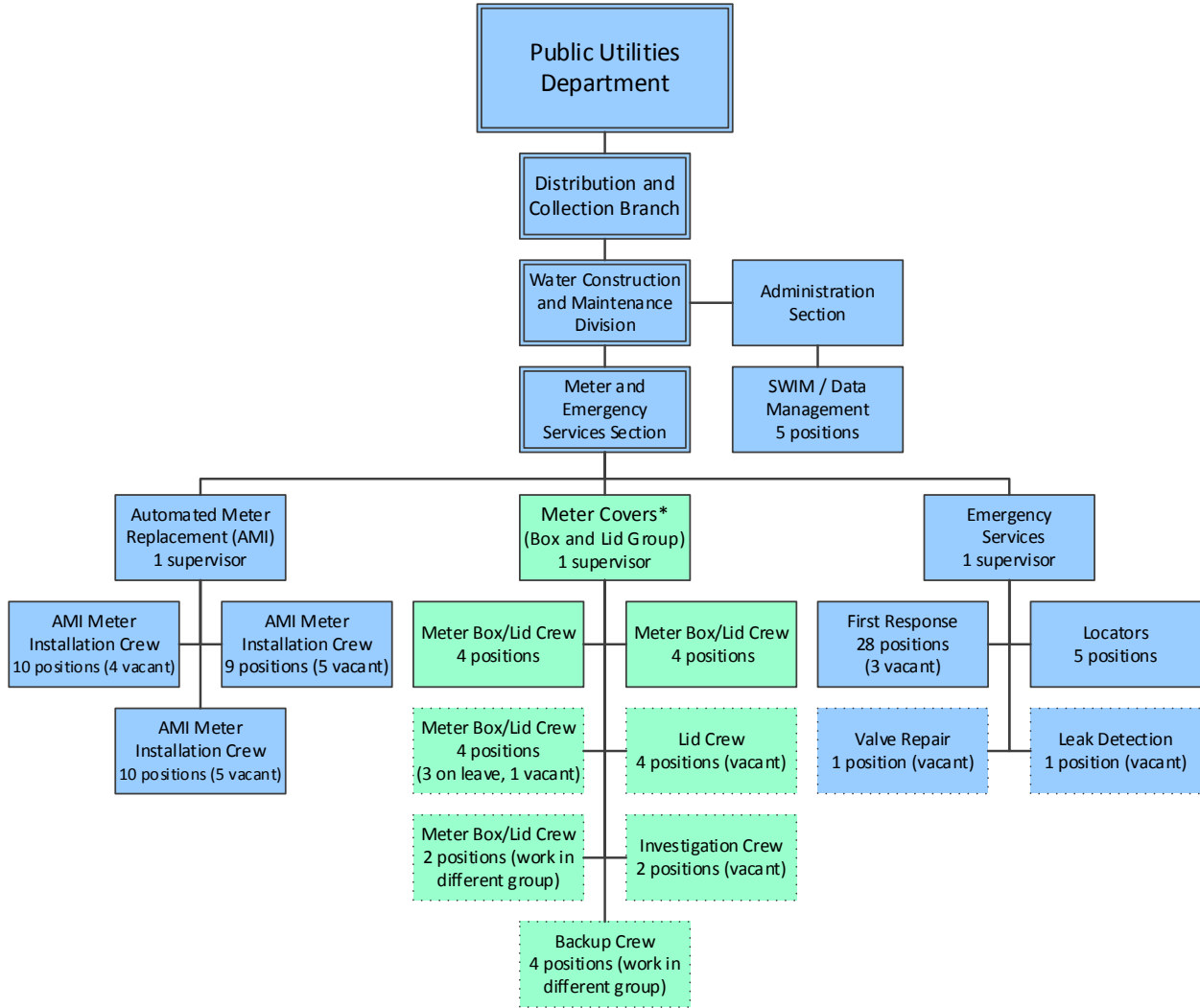
How is the Program Organized?

PUD's Water Construction and Maintenance Division (WCM) is responsible for overseeing the water meter box and lid replacement program and all service requests associated with replacement or repair. WCM also oversees other meter services and work groups that perform similar work to the Box and Lid Group—such as meter replacement and emergency services—and that may generate work orders for the Box and Lid Group. **Exhibit 2** summarizes the organizational structure for PUD's meter services group.

⁵ This is according to data from the Risk Management Department provided by PUD.

Exhibit 2

The Water Meter Cover Replacement Program is Part of the Public Utilities Department's Water Construction and Maintenance Division



Note: The org chart is current as of December 1, 2017.

Source: Auditor generated based on PUD's organizational chart and interview with the Box and Lid Supervisor.

How is the Program Staffed (How Many Employees Perform Box/Lid Replacement)?

In addition to the positions in the Box and Lid Group shown above, 16 positions—more than half—in the Box and Lid Group are either vacant, filled by employees who are on restricted duty or leave as a result of an industrial injury, or work in a different crew; only 8 positions are available to replace water meter boxes and lids.⁶ Exhibit 3 summarizes the number of positions in the Box and Lid Group.

⁶ This is as of December 2017. The 8 positions available to replace water meter boxes and lids are the 9 filled positions, less the supervisor.

Exhibit 3

More Than Half of Positions in Box and Lid Group are Vacant, on Restricted Duty or Leave Resulting from an Industrial Injury, or Work in a Different Crew

Position	Filled	Vacant	On Restricted Duty or Leave Resulting from an Industrial Injury	Works in Different Crew	Total
Water Systems Technician Supervisor	1				1
Water Systems Technician 4	2				2
Water Systems Technician 3	2	2	2	2	8
Water Systems Technician 2	1			1	2
Water Systems Technician 1	1				1
Water Utility Worker		1	1	1	3
Equipment Technician 1				1	1
Laborer	2	4		1	7
Total	9	7	3	6	25

Note: Figures reflect staffing as of December 4, 2017.

Source: Auditor generated based on organizational chart provided by PUD and interview with the Box and Lid Supervisor.

How Much Money is Spent on the Program?

The City has spent an average of approximately \$1.9 million dollars per year for water meter cover replacement between fiscal years 2015 and 2018.⁴ The City's expenditures for water meter cover replacement increased from \$1.6 million in fiscal year 2015 to \$2 million in fiscal year 2018, with personnel costs—including salary and benefits—making up about 71 percent of these expenses.⁷

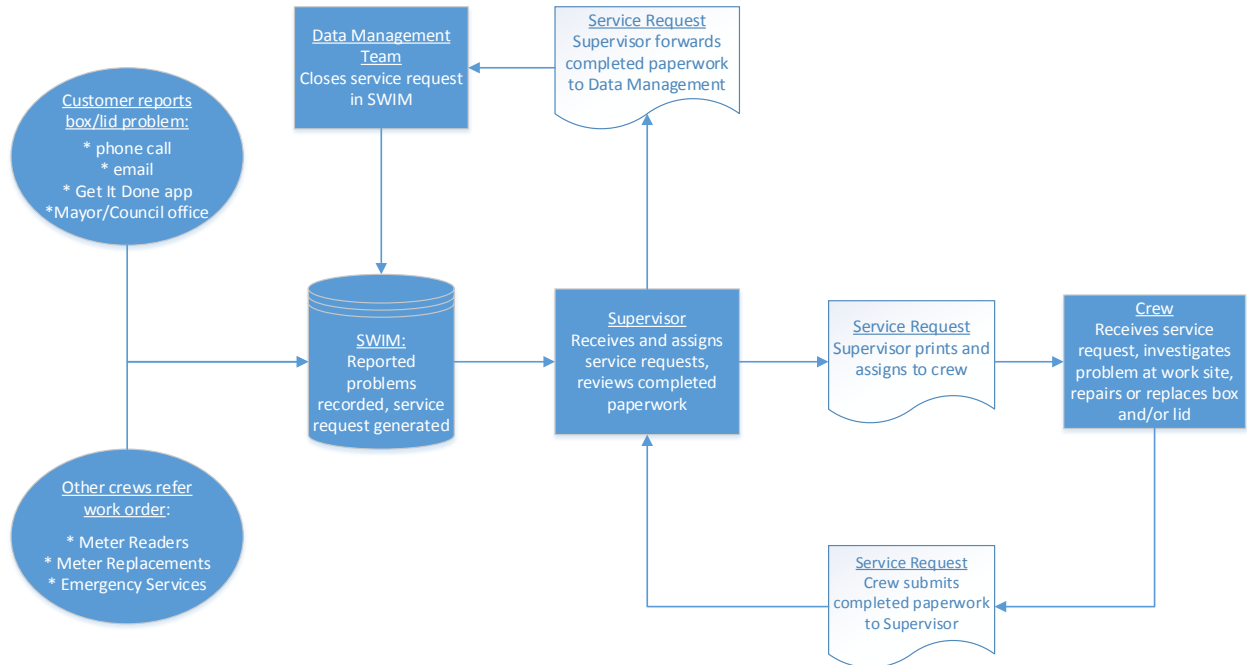
How Does the Replacement Process Work?

Exhibit 4 provides a simplified process diagram for the meter cover replacement process. The process shown in the diagram applied through March 2018, when PUD transitioned from its legacy service request system, SWIM, to a modern computer-based system, IAM, that is used by both supervisors and field crews. The process is explained in more detail following the exhibit.

