



PERFORMANCE AUDIT REPORT

BALTIMORE CITY DEPARTMENT OF PUBLIC WORKS

FISCAL YEARS ENDED

JUNE 30, 2016 and 2015

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Honorable Joan M. Pratt, Comptroller
and Other Members of the Board of Estimates
City of Baltimore, Maryland

Executive Summary

We conducted a performance audit of selected functions within the Baltimore City Department of Public Works for fiscal years ended June 30, 2016 and 2015 (stated period). The purpose of our performance audit was to determine whether the Department of Public Works met its performance measure targets, and to determine whether its internal controls and the related policies and procedures were effectively designed and placed in operation to monitor, control, and report valid and reliable information that is significant to selected performance measures or functions for the stated period. Our performance audit also included a follow-up of findings and recommendations that were included as part of our previous performance audit report of the Department of Public Works, dated December 30, 2016.

As a result of our audit, we determined that some of the targets for the selected performance measures were not met. We did not perform audit testing on the reliability of information or supporting documentation of the actual amounts reported for those performance measures that did not meet the performance measure targets.

We also noted certain areas where the effectiveness of the control procedures could be improved, and we recommend that:

- The Department of Public Works (DPW) continue to monitor the pressure zones, particularly those with unusually high percentages of Unaccounted for Water, and aggressively pursue appropriate corrective action to address the causes identified by DPW, such as: a) leaks; b) inaccuracies of the customer billing system; c) inaccuracies of the meters for supplying water; and d) any other causes that may be identified by DPW, in order to reduce distribution system water losses.
- DPW review its methodology used to determine the percent of MBE/WBE participation in engineering and construction projects and determine whether the methodology needs to be updated or revised. However, we noted that after fiscal year 2016, this performance measure no longer appears in the City's Budget Book.

- DPW management review and monitor missed trash and recycling pickups and continue to determine the causes of those missed pickups. DPW should establish corrective action plans to reduce the percentage of missed trash and recycling pickups, especially those where the cause was determined to be crew errors, not only to meet the established performance measure goals, but also to ensure effective and efficient operations, including the use of the City's resources.

A handwritten signature in cursive script that reads "Audrey Askew".

Audrey Askew, CPA
Acting City Auditor

March 5, 2018

Baltimore City Department of Public Works
Background Information
Fiscal Years Ended June 30, 2016 and 2015

The Department of Public Works' mission is to enhance and sustain healthy quality of life for every citizen and customer by providing efficient management of its services. The Department of Public Works consists of three major divisions: the Bureau of Solid Waste, the Bureau of Water and Wastewater, and the Surface Water Service.

The Bureau of Solid Waste is responsible for providing waste removal and recycling services, including curbside collection of mixed refuse, recycling, and seasonal waste for 640,000 residents in approximately 210,000 households. The Bureau also provides vacant and abandoned property maintenance services, rat control services as well as public right of way cleaning of streets, alleys and lots. The Bureau of Solid Waste is also responsible for disposal of refuse in accordance with governmental regulations and mandates, including the management of a 125-acre active landfill.

The Bureau of Water and Wastewater is responsible for the operation of a water distribution system that supplies water to 1.8 million customers in the Baltimore Metropolitan Region. These responsibilities include the operation, maintenance and security of three watershed systems; three filtration plants; pumping stations and 4,500 miles of water distribution mains. The collection and treatment of wastewater, the operation and maintenance of two wastewater treatment plants, approximately 3,100 miles of collection and conveyance lines, pumping stations and the City's system of storm drains are also the Bureau's responsibility.

The Surface Water Service consolidates all stormwater related functions and includes the Watershed Liaison Office, Stormwater Management and Sediment and Erosion Control, Storm Drain Engineering, Storm Drain and Waterway Maintenance, Water Quality Monitoring and Inspections, and Environmental Engineering. The Division's mission is to restore the City's surface water to swimmable, fishable conditions in compliance with the Environmental Protection Agency and the Clean Water Act.

The following is a summary of the various services provided by the Department of Public Works that were included as part of our Performance Audit:

1. **Waste Removal and Recycling (Service 633)** provides household waste and recycling pick up from over 210,000 households, 290 multifamily dwellings, and commercial businesses. This service also includes condominium refuse collection and bulk trash collection.
2. **Engineering Construction Management – Water and Wastewater (Service 675)** provides for the design, construction and management of water, wastewater, stormwater and environmental restoration capital improvement projects. The City is currently subject to a federal consent decree that has been in effect since 2002, which places stringent requirements on the City to upgrade its sewage system with the intent of eliminating sewer overflows and other illicit discharges.

