



**BALTIMORE CITY  
DEPARTMENT OF TRANSPORTATION**

**BIENNIAL PERFORMANCE AUDIT**

**FISCAL YEARS ENDED  
JUNE 30, 2017 & 2016**

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

## Executive Summary

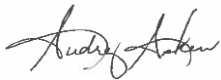
We conducted a performance audit of selected functions within the Department of Transportation (DOT) for the fiscal years ended June 30, 2017 and 2016 (the stated period). The purpose of our performance audit was to determine whether DOT met its performance measure targets, and to determine whether its 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 the previous performance audit report of the Department of Transportation issued by Hamilton Enterprises LLC, dated November 20, 2015.

As a result of our audit, we determined DOT has not met the targets for several of the selected performance measures, and its internal controls and the related policies and procedures were not effectively designed and placed in operations to monitor, control, and report valid and reliable information that is significant to the selected performance measures or functions for the stated period. We were not able to determine if some of the targets were met because of the lack of supporting documentation. We also determined the status of prior year recommendations that were included as part of the previous performance audit report of the Department of Transportation issued by Hamilton Enterprises LLC, dated November 20, 2015, as not fully implemented.

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

- DOT develop procedures to adequately maintain records, especially those to support the actual results of the performance measures included in the Budget Books.
- DOT should strengthen internal controls related to the actual results reported in the Budget Books. The Department of Audits identified several instances where the supporting documentation provided by DOT did not match the actual results reporting in the Budget Book.
- DOT continue to identify and address the causes for not meeting the established targets.

- DOT should review performance measures that are no longer measurable and consider replacing them with revised performance measures that may be more relevant and/or capable of being measured.
- As DOT moves closer to implementing a smart lighting network and its 2020 goal to have all street lights converted to light emitting diode (LED) lighting, the number of service requests is expected to decrease. DOT should reconsider revising this performance measure and how it is being tracked.
- DOT continues on its current path to replace inefficient High Pressure Sodium (HPS) lighting to more efficient LED street lights. DOT should review its internal controls regarding how monthly BGE electricity costs are monitored and entered into the City's accounting systems to more accurately report actual electricity costs per street light.
- DOT expedite the process of awarding a contract to a vendor who can design and implement a system that is capable of tracking citizen ratings.
- DOT expedite the process of awarding the new contract related to the Circulator service to restore the Circulator fleet to optimal operating efficiency.
- When determining revenues and expenditures for reporting purposes, DOT should use the general ledger detail to ensure that all transactions are captured.
- DOT should evaluate options to either improve the amenities offered to compete with other Harbor docking options or subcontract out the dock operations to an organization who may be able to operate the dock more effectively and efficiently. Even with the \$100K reduction in operating costs in FY 2017, Dock Master revenues only supported 18% of Dock Master operations.
- DOT should train Dock Master staff on how to accurately complete docking invoices and ensure all invoices for rascal dockings are recorded on the rascal docking log.



Audrey Askew, CPA  
City Auditor

October 24, 2018

**Baltimore City Department of Transportation**  
**Biennial Performance Audit**  
**Background Information**  
**Fiscal Years Ended June 30, 2017 and 2016**

The Department of Transportation (DOT) provides the City of Baltimore with a comprehensive and modern transportation system that integrates all modes of travel and provides mobility and accessibility in a convenient, safe and cost-effective manner.

DOT is responsible for the construction, reconstruction and maintenance of public streets, bridges and highways, maintenance of streetlights, alleys and footways and the conduit system. Other duties include: the management of traffic movement, the inspection and management of City construction projects including testing and inspection of construction materials, and the preparation of surveys. Capital and Federal funds are allocated for engineering, design, construction and inspection of streets and bridges in the City of Baltimore.

DOT maintains nearly 4,800 lane miles of roadways, including 288 bridges and culverts. The City's road network is composed of 540 miles of collector streets and 1,460 miles of local streets. About 8.1% of statewide vehicle miles traveled occur on City roadways. This amounts to 3.5 billion vehicle miles per year. DOT maintains 3,600 miles of sidewalks, 1,100 miles of alleys or alley ways and 80,000 roadway and pedestrian lights throughout the City.

DOT is responsible for the maintenance of the orderly and safe flow of traffic; conducting studies affecting pedestrian and vehicular safety; and providing and maintaining traffic signals, signs and pavement markings. DOT maintains approximately 1,300 signalized intersections, over 250,000 traffic and informational signs and over 4.5 million linear feet of lane markings. DOT maintains and repairs all open air malls across the city; operates a vehicle storage facility; conducts the sale of abandoned and/or unclaimed vehicles at public auctions; and is responsible for the removal and impounding of illegally parked, abandoned, or disabled vehicles.