⁷ These figures reflect expenses from the Water Utility Operating Fund.

Exhibit 4

Water Meter Cover Replacement Process



Source: Auditor generated based on field observations and discussions with PUD management and staff.

As shown in **Exhibit 4**, box and lid problems are generally reported by customers and by other City staff, especially other PUD field crews. Customers can report box and lid problems through PUD’s Customer Service Division, the City’s Station 38, PUD’s Meter Shop, the Get It Done mobile app, or via Mayor and Council offices.

PUD field crews can report box and lid problems several ways. For example, work crews—such as the meter replacement crew or the emergency services crew—can refer a new work order to the Box and Lid Group. This would be the case, for example, if the meter replacement crew noticed a box in need of replacement while replacing a meter. The meter replacement crew would refer the box replacement by writing this on their printed service request. Then, administrative staff would create a new work order in the maintenance management system, SWIM, which would appear in the box and lid supervisor’s work queue.

PUD’s meter readers also report box and lid problems, but they do so primarily via their hand-held ITRON device. In the normal course of completing their route, meter readers enter a trouble code in their hand-held device when they encounter boxes and/or lids in need of replacement or repair. This trouble code is saved and later

automatically converted to a service request in PUD's work order system, SWIM.

Whenever PUD receives a request for meter box or lid replacement, an electronic service request is created in PUD's maintenance system, SWIM, which then appears in the supervisor's electronic work queue in SWIM. The supervisor then prints and assigns the service request to a work crew. The work crew investigates the problem and completes the requested work whenever possible.⁸ The work crew is also responsible for writing down on the printed service request the action taken at the work location and for providing completed service requests to the supervisor at the end of the work day. The supervisor then reviews the service requests for completeness and accuracy before forwarding them to PUD's Data Management Team. Staff from the Data Management Team also reviews the completed service requests for completeness and accuracy and then updates the service request record in SWIM to a "completed" status, closing the service request and removing it from the supervisor's electronic work queue.

In March 2018, PUD transitioned from SWIM to the City's new Infrastructure Asset Management system, known as I AM San Diego (IAM). IAM is a comprehensive system meant to transform the way the City plans, prioritizes, and delivers maintenance and capital projects. Implementing IAM impacted many business processes within participating departments, including PUD. According to PUD, the system will provide for modernized methods for prioritizing, managing and scheduling the work of crews and enables detailed information collection on maintenance activities that occur in the field. With this detailed information, additional reporting on performance metrics can be done and analytics can guide management decisions.⁹

⁸ As explained later in this report, work crews were not always able to complete work assignments when arriving at a work site. This is due to several reasons, including: incomplete or inaccurate information in the service request system; work crews being unprepared or not fully equipped to complete box/lid replacement on their first visit; and jobs where a crew arrived at a work site and discovered work had previously been completed.

⁹ According to PUD, while the SAP system will bring about these improved processes, the adoption of a complex system with unfamiliar technology brings challenges. These challenges are expected in the first year of implementation of a system of this nature. All departments, including PUD, are in this process of adoption.

Audit Results

Finding 1: A Lack of Management Oversight and Accountability—Along with Process Inefficiencies and Limited Staffing Resources—Significantly Delay Box and Lid Replacement

Quickly addressing maintenance issues with water meter covers (boxes and lids) is essential to meet customer expectations, reduce the City's liability for trip and fall injuries, protect water metering infrastructure, and enhance the appearance of the City's public right-of-way.

Although the Public Utilities Department (PUD) has a goal of addressing box and lid maintenance issues within six months after they are reported, we found that this goal is rarely met. In fiscal year 2017, only 25 percent of box and lid replacements were done within PUD's six-month goal. Lids took approximately 321 days (11 months) to replace, while boxes took significantly longer, at an average of 630 days (1.7 years).

We found that PUD's delayed response to box and lid maintenance issues resulted from a lack of management oversight and accountability; a variety of process inefficiencies; and inadequate strategic planning. Specifically, we found that:

- Supervisors in the Box and Lid Group have not ensured adequate oversight and accountability and have not established performance goals for staff. Staff spend an average of only 3.6 hours in the field in an average 8-hour shift and repair and replace far fewer boxes and lids than could reasonably be expected;
- Other PUD crews often refer service requests to the Box and Lid Group to address, but these other crews do not receive adequate training on how to correctly diagnose box and lid issues. In addition, these other crews do not utilize available technology to communicate sufficient information to the Box and Lid Group, such as photos, that would allow them to determine what type of crew and equipment is needed to repair the problem or how it should be prioritized. As a result, approximately 40 percent of trips to repair box and lid issues are wasted when a crew arrives at a site but is not equipped to repair the problem;

- PUD's legacy service request system, SWIM, did not have sufficient controls to prevent duplicate service requests from being created when a problem was reported multiple times, leading to difficulties in prioritizing and assigning service requests efficiently;
- Service requests are often grouped inefficiently, leading crews to spend an excessive amount of time driving between work locations;¹⁰ and
- PUD did not anticipate and has not adjusted staffing resources to compensate for significantly increased box and lid workload generated by the AMI implementation project.

As a result, box and lid replacements are significantly delayed, are much more expensive than necessary, and PUD has a large backlog of approximately 25,000 box and lid maintenance service requests,¹¹ which continues to grow as the Box and Lid Group's productivity, limited by the issues described above, is insufficient to keep up with service demand. Unless these issues are corrected, it will take longer to address box and lid maintenance issues, which in turn will increase the City's liability for trip and fall injuries, and harm customer perception of the City's responsiveness.

Since the scope period of our audit, which covered box and lid maintenance activities in fiscal year 2017, PUD reports that it has made several improvements to the Box and Lid Group. Specifically, PUD hired a new Deputy Director to oversee the Water Construction and Maintenance Division, which includes the Box and Lid Group, and according to PUD, the Deputy Director and supervisors have worked to eliminate duplicates in the service request queue; identify work being done by contractors to reduce the number of jobs that are 'done on arrival'; and identify and quickly respond to resident complaints submitted via the City's Get It Done app.

While these are positive steps, our audit identified many additional issues that are severely impacting the Box and Lid Group's performance. To improve PUD's box and lid maintenance productivity, efficiency, and response times, we recommend that management implement and enforce formal performance standards for box and lid crews, including expectations for the amount of time crews should spend in the field, and the number of box and lid replacements crews should complete each day, on average. Furthermore, PUD should provide additional training and resources to other crews that refer service requests to the Box and Lid Group—

¹⁰ According to PUD, the recent implementation of IAM will enable the efficient grouping of service notifications.

¹¹ As of March 2018.

such as meter readers and the water meter installation team—to ensure the Box and Lid Group can efficiently prioritize service requests and address maintenance issues on their first trip to the location.

Even with these improvements, the Box and Lid Group needs significantly more staff to keep up with service demand. We recommend that PUD conduct an analysis to determine the number of crew members needed to meet timeline goals. This should include a re-evaluation of whether the current goal of addressing box and lid maintenance issues within six months is appropriate, given the City's emphasis on customer service.

**What We Found
(Condition)**

Although the Public Utilities Department (PUD) has a goal of replacing boxes and lids within six months after they are reported, we found that this goal is rarely met. Instead, the boxes and lids PUD replaced in fiscal year 2017 had been reported approximately 432 days (1.2 years) earlier, on average, with only 25 percent of replacements occurring within PUD's six-month goal.^{12,13} In fact, in the most extreme case, a box took 1,765 days (4.8 years) to replace. On average, however, lids took approximately 321 days (11 months) to replace, while boxes took significantly longer, at an average of 630 days (1.7 years). **Exhibit 5** summarizes the results of our analysis of box/lid replacement time.

¹² This is based on a statistical random sample of 100 meter locations where box or lid replacement work was performed during fiscal year 2017.

¹³ Of the 91 meter locations where a replacement was necessary, only 23 were done within six months of being reported.

Exhibit 5

The Average Box/Lid Replacement took Over a Year to Complete

Problem Type	Number of Locations	Average Completion Time		
		Days	Months	Years
Box	28	630*	20.7	1.7
Lid	50	321^	10.6	0.9
Total	78	432[†]	14.2	1.2

*Boxes 95 percent confidence level ± 217 days

^Lids 95 percent confidence level ± 101 days

†Altogether 95 percent confidence level ± 104 days

Note: We reviewed a statistical random sample of 100 water meter locations where PUD performed some type of box/lid work during fiscal year 2017. We found that PUD completed a box/lid replacement at 78 of these sites (shown above); that a replacement was still pending at 13 of these sites (as of March 11, 2018); and that PUD determined the reported problems at the 9 of remaining locations did not require replacement.

Source: Auditor generated based on a statistical random sample of meter locations where box/lid work was done in fiscal year 2017.

What Should Have Occurred (Criteria)

The City expects departments to provide excellent customer service. The first goal of the City’s Strategic Plan is to provide high quality public service, which includes promoting a customer-focused culture that prizes accessible, consistent, and predictable delivery of services. The goal also includes improving coordination and communication as it relates to customer satisfaction with the process of reporting problems to the City. Moreover, the Strategic Plan encourages the organization to anticipate and promptly respond to requests and establish clear standards and predictable processes.