Baltimore City Department of Public Works
Audit Scope, Objectives and Methodology
Fiscal Years Ended June 30, 2016 and 2015

We conducted a performance audit of selected functions within the Department of Public Works for fiscal years 2016 and 2015. The purpose of our performance audit was to determine: a) whether the Department of Public Works met its performance measure targets, and b) whether its internal controls and the related policies and procedures were effectively designed and placed in operation to monitor, control, and report valid and reliable information that is significant to selected performance measures or functions for fiscal years 2016 and 2015. Our performance audit included a follow-up of prior findings that were included as part of our previous Department of Public Works performance audit report, dated December 30, 2016. We conducted our performance audit in accordance with *Generally Accepted Government Auditing Standards*. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

The objectives of our audit were to determine whether the Department of Public Works (DPW) met its targets for selected performance measures in fiscal years 2016 and 2015 and to assess whether DPW's internal controls and related policies, processes, and procedures were effectively designed and placed in operation to monitor, control, and report valid and reliable information related to those performance measures. In addition to our follow-up on the findings and recommendations contained in our previous performance audit, our audit included selected performance measures within the following DPW Service Areas:

1. **Engineering Construction Management – Service 675.** We conducted our audit of DPW's efforts to meet its targets for distribution system water loss as percent of total water flow. (Priority Outcome: A Cleaner City - Outcome)
2. **Engineering Construction Management – Service 675.** We conducted our audit of DPW's efforts to meet its targets for % of MBE/WBE participation in engineering and construction projects. (Priority Outcome: A Cleaner City - Effectiveness)
3. **Waste Removal and Recycling – Service 663.** We conducted our audit of DPW's efforts to meet its targets for % of missed trash and recycling pickups. (Priority Outcome: A Cleaner City - Efficiency)

To accomplish our objectives, we conducted inquiries of key individuals to obtain an understanding of the internal controls and related policies, processes and procedures, and systems, established by DPW for the selected performance measures. Where possible, we also utilized the systems' documentation obtained as part of our audit of the City's Comprehensive Annual Financial Report (CAFR).

Baltimore City Department of Public Works
Audit Scope, Objectives and Methodology (continued)
Fiscal Years Ended June 30, 2016 and 2015

We also performed tests, as necessary, to verify our understanding of the applicable policies and procedures; reviewed applicable records and reports utilized to process, record, monitor, and control DPW's functions pertaining to the selected performance measures; assessed the efficiency and effectiveness of those policies and procedures; and determined whether DPW met its performance measure targets.

The findings and recommendations are detailed in the Findings and Recommendations section of this report. The responses of DPW and, when necessary, the Department of Audits' comments to those responses are included as part of each finding.

**Baltimore City Department of Public Works
Current Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

Engineering Construction Management – Service 675. Distribution System Water Loss (% of total water flow)

Background

Distribution System Water Loss (Unaccounted for Water) represents the percent of the volume of water produced at the treatment plants that is not consumed by the customers, and is calculated by subtracting the amount consumed from the amount of water produced at the treatment plants. The percentage of Unaccountable for Water is determined in the aggregate by DPW for 13 pressure zones.

Finding #1

The Department of Public Works – Office of Asset Management did not meet its target for the distribution system water loss (% of total water flow) performance measure during fiscal year 2015. After fiscal year 2016, this performance measure no longer appears in the City’s Budget Books; however, DPW furnished us with reports and supporting documentation for fiscal years 2016 and 2015 actual percentages. The actual percentage of total Unaccounted for Water for fiscal year 2016 reported was 22.32%, and met the target of 25%. However, although in total, DPW met the performance measure target for fiscal year 2016, individually, 6 of the 13 pressure zones exceeded the target, and three of the pressure zones significantly exceeded the target. The percentages of Unaccounted for Water for the Eastern 3rd Pressure Zone, the Falls 5th Pressure Zone, and the Sherwood 5th Pressure Zone were 43.92%, 56.58%, and 75.49%, respectively. Together, those three pressure zones accounted for 14% of the water produced, but 27% of the Unaccounted for Water. Similar results were also reported for those three pressure zones for fiscal year 2015. According to those reports, the actual percentage of total Unaccounted for Water for fiscal year 2015 was 35.51%, which exceeded the performance measure target of 25%. DPW has identified possible causes for the distribution system water loss such as: a) leaks; b) inaccuracies of the customer billing system; and c) inaccuracies of the meters for supplying water. According to DPW, the inaccuracies of the customer meters are being addressed by the on-going Meter Replacement Program.