The City's Automatic Traffic Violation Enforcement System (ATVES) program is a public safety initiative designed to reduce the number of motorists who run red lights. A traffic camera program is expected to be operational again during Fiscal 2018. DOT conducts safety education and training programs such as Safety City and related bicycle programs. DOT deploys almost 300 crossing guards at elementary and middle schools. DOT also operates the Charm City Circulator and water taxi "Harbor Connector" commuter service, and launched a bike share program during Fiscal 2017.

The Parking Authority is responsible for on-street and off-street parking including the management of the metered parking system and maintenance of 4,400 single-space parking meters, administration of special parking programs such as residential permit parking and ridesharing, enforcement of parking regulations and management and development of off-street parking facilities.

**Baltimore City Department of Transportation**  
**Biennial Performance Audit**  
**Audit Scope**  
**Fiscal Years Ended June 30, 2017 and 2016**

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

1. **Street Lighting (Service 500)** provides inspection, design, installation, powering, maintenance and repair of approximately 73,000 roadway and pedestrian lights throughout the City. This service also includes research and evaluation of lighting strategies to reduce energy consumption.
2. **Sustainable Transportation (Service 690)** encourages and provides cleaner forms of transportation to reduce citizen dependence on single-occupant vehicles. This service includes installation of bicycle facilities, marketing and development of ridesharing programs, and the operation of the Charm City Circulator and the water taxi commuter service.
3. **Dock Master Operations (Service 695)** provides for the coordination of dockside activities and the docking of vessels within the Inner Harbor. Funding includes the collection of docking fees from transient pleasure boats, scheduling of docking for charter boats, cruise ships and special ship visits, and promoting the dock availability to tourists. This service also provides for the coordination of maintenance and repair services necessitated by visiting vessels.
4. **Street Cut Management (Service 696)** inspects and monitors street cuts in the rights-of-way to insure that altered infrastructure is restored in compliance with City standards and specifications. Using infrastructure coordination technology, the agency coordinates project schedules with other agencies, utility companies and contractors to ensure minimal street cuts.

**Baltimore City Department of Transportation**  
**Biennial Performance Audit**  
**Audit Objectives and Methodology**  
**Fiscal Years Ended June 30, 2017 and 2016**

We conducted a performance audit of selected functions within the Department of Transportation (DOT) for the stated period. The purpose of our performance audit was to determine: a) whether DOT 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 the stated period. Our performance audit included follow-ups of prior year findings in DOT's previous performance audit report, dated November 20, 2015. 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 DOT met its targets for selected performance measures in the stated period and to assess whether DOT'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 of previous performance audits, our audit included selected performance measures within the following Department of Transportation service areas:

- a. Street Lighting (Service 500):** We conducted our audit of the Street Lighting Division to determine effectiveness, efficiency and outcome of the DOT's operations. We reviewed documentation to support the number of street light outage service requests that were completed. To determine street lighting effectiveness, we reviewed supporting document to determine percentage of street lights met City roadway lighting standards. Supporting documentation was not available to review citizen complaints to determine what percentage of those complaints are resolved with four days of the complaint being filed. Supporting documentation related to the percentage of citizens who rated street lighting services as "good" or "excellent" was also not available. As a result, the Department of Audits was unable to perform testing on these areas.
- b. Sustainable Transportation (Service 690):** We conducted our audit of the Sustainable Transportation Division to determine the effectiveness and efficiency of the current fleet of Circulator buses. To determine the effectiveness of the fleet, we compared the estimates for annual ridership to the performance targets. To determine the efficiency of the Circulator fleet, we reviewed supporting documentation that tracked the headway during rush hour.

**Baltimore City Department of Transportation**  
**Biennial Performance Audit**  
**Audit Objectives and Methodology**  
**Fiscal Years Ended June 30, 2017 and 2016**

- c. Dock Master Operations (Service 695):** We conducted our audit of the Dock Master Division to determine the outcome and efficiency of the Dock Master operations. We reviewed documentation to support the number of vessel dockings. To determine the efficiency of the Dock Master Operations, we reviewed support for the percentage of docking capacity booked during peak season and the number of rascal dockings. A rascal docking results when a vessel has been docked for any period of time, but not checked in and invoiced by the Dock Master staff prior to vessel's departure. To determine the outcome of the Dock Master Operations, we reviewed support to determine the percentage of Dock Master Operations that were supported by docking fee revenue.
  