According to PUD’s draft policy and procedures for meter box and lid replacement, service requests should be completed within six months after appearing in the supervisor's work queue (i.e. when a service request is referred to the Box and Lid Group).¹⁴ Furthermore, supervisors provided the following expectations—which they felt were reasonable—of what the box and lid crews can complete on a typical work day:

- 1-person lid crew: replace at least 20 lids;
- 2-to-3-person concrete box crew: replace at least 2 boxes;
- 2-person dirt box crew: replace at least 5 boxes.

¹⁴ According to PUD, this policy was drafted in 2016 but has not been formalized due to other competing priorities. Nevertheless, the Box and Lid Group operates under this policy.

**Why This Occurred
(Causes)**

We found that PUD's slow response to box and lid maintenance issues is caused by a number of factors. First, management and supervisors have not implemented formal performance standards for the Box and Lid Group or ensured that crews are held accountable for meeting reasonable productivity expectations. Second, we found multiple inefficiencies in the service request process, including:

- A lack of training and technology for other PUD crews that generate box and lid service requests, resulting in misdiagnosing problems and the Box and Lid Group lacking information, such as photos, that is needed to ensure field crews are properly prepared and equipped to complete work on their first visit;
- Duplicate service requests and finding jobs already done on arrival; and
- Inefficient routing of service requests.

Third, PUD did not plan for increased box/lid replacements resulting from AMI implementation.

The following sections discuss these issues in more detail.

**Cause #1: The Box and Lid
Group's Productivity is
Extremely Low**

The Box and Lid Group's very limited productivity is the primary factor contributing to significant delays in completing box and lid replacement. We found that the Box and Lid Group is not maximizing their time in the field, completing far fewer replacements than is reasonable based on the number of available crew members, the supervisor and manager's expectations, and our observations in the field. **Exhibit 6** shows that, on an average work day in fiscal year 2017, the Box and Lid Group consisted of about 8 employees that collectively replaced only about 4 boxes and 15 lids.¹⁵ This is in contrast to the supervisor and manager's expectations, which suggest 8 employees should collectively be able to replace 12 boxes and 20 lids on a typical work day.

¹⁵ This is based on a statistical random sample of 16 workdays between September 2016 and February 2018, with a 95 percent confidence level and ± 2 boxes and 5 lids. We also compared this to PUD's average box/lid productivity for the entire year, and found that the average on these days was similar to—slightly higher than—average productivity over the entire year, indicating our sample was generally representative.

Exhibit 6

Average Daily Figures Indicate the Box and Lid Group's Productivity is Very Low Compared to Expectations

Expected Output: a crew of 8 should be able to replace 12 boxes and 20 lids per day



Actual Output: a crew of 8 is replacing 4 boxes and 15 lids per day



Note: The expected output assumes 4 employees (2 crews) on dirt boxes, 3 employees (1 crew) on concrete boxes, and 1 employee (1 crew) on lids. The quantity and mix of boxes and lids completed can vary depending on how the supervisor assigns crews on any given day. For example, if there were 2 employees on dirt boxes (1 crew), 3 employees on concrete boxes (1 crew), and 3 employees on lids (3 crews), the expected output would be 5 boxes in dirt, 2 boxes in concrete and 60 lids.

Source: Expected Output is auditor generated based on the supervisor's expectations of what crews should be able to accomplish in a work day, and Actual Output is auditor generated based on statistical random sample of work days between September 2016 and February 2018.

The main reason for such low output was that, on a typical 8-hour work day in fiscal year 2017, box and lid crews spent less than 4 hours in the field completing service requests. We reviewed service request data for a statistical random sample of 30 work days between July 2016 and March 2018 and found that a crew's first service request of the day began at 9:36am,¹⁶ on average, and that their last service request of the day was completed at 1:09pm, on average.¹⁷ This

¹⁶ With a 95 percent confidence level \pm 13 minutes.

¹⁷ With a 95 percent confidence level \pm 10 minutes.

means only about 3.6 hours of the typical work day were spent in the field. Of this, only about 2.5 hours were spent actually completing box/lid replacement work during an average work day. The remaining time in the field appears to primarily have been spent driving between work locations.¹⁸ **Exhibit 7** summarizes key figures related to how the Box and Lid Group spent time on a typical work day in fiscal year 2017.

Exhibit 7

Box and Lid Crews Spent Less than Half of the Average Work Day in the Field

Start Time	9:36 am
End Time	1:09 pm
Field Time	3.6 hrs
Work Time	2.5 hrs
Other Time*	1.1 hrs

*Includes driving time between work locations while in the field, break times, etc. This does not include driving time from the Chollas Yard work station to the first work site of the day, or from the last work site of the day back to the Chollas Yard, because these times were not recorded in the service request system, SWIM.

Source: Auditor generated based on statistical random sample of work days between July 2016 and March 2018.

Given the low productivity reflected in the service request data, we interviewed supervisors and managers responsible for the box and lid replacement program to understand controls and practices in place that would help ensure oversight and promote accountability within the work unit. However, based on our conversations, we were unable to account for all of the remaining 4.4 hours in an average work day.

Employees in the Box and Lid Group keep a work schedule that begins at 6:30 a.m. and ends at 3:00 p.m. According to the box and lid supervisor, on a typical work day:

- Employees in the Box and Lid Group will arrive at the meter shop at 6:30 a.m., socialize for a bit while receiving their work assignments, load their truck with equipment, and leave the yard no later than 8:00 a.m.
- Employees complete their assigned work, take a lunch break at some point in the day, and return to the work yard at about 2:30 p.m.
- Back at the yard, employees unload any trash and/or unused materials, prepare their truck for the next day (re-fuel if necessary), and submit completed service request paperwork to the supervisor before ending the work day at 3:00 p.m.

¹⁸ In addition to driving time, this may include the time spent on breaks and lunch.

PUD's draft policy and procedures for meter box and lid replacement state that "[employees] are allotted 20 minutes in the morning and afternoon for loading [and] unloading trucks and to complete necessary paperwork," and that employees should be "out of the yard by 7:10 a.m."¹⁹ The supervisor indicated allowing employees to socialize in the morning before leaving the yard as a way of promoting camaraderie and a sense of team within the group. While this is reasonable to an extent, the fact that crews do not typically start their first job until after 9:30 a.m.—three hours after the start of their work day—indicates widespread abuse and a lack of accountability within the Box/Lid Group.

PUD Has Not Established or Enforced Performance Standards, Goals, or Expectations

Based on our conversations with the supervisor and manager, we learned that the Box and Lid Group operates under an informal supervisory environment, lacking formal performance standards, goals, or expectations related to productivity. In addition, quotas and other incentives to encourage a high level of output are not currently in place and have not been used in the past. According to the supervisor, one of the reasons for this is that quotas or similar productivity goals may discourage employees from producing more than the minimum requirements. We maintain, however, that developing goals based on reasonable expectations and holding employees accountable can help increase productivity.

Section Management Has Not Ensured Strong Oversight and Accountability

The supervisor and manager emphasized treating all team members with respect and keeping employee morale up as a way of encouraging greater cooperation and a stronger sense of team. The supervisor also expressed a preference to lead the team in a less formal manner, using informal discipline methods (i.e. conversations) to address any performance issues that might arise. The supervisor stated there has not been a need to place an employee in the crew under formal discipline; any performance issues have been resolved through conversations. Moreover, the supervisor stated that, regardless of disciplinary methods, employees are still expected to do the job and complete as much work as quickly and as effectively as possible. Lastly, management stated that the supervisor and manager regularly encourage employees to do their best and remind them that the work they do matters a great deal to customers.

However, given the Box and Lid Group's limited staffing resources and the volume of pending work, it is imperative that management do everything possible to ensure that resources are used as efficiently and effectively as possible.

¹⁹ According to PUD, this policy was drafted in 2016 but has not been formalized due to other competing priorities. Nevertheless, the Box and Lid Group operates under this policy.

- Recommendation 1** To improve productivity, oversight, and accountability within the Box and Lid Group, PUD should establish and enforce productivity standards, goals, quotas, or similar performance targets based on reasonable expectations about how much time crews should spend in the field and what crews should be able to accomplish in that time, on average, given known resource constraints. Finalized performance targets should be communicated to all employees in the group so that all are aware of these expectations. (Priority 1)
- Recommendation 2** To maximize the Box and Lid Group's available productive time, PUD should require work crews to spend additional time in the field completing service requests. In addition, PUD should formalize policies related to employee work schedules, including when they should leave and return to the work yard and when they should start and end their time in the field. These policies should be communicated to all employees in the group so that all are aware of these expectations. (Priority 1)
- Recommendation 3** To monitor adherence to the performance targets and work schedule policies from Recommendations 1 and 2, respectively, and to hold employees accountable for delivering expected performance, PUD should establish responsibilities for regularly generating and reviewing performance reports from the service request system. These reports should contain enough information for management to monitor whether employees are keeping up with established expectations for the use of their time and with established production targets. (Priority 1)
- Recommendation 4** To hold employees accountable for delivering expected performance, PUD should include the results of the reports from Recommendation 3 in the normal process of evaluating employees' performance. If management finds employees are deficient, PUD should use formal performance plans and discipline methods as appropriate. (Priority 1)

Cause #2: Inefficiencies in the Service Request Process

While low productivity was the most significant cause delaying box/lid replacement, we noted several other issues contributing to process inefficiencies, which also caused excessive box/lid replacement timelines. Specifically, wasted trips were caused by incomplete or inaccurate information in the service request system; field crews being unprepared or not fully equipped to complete replacement on their first visit; and jobs where a crew arrived at a work site and discovered work had previously been completed. In addition, service requests were sometimes assigned for completion in a way that was inefficient, in part because of limitations of the service request system.