Recommendation #1

We recommend that DPW continue to monitor the pressure zones, particularly those with unusually high percentages of Unaccounted for Water, and aggressively pursue appropriate corrective action to address the causes identified by DPW in order to reduce distribution system water losses.

Agency Response

Significant components of unaccounted water include water main breaks and leaks, distribution system flushing, and fire flows. Breaks and leaks are normal and expected in any water system, and more so in older water systems. Pipes deteriorate over time due, mainly, by internal and external corrosion. Our water system is in average over 80 years old, and was mostly built with cast iron pipes. Cast iron pipes are very strong, but unfortunately not very flexible. Every winter, freezing and thawing cycles causes the ground around the pipes to shift.

**Baltimore City Department of Public Works
Current Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

Finding #1 (continued)

Agency Response (continued)

These ground movements cause the cast iron pipes to break. Hence, breaks and leaks are normal operation factors.

Distribution system flushing is a preventive maintenance measure designed to clean the pipes by flushing out sediments and corrosion by products that accumulate in the pipes. If these sediments are not flushed regularly, they harden and form nodules on the pipe interior surface (known as tuberculation) that eventually restrict the flow of water and can even clog the pipes. Hence, flushing is a normal operational demand. In other words, flushing is a non-revenue water use necessary to operate the distribution system.

There are two main activities related to fire flows. First and most important is the water used by firemen to extinguish fires. And second is the water used for fire flow testing. Fire flow tests help us determine the hydraulic capacity of water mains to deliver fire flows. Fire flow data is used by engineers and fire-sprinkler-system designers to expand the distribution system, and to design fire protection systems for buildings. Fire flow testing also provides insight on the condition of water mains. Therefore, non-revenue fire flows are necessary uses of water, and are consider normal operating factors for a water system.

Engineering Construction Management – Service 675. Percent of MBE/WBE Participation in Engineering and Construction Projects

Background

The MBE/WBE participation in DPW’s Engineering and Construction Contracts is managed by the Minority and Women’s Business Opportunity Office (MWBOO). Part of the award process for those contracts includes reviewing the MBE/WBE plans to meet the requirements/goals set by MWBOO. In essence, DPW will not meet the target for MBE/WBE participation if the contractors or consultants do not meet the MBE/WBE goals set by MWBOO for the project.

Finding #2

The Department of Public Works – Engineering Construction Management did not meet its fiscal years 2016 and 2015 performance measure targets for the percent of MBE/WBE participation in engineering and construction projects. According to the City’s Budget Books, the performance measure targets for fiscal years 2016 and 2015 were 30% and 27%, respectively. Based on a report provided to us by DPW, the actual amounts during fiscal years 2016 and 2015 were 23%. Actual amounts for MBE/WBE participation are determined on a fiscal year basis; i.e., at the end of each fiscal year. Those amounts are determined based on the percentage of actual reported amounts paid to MBE/WBE contractors or consultants at the end of the fiscal year compared to the total invoices paid through the end of the fiscal year.

**Baltimore City Department of Public Works
Current Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

Finding #2 (continued)

Therefore, for contracts that are not completed by the end of the fiscal year, the contracts are also included on the subsequent years' schedule, until the project is closed out. Consequently, it is possible that the reported percentages of MBE/WBE participation for a particular project may be different from one fiscal year to the next, especially if the MBE/WBE payments do not occur evenly throughout the contract; for example, if a larger portion of MBE/WBE payments occur towards the end of the contract.

Recommendation #2

We recommend that DPW review its methodology used to report the percent of MBE/WBE participation in engineering and construction projects and determine whether the methodology needs to be updated or revised. However, we noted that after fiscal year 2016, this performance measure no longer appears in the City's Budget Book.

Agency Response

DPW does not determine the percent of MBE/WBE participation; this is determined by MWBOO. However, DPW has reviewed its methodology used to report the actual % MBE/WBE participation achieved, and agrees that a revision to this metric is needed. The current metric is flawed because:

1. The metric measures the % of MBE/WBE participation achieved by the project, but does not take into account the different targets assigned to each project individually by MWBOO.
2. The metric measures the % of MBE/WBE per fiscal year, but this does not take into account projects that span multiple fiscal years.