Service Request System Lacks Complete and Accurate Information

Incomplete or inaccurate information in the service request system resulted from both system limitations and a lack of training for employees that refer problems to the Box and Lid Group for replacement.

We found that other PUD crews, such as meter readers and meter replacement crews, did not always identify and report box/lid problems consistently or accurately. For example, there were some instances where different meter readers at various points in time reported a box or lid problem at the same location. Sometimes, this resulted in conflicting or inaccurate reports of the problem. For example, one meter reader may have identified a lid problem while a different meter reader identified a box problem. In a different scenario, a meter reader may have requested a lid replacement that actually requires a box replacement instead.

In other cases, there was not enough information provided in the service request system. For example, the Box and Lid Group may receive only a generic description of the request, such as "replace meter box" or "replace meter lid." Missing from the request is any information about the current condition of the box/lid, such as whether the box is in dirt or concrete and what size box or lid is required to complete the job.²⁰

Finally, not all field crews, such as meter readers, emergency services, and meter replacement crews, use photos—either through the Get It Done app, the photo capabilities in IAM, or their smartphones—to report box/lid problems. A photo would provide the supervisor with a better understanding of site conditions and what would be

²⁰ According to PUD, the new IAM system displays a specific box/lid size code in the notification description when a service notification is generated by a meter reader and if the meter reader included this information. In addition, the IAM system can be configured to record the meter box location specifications such as concrete or dirt.

necessary to fix the problem. In the case of meter readers, for example, employees forgo the use of the Get It Done app to report box/lid problems because they use their hand-held meter reading device instead. The device, however, does not allow the meter reader to input additional descriptive information about the problem, limiting the ability of the Box and Lid Group to respond effectively. Alternatively, the Get It Done app also allows users—which can include meter readers—to report box/lid problems with a description, photo, and location tag. While using the app would take meter readers an additional few minutes longer than it would to use their hand-held device, reporting a problem this way would be more efficient overall because it would help prevent wasted trips by other crews—sometimes made up of multiple employees—and help to ensure problems are addressed on the first trip.

Incomplete or Inaccurate Information Increases the Risk of Wasting Time and Resources

Information about site conditions directly affects the Box and Lid Group's ability to prepare; knowing this information would help the supervisor assign a crew and ensure they carry the necessary equipment and materials to finish work at the site. Without complete and accurate information, there is an increased risk that a box and lid crew will arrive at the site unprepared to complete the necessary work, wasting time and resources on a trip that does not result in box/lid replacement and further extending the completion timeline. In fact, we found that each box and lid crew wasted approximately one trip per work day and that PUD made wasted trips to a substantial number of meter locations where the Box and Lid Group performed some type of work during fiscal year 2017. We found that about 40 percent of these trips were wasted investigating the problem, referring the problem to another crew, or taking no action. This figure includes trips made to a meter location by all PUD work crews, including crews other than the box and lid crews, such as the emergency services crew.²¹ **Exhibit 8** shows that PUD visited a meter location more than once, on average, to complete a service request for box/lid replacement. Very often, multiple site visits were needed to repair boxes, which took almost two trips to replace, while lids took slightly over one trip to replace, on average.

²¹ In our analysis, we considered a trip to have been wasted when a PUD work crew—including box/lid and emergency services crews—visited a work location but did not complete a box/lid replacement. We did not count visits to the site made by meter readers or meter replacement crews as wasted trips, even when the problem had been identified as a lid. We also did not count instances where the supervisor closed a duplicate service request as “investigated” or “no action taken,” since a crew had likely not been dispatched in those cases. In cases where the problem had been reported directly by a customer—and when there was not already a pending service request—we allowed one initial visit by a PUD crew to investigate the problem before counting subsequent trips as wasted if they did not result in box/lid replacement. Underlying our method was the idea that, when a problem is referred by another PUD crew, PUD work crews should be able to complete a replacement on their first visit to a work site.

Exhibit 8

About 40 Percent of Trips Made to Replace a Box or Lid Were Wasted

Problem Type	Problem Count [^]	Total Trips*	Average Trips per Problem	Unnecessary Trips*	Percentage of Trips Wasted
Box	40	72	1.8	36	50%
Lid	60	69	1.1	21	30%
Total	100[^]	141	1.4	57	40%

Notes: The average number of trips is estimated at 95 percent confidence with ± 0.4 trips per box; ± 0.2 trips per lid; and ± 0.2 trips altogether.

[^]We reviewed a statistical random sample of 100 water meter locations where PUD performed some type of box/lid work during fiscal year 2017. We found that PUD completed a box/lid replacement at 78 of these sites (shown in **Exhibit 9**); that a replacement was still pending at 13 of these sites (as of March 11, 2018); and that PUD determined the reported problems at the 9 of remaining locations did not require replacement.

*This includes trips made by other PUD crews, including Emergency Services crews.

Source: Auditor generated based on a statistical random sample of meter locations where the box/lid crew performed some type of work in fiscal year 2017.

Making more than one trip to fix a problem resulted in extensive delays for work completion. In most cases, when providing service, PUD replaced a box or a lid on their first visit (79 percent of the time). However, when this was not the case, PUD completed service approximately eight months, on average, after their first visit. Although the sample size in this example is relative small, **Exhibit 9** shows the average delay resulting from multiple visits was 237 days.

Exhibit 9

Making More than One Trip Added About 237 Days to Work Completion Timeline

Problem Type	Resolved (Serviced)	Resolved on First Visit		Not Resolved on First Visit		Avg # Days Added by Multiple Visits
		Count	Percentage	Count	Percentage	
Box	29	18	62%	11	38%	136
Lid	49	44	90%	5	10%	557
Total	78	62	79%*	16	21%	237**

Notes:

*± 9 percent at 95 percent confidence.

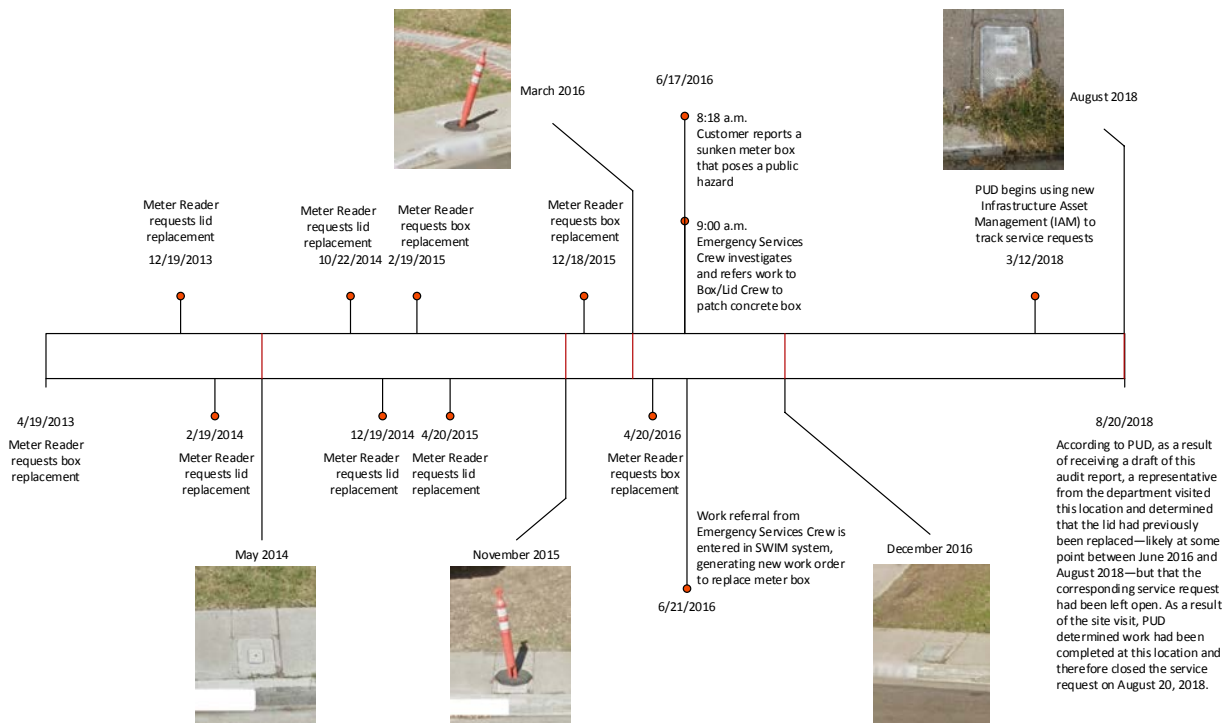
**Due to the small sample size of box/lid problems that were not resolved on the first visit, the number of days is only presented as an example of the significant impact that wasted trips can have on replacement timelines and is not reliable enough to project to the entire population.

Source: Auditor generated based on a statistical random sample of meter locations where the Box and Lid Group performed some type of work in fiscal year 2017.

In one extreme example, since 2013, PUD has received multiple reports of a box/lid problem at a location—and at one point sent an emergency services work crew to investigate the problem—but did not complete the necessary repairs for at least three years after receiving the first report of a problem. Noteworthy here is that meter readers diagnosed the problem differently on different occasions, sometimes reporting a box in need of replacement and sometimes a lid. As explained previously, this increases the risk that the box/lid crew is not prepared to address the actual problem when they arrive at the site. Also noteworthy is that PUD quickly responded when a customer requested service—on the same day in fact. However, PUD’s response to the customer’s request did not fix the reported problem. Instead, the responding emergency services crew referred the problem to the Box and Lid Group for repair, essentially replicating previous meter readers’ reports and wasting a trip to the site. The timeline in **Exhibit 10** illustrates this extreme case where process inefficiencies have contributed to a box/lid replacement time of at least three years.

Exhibit 10

In One Extreme Example, Process Inefficiencies Contributed to a Replacement Timeline of at Least Three Years



Source: Auditor generated based on data from SWIM, IAM, and Google Maps Street View.

Field Crews are Not Properly Prepared or Equipped to Complete Work on Their First Visit

In some instances, the Box and Lid Group investigated a problem even though it had been referred by another PUD crew. When crews investigate a problem without resolving it, they note basic information about the nature of the problem, site conditions, and any specialized equipment that may be necessary to complete work. It is understandable for customers or others outside PUD to provide insufficient information about a problem because they are not subject matter experts. However, PUD crews should be able to provide enough information in a service request so that the assigned crew can resolve the problem on their first visit.

In other cases, the crew investigated but took no action other than referring the problem to another crew or even back to the same box/lid work queue, sometimes with additional information. This deferral adds to the length of time a problem remains unresolved.

Lastly, other PUD crews sometimes referred damaged or broken lids to the Box and Lid Group for replacement instead of replacing it themselves. Assuming the box is in good condition and that the crew has the correct size lid on hand, a lid replacement can typically be very straightforward, taking very little time to complete. Therefore, having as many field crews as possible replace damaged or broken lids instead of referring them would alleviate some of the service demand on the Box and Lid Group and allow PUD to solve the problem—and, potentially, mitigate the associated public liability—faster. According to PUD, in November 2017, employees from the Box and Lid Group trained meter readers on how to identify box/lid problems while completing their reading route. PUD also equipped meter readers with lids and instructed them to replace any in need of replacement after completing their meter reading route.

Jobs that are "Done on Arrival" Also Cause Wasted Trips

Some service requests for box/lid replacement were closed as being "done on arrival." This happens when the crew arrives at the work location and determines that the reported problem had previously been fixed or that there really was no problem in the first place. We attribute the latter to an insufficient knowledge base on the part of the crews that refer work to the Box and Lid Group, and we attribute the former primarily to two causes:

1. Service requests left open in the service request system after work is completed. This can happen if the service request process fails and the completed paperwork never makes it to the supervisor and/or to staff in the Data Management Team or if the paperwork is never processed by staff in the Data Management Team. The original service request would remain

in the work queue and may eventually be re-assigned to a crew despite having previously been completed.

2. Water main group jobs and water service renewals, where a contractor replaces boxes and lids as part of planned work in the right-of-way. In some cases, these replacements are not communicated to the Box and Lid Group, either by the contractor or internally by other PUD work units.

Service Requests Are Not Always Grouped Efficiently

We also found that service requests were not always grouped in the most efficient manner. We reviewed service request data for 16 working days between September 2016 and February 2018 and found that approximately half of box and lid crews were assigned to complete service requests in different areas of the City instead of focusing on a single area. For example, **Exhibit 11** shows that the work locations for crews replacing boxes and lids on June 26, 2017 were as far away as Pacific Beach and Rancho Peñasquitos.

Exhibit 11

Service Requests Are Not Always Grouped Efficiently

	Crew Size	Assignment	Grouped Efficiently?	Work Locations
Crew 1	3	Boxes	No	Kearny Mesa; Rancho Peñasquitos
Crew 2	2	Box/Lids	No	Pacific Beach; Rancho Peñasquitos
Crew 3	1	Lids	No	Mission Beach; Mira Mesa
Crew 4	1	Lids	Yes	Pacific Beach; La Jolla
Crew 5	1	Lids	No	Scripps Ranch; Carmel Valley; University City

Source: Auditor generated based on service request data for a statistical random sample of working days between September 2016 and February 2018.

Working in different areas of the City may be inefficient because additional time is spent driving between work sites, reducing the amount of time available to complete work. For example, we estimate that the average driving time for crews that were grouped efficiently (relatively close together) was 0.7 hours (about 40 minutes). However, crews that were grouped inefficiently took an average of 1.2 hours (about an hour and 10 minutes) of driving time—a difference of about 30 minutes. With a backlog of tens of thousands of service requests spread across the City, there is an opportunity to group them more closely together to maximize productive time while in the field.

Duplicate Service Requests Created Inefficiencies

PUD’s previous service request system, SWIM, allowed duplicate service requests to be created for the same problem, causing the backlog of pending service requests to grow over time and creating several inefficiencies. For example, the box/lid supervisor eliminated

some duplicates by grouping them together when assigning crews to a work location; these would be closed together once crews completed the work. Additionally, on an ongoing basis and as time allowed, the supervisor would identify and remove duplicates in the work queue by closing them with an action code of "investigated" or "no action taken." This was a manual and labor-intensive process that required the supervisor to print and forward duplicate service requests to the Data Management Team, which would close the requests and remove them from the supervisor's work queue in SWIM. While the effort is understandable as a way of trying to control the size of the work queue, the time spent constantly grouping and closing duplicate service requests represents an inefficient use of time, both by the box/lid supervisor and by staff in the Data Management Team.

In addition, having multiple service requests for the same problem diminished the supervisor's ability to address the backlog in a logical manner. Service requests are assigned a priority between 1 and 3, with 1 being the most urgent and requiring the fastest resolution. In cases with duplicate service requests, priorities were not always applied consistently, making them unreliable for determining which problems to address first. This diminished the supervisor's ability to assign crews to complete the most urgent work first.

According to PUD, duplicates are no longer created in IAM the same way they were in SWIM. Whereas duplicate service requests with multiple work orders could be created in SWIM, in IAM, only one service request can be open at a time. While IAM records any recurring meter reader observations within the original service notification, the notification queue does not fill up with duplicates. Moreover, the work process is different in IAM than it was in SWIM. Therefore, any recurring meter reader observations may not be as problematic for the crew's ability to complete work efficiently.

To address inefficiencies in the box/lid replacement process, PUD should focus on generating more complete and accurate information about box and lid problems in its IAM system. Specifically:

Recommendation 5 PUD should identify or develop and use data fields in the IAM system that provide more complete and accurate information about site conditions (box/lid size, whether in concrete or dirt, etc.) (Priority 2)

Recommendation 6 PUD should research and implement the capability to attach pictures to a service request within the IAM system. Alternatively, PUD should standardize the use of the Get It Done app for all field crews that refer work to the Box and Lid Group, including meter readers. (Priority 2)

- Recommendation 7** PUD should train all PUD field crews, including meter readers, on how to properly identify and report box/lid problems. This training should be made available to field crews after being hired and once a year as refresher training during PUD's annual spring training. (Priority 2)
- Recommendation 8** PUD should develop and distribute a pocket reference guide for field crews that refer problems to the Box and Lid Group so that field crews can more accurately diagnose problems in the field. (Priority 2)
- Recommendation 9** To improve management oversight of the box/lid replacement process, PUD should develop monitoring procedures and measures—which should include generating reports from the IAM system on an ongoing basis— to ensure that no trips are wasted in the process of completing box/lid replacements. (Priority 2)
- Recommendation 10** PUD should develop a more efficient routing procedure for box/lid replacements. For example, every work day, the box/lid supervisor could group service requests in one specific area of the City and assign crews to complete replacement work there that day. To ensure work is completed throughout the City, the crews could have a rotation of work areas that would take them to a different area every day. One application of this approach might be to group service requests within the same Council District and work in a different Council District every day. (Priority 2)

Cause #3: PUD's AMI Implementation Project Has Increased Box and Lid Workload

In addition to the existing backlog, service demand for box/lid replacement has increased significantly in recent years, due in part to the department's AMI implementation project. The project is generating a significant number of box and lid service requests that the Box and Lid Group did not receive before, furthering the Box and Lid Group's service request backlog. **Exhibit 12** provides the total number of service requests for box/lid replacement and the portion of them attributed to the AMI implementation project.

Exhibit 12

The Portion of Service Requests Caused by the AMI Implementation Project Increased Between Fiscal Years 2015 and 2017

Fiscal Year	Problem Type	Problem Count	Problem Count (AMI)	Percentage AMI
2015	Box	5,663	0	0%
	Lid	1,145	0	0%
	Total	6,808	0	0%
2016	Box	2,992	980	33%
	Lid	1,812	831	46%
	Total	4,804	1,811	38%
2017	Box	4,902	2,327	47%
	Lid	6,644	4,326	65%
	Total	11,546	6,653	58%

Source: Auditor generated based on data provided by PUD from SWIM.