To correct these flaws, DPW proposes to revise this metric to measure the % of completed projects that meet their MBE/WBE goals. This will address the flaws because:

1. The number of projects meeting the goal will be measured. This accounts for differences in the targets that MWBOO sets.
2. The reporting will only occur when the project is complete. This accounts for projects which span multiple fiscal years.

**Baltimore City Department of Public Works
Current Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

Waste Removal and Recycling – Service 663. Percent of Missed Trash and Recycling Pickups

Finding #3

The Department of Public Works did not meet its fiscal years 2016 and 2015 performance measure targets for percent of missed trash and recycling pickups. According to the fiscal years 2016 and 2015 Budget Books, the performance measure targets were .05% and .04%, respectively. The actual amounts for fiscal years 2016 and 2015 (reported in fiscal years 2018 and 2017 Budget Books) were .07% and .06%, respectively. The actual amounts are calculated through the Customer Service Report (CSR). These numbers reflect contacts to 3-1-1 operators who then create the mixed refuse and recycling service requests. Solid Waste employees pull that information, investigate and close the CSR once it is addressed. Solid Waste relies on the CSR reports for the total number of service requests, closed on time percentages, over dues, and other matters related to the service request.

Recommendation #3

We recommend that DPW management review and monitor missed trash and recycling pickups and continue to determine the causes of those missed pickups. DPW should establish corrective action plans to reduce the percentage of missed trash and recycling pickups, especially those where the cause was determined to be crew errors, not only to meet the established performance measure goals, but also to ensure effective and efficient operations, including the use of the City’s resources.

Agency Response

The Bureau would like to point out the CSR Service Requests upon which this performance is based are SW-Mixed Refuse and SW-Recycling. Although these Service Requests are used to report missed mixed refuse and missed recycling pickups they are not exclusive to those concerns. In addition, when reported as missed pickups, further investigation may reveal that residents may have set out materials after accepted times, been confused about the schedule, set out the wrong materials, etc.

Finally, there should be some context here. In 2017, there were a total of 11,079 SW-Mixed Refuse and SW-Recycling Service Requests. If every one of them were actual missed pickups, they would represent 0.10% of total pickups for the year (10,920,000).

We set high goals for our team but that should not preclude recognition of the exceptional standards our crews have already achieved in every type of circumstance.

**Baltimore City Department of Public Works
Status of Prior Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

The following is a summary of the status of the prior findings and recommendations included as part of our prior performance audit report of the Department of Public Works, dated December 30, 2016.

Previous Finding #1

DPW did not meet its targets for the number of rat burrows baited during fiscal years 2014 and 2015. However, because of missing data and discrepancies in data to support the actual reported amounts, we could not determine whether the reported performance measure amount were accurate and reliable.

Previous Recommendation #1A

We recommended that DPW establish procedures to document supervisory reviews and approvals of information contained on the Daily Treatment Worksheets and to reconcile key information, particularly the number of rat burrows baited, to the information recorded and reported in the Customer Service Report (CSR) system, the CitiStat reports, and applicable payroll attendance information.

Follow-up Status #1A

Not Implemented. According to the Bureau of Solid Waste, it has not been able to obtain the technology to enable electronic recording of the work in real time. The Agency will continue to explore into obtaining a technology with the software to allow it to record in real time with it being uploaded to the City's CSR system.

Agency Response

Correct. We continue to explore this possibility; however, please note that the city is planning to implement salesforce which is the new 311 system that will replace the current Motorola system. Therefore, it was advisable to wait until this new system is in place before acquiring devices to record work in real time.

Previous Recommendation #1B

We recommended that DPW establish or improve policies and procedures to adequately maintain records.

Follow-up Status #1B

Implemented According to DPW, But We Did Not Verify. As a result of the audit, during senior staff CitiStat review meetings and district roll call meetings the SOP was reiterated verbally. The Agency reviewed its SOPs and reiterated to all personnel that they must be strictly adhered to. We did not verify the verbal communications.

Agency Response

DPW keeps signed copies verifying SOPs have been communicated to all personnel.

**Baltimore City Department of Public Works
Status of Prior Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

Agency Response (continued)

In addition, an excel spreadsheet has now been created to track all baited burrows and inspection findings directly off the Daily Treatment Worksheets so that that information is tracked, verified and documented daily.

Previous Finding #2

Parts 2 and 3 of the Inspection and Follow-up Action Checklist for Detecting and Preventing Rats were rarely completed by the inspectors for the four weeks that we tested.