The Box and Lid Group Does Not Have the Staffing Capacity to Keep up With Service Demand

The Government Finance Officers' Association (GFOA) emphasizes "the importance of giving real thought to the structure of the organization, on both the macro- and micro-level, to position all employees for maximum efficiency." However, even if the Box and Lid Group makes gains in productivity and process efficiencies, the crew's staffing resources are not enough to keep up with service demand. In fiscal year 2017, new service requests were created at a rate of 47 per work day, as shown in **Exhibit 13**.

Exhibit 13

Fiscal Year 2017 Service Demand

Problem Type	Total Number of New Service Requests*	Average Number of Service Requests per Work Day^
Box	4,902	20
Lid	6,644	27
Total	11,546	47

Notes:

*These figures reflect unique meter locations (not duplicate service requests).

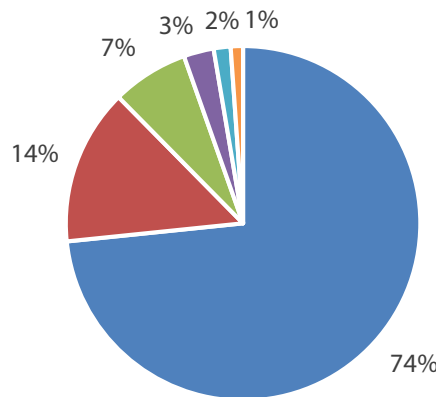
^There are 249 work days per year (days in the calendar year less weekends and City holidays). Figures for the average number of service requests per work day are rounded.

Source: Auditor generated based on service request data provided by PUD from SWIM.

Based on the supervisor’s expectations of what crews should be able to accomplish in a work day, the Box and Lid Group would need to be staffed with 20.4 employees—more than twice the current staffing level of 8—to be able to keep up with service demand level experienced in fiscal year 2017. This figure assumes all of the group’s available working time—that is, all working hours minus holidays—is spent on regular work duties. However, an absence rate should also be considered when staffing the group on an ongoing basis. For example, in the three years between fiscal years 2016 and 2018, employees in the Box and Lid Group collectively recorded regular working time at a rate of 74 percent.²² The remainder of their time was recorded as leave from work—including vacation, industrial leave, light duty, long-term disability—and time spent on training. **Exhibit 14** provides a breakdown of the Box and Lid Group’s time entries between fiscal years 2016 and 2018.

Exhibit 14

About a Quarter of the Box and Lid Group’s Available Work Time was Spent Away from Work Between Fiscal Years 2016 and 2018



- Regular Working Time
- Leave
- Industrial Leave
- Light Duty
- In Service Training
- Long Term Disability

Source: Auditor generated based on time entry data from SAP.

Based on this analysis, PUD management can expect about a quarter of the group’s available time to be spent away from work, not performing regular work duties. The department should therefore staff the group accordingly. Factoring in the amount of time employees spent on vacation, industrial leave, light duty, training, and other non-productive time between fiscal years 2016 and 2018,

²² This reflects the time spent performing regular work duties.

the group would need to be staffed with approximately 27.5 crew members on the average workday to meet the level of service demanded in fiscal year 2017, as shown in **Exhibit 15**.

Exhibit 15

Potential Staffing to Meet Service Demand

	Crew Size	Number of Crews	Number of Employees	Number of Employees w/ Absence Rate	Expected Output
Boxes - Dirt [†]	2	2	4	5.4 [^]	10
Boxes - Concrete [†]	3	5	15	20.3 [^]	10
Lids	1	1.4 [^]	1.4 [^]	1.8 [^]	27
Total			20.4[^]	27.5[^]	47

Notes:

[†]Based on a statistical random sample, approximately half of the boxes replaced in fiscal year 2017 were in concrete, and the other half were in dirt. We applied this breakdown to fiscal year 2017 service demand in order to estimate the number of boxes—both in concrete and in dirt—that crews may be assigned to replace in this potential staffing scenario.

[^]Figures with decimals reflect an average staffing level. For example, a staffing level of 1.4 employees means that some days there will be 1 employee and on other days there will be 2, averaging to about 1.4 employees over time.

Source: Auditor generated based on fiscal year 2017 service demand, supervisor’s expectations of what crews can accomplish in a typical work day, and time entries between fiscal years 2016 and 2018.

We should note that the estimated staffing level above is only sufficient to meet the demand for new box and lid service requests coming in—the existing box and lid service request backlog would remain the same, making it difficult to address service requests within PUD’s six-month goal. Furthermore, the example above assumes that all 27.5 positions are filled. In order to reduce the box and lid service request backlog and account for the likelihood that some positions may be vacant at times, the Box and Lid Group may need more than the 27.5 FTE shown above in order to eventually be able to address box and lid service requests within six months or less.

Recommendation 11

To ensure the Box and Lid Group has the necessary staffing capacity to meet service demand and performance targets, PUD should re-evaluate the size of the Box and Lid Group. This assessment should include a consideration of time that employees spend on activities other than regular work duties, such as vacation, industrial leave, restricted duty assignments, training, and any other activities that take employees away from work. When conducting this assessment, PUD should also re-evaluate the Box and Lid Group’s current six-month performance goal, given the potential for public liability and the City’s emphasis on customer service. Lastly, PUD should also

evaluate alternate means of completing box/lid replacement work, which may include outsourcing these activities to an outside contractor. (Priority 2)

**Impact of Taking No Action
(Effect)**

The lack of performance standards and accountability, process inefficiencies, and inadequate strategic planning and staffing has led to a waste of resources, slow response to box and lid service requests, and a large and growing service request backlog that will result in even slower resolution of maintenance issues in the future unless corrected.

*Box/Lid Replacements Are
Much More Expensive than
Necessary*

One impact of the lack of performance standards and accountability, as well as process inefficiencies, is that box and lid replacement work is much more costly than necessary. While PUD only tracks the cost of the program as a whole, and does not track the cost of individual box or lid replacements, we used the Box and Lid Group's expenditures and actual productivity in fiscal year 2017, along with feedback from supervisors²³ to calculate a rough estimate of the current cost to conduct box and lid maintenance activities, given current productivity levels. For example, we estimate that it cost PUD approximately \$2,900 to replace a box in concrete in fiscal year 2017.²⁴ The high cost is driven by the fact that so little time is spent in the field, crews do not produce reasonable levels of output, and much of the time spent in the field is wasted when work orders cannot be completed on the first trip or the work is found to already be complete. Similarly, we estimated that by ensuring crews maximize their time in the field, adhering to reasonable output standards, and eliminating process inefficiencies and wasted trips, this cost could be reduced to approximately \$1,100. We anticipate that similar efficiency gains can be achieved for other types of work, such as boxes in dirt and lids.

*Box/Lid Replacement
Backlog Continues to Grow*

Continued low productivity, process inefficiencies, and understaffing will continue to grow PUD's box and lid service request backlog and further delay maintenance completion. As of July 6, 2017, the backlog for box/lid replacement consisted of 33,280 service requests, with the

²³ PUD spent approximately \$2.33 million on the Box and Lid Group in fiscal year 2017. However, supervisors indicated that approximately one-third of the employees allocated to the Box and Lid Group were actually working on other activities, such as the AMI implementation project. This means that the actual cost of the Box and Lid Group was approximately \$1.55 million in fiscal year 2017, during which PUD replaced 713 boxes and 2,734 lids. In order to estimate the current cost of different activities (box in concrete vs. box in dirt vs. lids) we relied on the supervisor and manager's descriptions of the relative level of effort needed to complete each task.

²⁴ As discussed previously in this section, the Box and Lid Group supervisor and manager stated that, on average, a crew of three employees should be able to replace two boxes in concrete per day; a crew of two employees should be able to replace five boxes in dirt; and a crew of one employee should be able to replace 20 lids per day. We used these projected productivity levels to determine what the estimated cost of replacing a box in concrete should be.

oldest dating back to July 31, 2008. However, a portion of these were duplicates. According to PUD, by the time of PUD’s transition from SWIM to IAM in March 2018, PUD had been able to identify and eliminate most duplicate service requests, reducing the the number of service requests in the backlog to 25,494. Still, with low productivity, process inefficiencies, a growing service demand, and limited staffing resources, the backlog will continue growing. For example, as shown in **Exhibit 16**, in fiscal year 2017, PUD opened service requests to replace 4,902 boxes and 6,644 lids, but only completed work on 713 boxes and 2,734 lids during the same time period. Thus, PUD’s backlog of box and lid service requests grew by more than 8,000 service requests in fiscal year 2017 alone.

Exhibit 16

PUD’s Backlog of Box and Lid Service Requests Continues to Grow

	Opened		Closed		Carry-over	
	Box	Lid	Box	Lid	Box	Lid
FY15	5,663	1,145	778	1,148	4,885	(3)
FY16	2,992	1,812	614	2,131	2,378	(319)
FY17	4,902	6,644	713	2,734	4,189	3,910
FY18	2,375	3,199	759	1,365	1,616	1,834
					13,068	5,422

Note: These figures reflect unique meter locations by year (not duplicate service requests), but do not account for the number of open service requests existing prior to fiscal year 2015 (prior backlog).

Source: Auditor generated based on data from SWIM and IAM.

As shown in **Exhibit 16**, the backlog has grown to at least 18,000 service requests for box and lid replacements since fiscal year 2015.²⁵ This emphasizes the need to increase productivity and improve efficiencies in the process so that boxes and lids can be replaced at a faster rate.

Other Impacts

This is problematic for the City because the longer a reported box/lid problem goes unaddressed, the higher the risk of public liability claims against the City. Moreover, such lengthy wait times for box/lid replacement represent poor customer service, which reflects poorly on the City’s image.

²⁵ This does not account for the backlog that existed prior to fiscal year 2015. The actual size of the backlog is likely closer to 25,494, which is the number of service requests transferred from SWIM to the IAM system in March 2018.

Conclusion

Water meter cover (box/lid) replacement is an important activity that mitigates some of the City's public liability and helps to maintain PUD's water metering system.

Based on the evidence gathered during our review, we found PUD mismanaged the box/lid replacement program. Specifically, a lack of strong management oversight and accountability resulted in very low employee productivity, while several other issues resulted in larger process inefficiencies. In addition, PUD has not increased staffing in response to increased box/lid repair workload generated by the AMI Implementation project. Together, these factors caused significant delays in replacing boxes and lids throughout the City and resulted in replacement work that is much more costly than necessary.

To address these deficiencies, we made recommendations intended improve management oversight, accountability, productivity, monitoring, process efficiency, and staffing. By implementing these recommendations, PUD has an opportunity to improve management of the box/lid replacement program, which can result in faster completion times, lower cost per replacement, improved customer service, and reduced public liability.

Recommendations

- Recommendation 1** To improve productivity, oversight, and accountability within the Box and Lid Group, PUD should establish and enforce productivity standards, goals, quotas, or similar performance targets based on reasonable expectations about how much time crews should spend in the field and what crews should be able to accomplish in that time, on average, given known resource constraints. Finalized performance targets should be communicated to all employees in the group so that all are aware of these expectations. (Priority 1)
- Recommendation 2** To maximize the Box and Lid Group's available productive time, PUD should require work crews to spend additional time in the field completing service requests. In addition, PUD should formalize policies related to employee work schedules, including when they should leave and return to the work yard and when they should start and end their time in the field. These policies should be communicated to all employees in the group so that all are aware of these expectations. (Priority 1)
- Recommendation 3** To monitor adherence to the performance targets and work schedule policies from Recommendations 1 and 2, respectively, and to hold employees accountable for delivering expected performance, PUD should establish responsibilities for regularly generating and reviewing performance reports from the service request system. These reports should contain enough information for management to monitor whether employees are keeping up with established expectations for the use of their time and with established production targets. (Priority 1)
- Recommendation 4** To hold employees accountable for delivering expected performance, PUD should include the results of the reports from Recommendation 3 in the normal process of evaluating employees' performance. If management finds employees are deficient, PUD should use formal performance plans and discipline methods as appropriate. (Priority 1)
- Recommendation 5** PUD should identify or develop and use data fields in the IAM system that provide more complete and accurate information about site conditions (box/lid size, whether in concrete or dirt, etc.) (Priority 2)
- Recommendation 6** PUD should research and implement the capability to attach pictures to a service request within the IAM system. Alternatively, PUD should standardize the use of the Get It Done app for all field crews that refer work to the Box and Lid Group, including meter readers. (Priority 2)

- Recommendation 7** PUD should train all PUD field crews, including meter readers, on how to properly identify and report box/lid problems. This training should be made available to field crews after being hired and once a year as refresher training during PUD's annual spring training. (Priority 2)
- Recommendation 8** PUD should develop and distribute a pocket reference guide for field crews that refer problems to the Box and Lid Group so that field crews can more accurately diagnose problems in the field. (Priority 2)
- Recommendation 9** To improve management oversight of the box/lid replacement process, PUD should develop monitoring procedures and measures—which should include generating reports from the IAM system on an ongoing basis—to ensure that no trips are wasted in the process of completing box/lid replacements. (Priority 2)
- Recommendation 10** PUD should develop a more efficient routing procedure for box/lid replacements. For example, every work day, the box/lid supervisor could group service requests in one specific area of the City and assign crews to complete replacement work there that day. To ensure work is completed throughout the City, the crews could have a rotation of work areas that would take them to a different area every day. One application of this approach might be to group service requests within the same Council District and work in a different Council District every day. (Priority 2)
- Recommendation 11** To ensure the Box and Lid Group has the necessary staffing capacity to meet service demand and performance targets, PUD should re-evaluate the size of the Box and Lid Group. This assessment should include a consideration of time that employees spend on activities other than regular work duties, such as vacation, industrial leave, restricted duty assignments, training, and any other activities that take employees away from work. When conducting this assessment, PUD should also re-evaluate the Box and Lid Group's current six-month performance goal, given the potential for public liability and the City's emphasis on customer service. Lastly, PUD should also evaluate alternate means of completing box/lid replacement work, which may include outsourcing these activities to an outside contractor. (Priority 2)

Appendix A: Definition of Audit Recommendation Priorities

DEFINITIONS OF PRIORITY 1, 2, AND 3 AUDIT RECOMMENDATIONS

The Office of the City Auditor maintains a priority classification scheme for audit recommendations based on the importance of each recommendation to the City, as described in the table below. While the City Auditor is responsible for providing a priority classification for recommendations, it is the City Administration's responsibility to establish a target date to implement each recommendation taking into consideration its priority. The City Auditor requests that target dates be included in the Administration's official response to the audit findings and recommendations.

Priority Class ²⁶	Description
1	Fraud or serious violations are being committed. Significant fiscal and/or equivalent non-fiscal losses are occurring. Costly and/or detrimental operational inefficiencies are taking place. A significant internal control weakness has been identified.
2	The potential for incurring significant fiscal and/or equivalent non-fiscal losses exists. The potential for costly and/or detrimental operational inefficiencies exists. The potential for strengthening or improving internal controls exists.
3	Operation or administrative process will be improved.

²⁶ The City Auditor is responsible for assigning audit recommendation priority class numbers. A recommendation which clearly fits the description for more than one priority class shall be assigned the higher priority.

Appendix B: Objectives, Scope, and Methodology

- Objectives** In accordance with the Office of the City Auditor's approved Fiscal Year 2018 Audit Work Plan, and per a request from Councilmember Sherman, we conducted an audit of the Public Utilities Department's (PUD's) Water Meter Cover Replacement Program. The overall objectives of this audit were to:
1. Assess whether efficiency improvements can be made to the water meter box/lid replacement process in order to shorten service request completion time; and
 2. Assess whether the water meter cover replacement program has the staffing capacity to complete a service request in less time than its current goal of six months, on average.

Scope and Methodology **Objective 1**

To assess whether efficiency improvements would shorten the completion time for box and lid service requests, we reviewed documentation on the Box and Lid Group's current policies and procedures, and interviewed the manager, supervisor, and staff in the Box and Lid Group in order to understand current Box and Lid Group processes. We also interviewed supervisors and staff in other groups that refer service requests to the Box and Lid Group—including meter readers, emergency services, and the AMI installation team—to gain a variety of perspectives on the box and lid maintenance process. In addition, we observed box and lid crews, AMI installation crews, emergency services crews, and meter readers in the field to better understand current processes for diagnosing, reporting, and completing box and lid service requests and to identify issues that may affect productivity.

To test whether and to what extent various issues affected the timeliness of box/lid replacement, we analyzed service request data provided by PUD and also obtained service request data directly from PUD's legacy service request system, SWIM. Investigation of this data revealed that, due to the large number of duplicate service requests, as well as the fact that it often takes several service requests to repair many maintenance issues, analysis of the data as a whole would not yield accurate results for maintenance completion times, staff working times and productivity, or the incidence of inefficiencies, such as wasted trips that did not result in the completion of maintenance.

Therefore, we selected and analyzed a statistical random sample of 100 water meter locations where PUD had completed some type of box/lid maintenance work in fiscal year 2017. We traced the service request history for each location in the sample back to the original problem report in order to estimate: (1) how long it took to repair box and lid maintenance issues after they were originally reported; (2) how many trips PUD crews made before fixing the problem; and (3) how many of those trips were "wasted" – e.g., the crew should have had the information and tools needed to repair the problem, but did not.

We also interviewed Box and Lid Group management to determine working time and productivity expectations for box and lid crews, and selected and analyzed a statistical random sample of 30 work days between July 2016 and March 2018 to estimate how much time box and lid crews spend in the field each day and how much of that time is spent working at job sites versus travelling between jobs. For a subset of 16 of these days, we performed more extensive analysis to determine how many crews and crew members were working on each day; how many boxes and lids the crew collectively completed each day; and whether each crew's service requests were grouped to enable efficient routing.