Previous Recommendation #2

We recommended that Bureau of Solid Waste's Standard Operating Procedure (SOP) should be expanded to address the Inspection and Follow-up Checklist for Detecting and Preventing Rats and to include specific instructions for completing the inspection form, particularly Part 2 and 3. Inspectors should be given adequate guidance, direction and training on completing the inspection form. As part of its review and approval process, Supervisors should sign off to verify that the inspection form is properly completed.

Follow-up Status #2

Implemented According to DPW, But We Did Not Verify. As a result of the audit, according to DPW, during senior staff CitiStat review meetings and district roll call meetings, the Standard Operating Procedure (SOP) was reiterated verbally. Also according to DPW, the Agency reviewed its SOPs and reiterated to all personnel that they must be strictly adhered to. We did not verify this verbal communication.

Agency Response

DPW keeps signed copies verifying SOPs have been communicated to all personnel.

Previous Finding #3

DPW did not meet its target for the tonnage collected from household recycling for fiscal years 2014 and 2015 even though the reported tonnage collected was overstated because it included items that are not considered as household recycling

Previous Recommendation #3

We recommended that DPW review its performance measures included in the Agency Detail Board of Estimates Recommendations (Budget Books) to ensure that the reported amounts are consistent with the established performance measures and to determine the steps that are necessary to improve actual performance so that the performance measure targets can be met. We also recommended that DPW review future performance measures to determine whether those targets require updating or revisions based on past actual amounts. Before changing any future performance measures, however, DPW should follow the procedures established by the Department of Finance, Bureau of Budget and Management Research, for the review and approval of any suggested changes to performance measures.

**Baltimore City Department of Public Works
Status of Prior Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

Follow-up Status #3

Not Implemented. The Agency is in the process of meeting with BBMR to re-set the targets and to change the nomenclature to more adequately reflect what materials are being collected. All recycling collected by the Agency is single stream material (paper, plastics, glass and cans mixed together) and there is no differentiation between material collected from a school, business or residential household. Therefore, the tonnages from all material should be counted towards the set targets.

Agency Response

DPW has changed the targets on the performance measurement scorecard. Again, DPW reiterates that recycling tonnages and measurements of them reflect types of materials collected rather than the source. The state counts some types of materials (mixed paper) towards the city's recycling goal rather than others (concrete).

Previous Finding #4

We were unable to verify the accuracy of the reported amounts of recycling tonnage collected because, even though DPW did not meet its performance measure targets, we were not given the recycling truck tickets that we requested for testing.

Previous Recommendation #4

We recommended that, in accordance with Baltimore City's Administrative Manual (Section AM 502-1), DPW establish procedures to adequately maintain records.

Follow-up Status #4

Partially Implemented. The Agency reviewed AM-502-1 with its senior managers to ensure the policy is adhered to. Security of records has been strengthened and the Agency is exploring means to have all records digitally preserved. *The Agency originally responded **Implemented**, but it appears that the recommendation was **Partially Implemented** because the Agency is still exploring ways to preserve its records.*

Previous Finding #5

DPW did not meet its targets for the linear feet of water distribution system rehabilitated/replaced in fiscal years 2014 and 2015.

Previous Recommendation #5

We recommended that DPW review its performance measures included in the Agency Detail Board of Estimates Recommendations (Budget Books) to ensure that the reported amounts are consistent with the established performance measures and to determine the steps that are necessary to improve actual performance so that the performance measure targets can be met. We also recommended that DPW review future performance measures to determine whether those targets require updating or revisions based on past actual amounts.

**Baltimore City Department of Public Works
Status of Prior Findings and Recommendations
Fiscal Years Ended June 30, 2016 and 2015**

Previous Recommendation #5 (continued)

Before changing any future performance measures, however, DPW should follow the procedures established by the Department of Finance, Bureau of Budget and Management Research, for the review and approval of any suggested changes to performance measures.

Follow-up Status #5

Implemented. Based on a discussion with DPW, their current status is that they have corrected and implemented the audit recommendation. Any revision that may occur will be supported by DPW.

Previous Finding #6

We could not verify the reliability of the reported linear feet of water distribution system rehabilitated/replaced in FY 2014 because supporting documentation for those amounts was not available for audit testing.

Previous Recommendation #6

We recommended that, in accordance with Baltimore City's Administrative Manual (Section AM-502-1), DPW establish procedures to adequately maintain records.

Follow-up Status #6 – Implemented

DPW fully implemented the CM14 system to record all its transactions for tracking, monitoring, and reporting purposes. During our audit testing for fiscal year 2015, all supporting documents requested from DPW were provided to us by DPW through the CM14 system.