Objective 2

To evaluate whether the Box and Lid Group's staffing was sufficient to keep up with current service demand and meet PUD's goal of completing box/lid service requests within six months after they are received, we again used the supervisor and manager's expectations of reasonable crew productivity, i.e., a crew of three employees should be able to complete two boxes in concrete per day, a crew of two employees should be able to complete five boxes in dirt per day, and a crew of one employee should be able to replace 20 lids per day. We then used PUD's service request data to determine the number of box and lid service requests that were generated in fiscal year 2017. In addition, we used time card entries to calculate the average non-productive time for the Box and Lid Group between fiscal years 2016 and 2018, and we calculated the number of crew members that would be needed to address the box/lid service requests that were generated in fiscal year 2017, after taking into consideration non-productive time.

Data Reliability Testing As discussed above, our conclusions rely heavily on analysis of PUD's service request data. To test the reliability of this data, we selected a statistical random sample of 20 meter locations—and the associated box/lid service requests—where box and lid work was performed in fiscal year 2017, and reviewed the data in SWIM against the paper service request records that crews complete in the field and submit at the end of the day. We also selected a judgmental sample of 18 completed service requests, and performed the same test in reverse (comparing the data in the paper service requests against the data in SWIM). Although PUD was unable to locate a small number of the paper service requests we requested, PUD was in the midst of moving work locations, and was transitioning from SWIM to IAM when we made our request. Based on the service requests we reviewed, we found that the data on the paper service requests matched the data in SWIM, and vice versa. Therefore, we determined that the data in SWIM was sufficiently complete, accurate, and reliable for the analyses we performed in this audit.

Internal Controls Testing Our internal controls testing was limited to specific controls related to data entry for box and lid service requests; controls for monitoring staff productivity and enforcing productivity expectations; controls for ensuring that the Box and Lid Group receives accurate diagnoses of box and lid maintenance issues and sufficient information to determine the correct remedy; controls to ensure the efficient routing of service requests; and controls to ensure that staffing levels are commensurate with service demand and response time goals.

Compliance Statement 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 the audit objectives.



THE CITY OF SAN DIEGO

M E M O R A N D U M

DATE: August 30, 2018

TO: Eduardo Luna, City Auditor, Office of the City Auditor

FROM: Johnnie Perkins, Deputy Chief Operating Officer, Infrastructure/Public Works
via Stacey LoMedico, Assistant Chief Operating Officer

SUBJECT: Management's Response to the Public Utilities Department's Water Meter Cover Replacement Program Audit

The purpose of this memorandum is to provide Management's responses to the recommendations contained in the Office of the City Auditor's Performance Audit of the Public Utilities Department's (PUD) Water Meter Cover Replacement Program.

RECOMMENDATION #1: To improve productivity, oversight, and accountability within the box/lid crew, PUD should establish and enforce productivity standards, goals, quotas, or similar performance targets based on reasonable expectations about how much time crews should spend in the field and what crews should be able to accomplish in that time, on average, given known resource constraints. Finalized performance targets should be communicated to all employees in the crew so that all are aware of these expectations. (Priority 1)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will establish and enforce performance targets based on reasonable expectations regarding the time box/lid crews should spend in the field to accomplish performance goals. These performance targets will be communicated to all employees.

Target Implementation Date: January 31, 2019

RECOMMENDATION #2: To maximize the box/lid crew's available productive time, PUD should require work crews to spend additional time in the field completing service requests. In addition, PUD should formalize policies related to employee work schedules, including when they should leave and return to the work yard and when they should start and end their time in the field. These policies should be communicated to all employees in the crew so that all are aware of these expectations. (Priority 1)

MANAGEMENT RESPONSE: Management agrees with the recommendation. Spending time in the field and completing daily repairs and replacements during the eight-hour work day is a current requirement that has been repeatedly communicated verbally to every employee within the Meter Lid and Box Section and Water Construction Maintenance Division. PUD will immediately create formal written work standards for the employees in the crew.

Target Implementation Date: October 31, 2018

RECOMMENDATION #3: To monitor adherence to the performance targets and work schedule policies from Recommendations #1 and #2, respectively, and to hold employees accountable for delivering expected performance, PUD should establish responsibilities for regularly generating and reviewing performance reports from the service request system. These reports should contain enough information for management to monitor whether employees are keeping up with established expectations for the use of their time and with established production targets. (Priority 1)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will establish procedures for routinely generating and reviewing performance reports from the service request system which will contain sufficient information to evaluate employees' use of time and production.

Target Implementation Date: March 31, 2019

RECOMMENDATION #4: To hold employees accountable for delivering expected performance, PUD should include the results of the reports from Recommendation #3 in the normal process of evaluating employees' performance. If management finds employees are deficient, PUD should use formal performance plans and discipline methods as appropriate. (Priority 1)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will include the results of the reports from Recommendation #3 in the normal process of evaluating employees' performance and if management finds employees are deficient, PUD will use formal performance plans and discipline methods, as appropriate.

Target Implementation Date: March 31, 2019

RECOMMENDATION #5: PUD should identify or develop and use data fields in the IAM system that provide more complete and accurate information about site conditions (box/lid size, whether in concrete or dirt, etc.). (Priority 2)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will identify and evaluate the use of data fields in the IAM system that provide more complete and accurate information about site conditions.

Target Implementation Date: January 31, 2019

Recommendation #6: PUD should research and implement the capability to attach pictures to a service request within the IAM system. Alternatively, PUD should standardize the use of the Get It Done app for all field crews that refer work to the box/lid crew, including meter readers. (Priority 2)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will continue to research the capability to attach pictures to a service request within the IAM system, will test utilization of the Get It Done app for field crews that refer work to the box/lid crew, and will implement the system that most effectively and efficiently meets PUD's needs.

Target Implementation Date: January 31, 2019

RECOMMENDATION #7: PUD should train all PUD field crews, including meter readers, on how to properly identify and report box/lid problems. This training should be made available to field crews after being hired and once a year as refresher training during PUD's annual spring training. (Priority 2)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will train all PUD field crews on how to properly identify and report box/lid problems, and will ensure this training is made available to field crews once a year as a refresher course.

Target Implementation Date: February 28, 2019

RECOMMENDATION #8: To improve management oversight of the box/lid replacement process PUD should develop and distribute a pocket reference guide for field crews that refer problems to the box/lid crew so that field crews can more accurately diagnose problems in the field. (Priority 2).

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will develop and distribute a reference guide that is incorporated electronically to every crew member via cell phones, tablets and and/or hand-held readers. In addition, information will be available in each service vehicle that summarizes steps and guidelines to diagnose issues, problems or concerns in the field.

Target Implementation Date: February 28, 2019

RECOMMENDATION #9: To improve management oversight of the box/lid replacement process, PUD should develop monitoring procedures and measures - which should include generating reports from the IAM system on an ongoing basis - to ensure that no trips are wasted in the process of completing box/lid replacements. (Priority 2)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will develop monitoring procedures, including reviewing periodic reports from the IAM system, to detect and prevent wasted trips and ensure the completion of box/lid replacements. With the implementation of IAM the department now has a viable software system to produce reports regarding operations and performance.

Target Implementation Date: January 31, 2019

RECOMMENDATION #10: PUD should develop a more efficient routing procedure for box/lid replacements. For example, every work day, the box/lid supervisor could group service requests in one specific area of the City and assign crews to complete replacement work there that day. To ensure work is completed throughout the City, the crew could have a rotation of work areas that would take them to a different area every day. One application of this approach might be to group service requests within the same Council District and work in a different Council District every day. (Priority 2)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will consider various methods and develop a more efficient routing procedure for box/lid replacements.

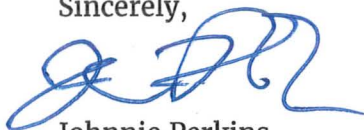
Target Implementation Date: February 28, 2019

RECOMMENDATION #11: To ensure the box/lid crew has the necessary staffing capacity to meet service demand and performance targets, PUD should re-evaluate the size of the box/lid crew. This assessment should include a consideration of time that employees spend on activities other than regular work duties, such as vacation, industrial leave, restricted duty assignments, training, and any other activities that take employees away from work. When conducting this assessment, PUD should also re-evaluate the box/lids crews' current six-month performance goal, given the potential for public liability and the City's emphasis on customer services. Lastly, PUD should also evaluate alternate means of completing box/lid replacement work, which may include outsourcing these activities to an outside contractor. (Priority 2)

MANAGEMENT RESPONSE: Management agrees with the recommendation. PUD will re-evaluate the size of the box/lid crews. The assessment will consider time employees spend on other activities and alternate means of completing replacement work.

Target Implementation Date: April 30, 2019

Sincerely,



Johnnie Perkins

Deputy Chief Operating Officer, Infrastructure/Public Works

CB/ajp

cc: Aimee Faucett, Chief of Staff, Office of the Mayor
Kris Michell, Chief Operating Officer
Stacey LoMedico, Assistant Chief Operating Officer
Rolando Charvel, Chief Financial Officer
Julio Canizal, Director, Risk Management Department
Darrin Schwabe, Interim Director, Human Resources Department
Matt Vespi, Interim Director, Public Utilities Department
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Jessica Lawrence, Director of Finance Policy and Council Affairs, Office of the Mayor
Lee Friedman, Infrastructure Policy Manager, Office of the Mayor
Gary Vetter, Interim Program Manager, Public Utilities Department