- d. Street Cut Management (Service 696):** We conducted our audit of the Street Cut Management Division to determine effectiveness and efficiency. To determine the effectiveness of the Street Cut Management operations, we reviewed supporting documentation for the total number of street cuts made and the percentage of street cuts determined to be improper during inspection. To determine the efficiency of the Street Cut Management operations, we reviewed documentation to determine the average number of hours between when a street cut service request was received and when the inspection was completed.

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 the DOT 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). 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 DOT's functions pertaining to the selected performance measures; assessed the efficiency and effectiveness of those policies and procedures; and determined whether the Department of Transportation met its performance measure targets.



**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Street Lighting (Service 500)**

**PERFORMANCE MEASURES**

Type	Measure	FY14 Actual	FY15 Actual	FY16 Actual	FY17 Target	FY17 Actual	FY18 Target	FY19 Target
Output	# of street light outage service requests completed	822	823	777	810	739	803	803
Efficiency	Average annual electricity cost per street light	91.02	84.54	98.79	84.34	91.45	91.45	91.45
Effectiveness	% of inspected streets meeting City roadway lighting standards	62%	60%	49%	60%	50%	60%	60%
Effectiveness	% of street light outages repaired within 4 days	85%	92%	93%	89%	99%	90%	95%
Outcome	% of citizens rating street lighting services 'good' or 'excellent'	61%	48%	N/A	75%	N/A	75%	75%

A current citizen rating of street lighting services is unavailable, because Baltimore switched from an annual to a biennial survey in 2015, then postponed the 2017 survey to initiate a rebid process aimed at a new survey design that facilitates national benchmarking. The next Baltimore Citizen Survey is scheduled for fall of 2018.

**Background**

DOT provides inspection, design, installation, powering, maintenance and repair of approximately 73,000 roadway and pedestrian lights throughout the City. This service also includes research and evaluation of lighting strategies to reduce energy consumption.

**Audit Result #1 – Number of Street Light Outage Service Requests Completed (Output)**

DOT reported that it did not meet its FY 2017 and FY 2016 performance targets related to the number of street light outage service requests completed. The completed service request targets per the FY 2019 Budget Book were 810 for FY 2017 and 800 for FY 2016. The support provided by DOT reflected completed service requests of 740 for FY 2017 and 772 for FY 2016.

The number of service requests completed is primarily driven by citizen complaints to the City’s 311 non-emergency line. Continued decreases in service requests are an expected result following DOT’s conversion to more efficient and reliable LED lighting street lighting.

**Auditee’s Response:**

In FY 2016, 822 street light outage service requests were completed and in FY 2017, 739 street light outage service requests were completed. These numbers reflect 100% completion. Furthermore, in the summer 2017, DOT/BG&E Street Light Outage working group was created to collaborate with BG&E for better visibility and understanding of the street light outage repair process and timeline to better manage the customer/service provider relationship and work collectively to ensure accountability and transparency to the citizens by (1) streamlining and consolidating the process, (2) reducing response time, (3) enhancing public communication and (4) providing seamless service delivery.

**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Audit Result #1 – Number of Street Light Outage Service Requests Completed (Continued)**

**Auditee’s Response (continued):**

Based on available funding, with this forthcoming smart lighting network, DOT is anticipating a reduction in the number of outage requests because these outages will be automatically detected and scheduled for repair. The overall efficiency of the lighting system will be measured by the lumen (brightness) output of the system, a direct correlation to the life expectancy of the light fixtures.

The BMORE Bright Campaign is expected to kick off the in the fall of 2018 with an anticipated completion date of December 2020. While the Department will continue to collect data related to this performance measurement, it will also develop guidelines on how to use the data for budget reporting.

**Finding #1 – Average Annual Electricity Cost Per Street Light (Efficiency)**

**Condition:**

DOT reported that it did not meet its FY 2017 and FY 2016 performance targets related to annual electricity cost per street light. The performance targets were \$84.34 and \$93.15 during FY 2017 and FY 2016, respectively. The actual average annual electricity cost per street light reported in the FY 2019 Budget Book was \$91.46 and \$98.79 in FY 2017 and FY 2016, respectively. While DOT was able to provide documentation to support the actual amounts reporting in the FY 2019 Budget Book, the Department of Audits was unable to conclude on the integrity of the average annual electricity cost per street light.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

Many of the City’s street lights are older inefficient HPS street lights.

**Effect:**

HPS street lights result in higher energy costs.

**Recommendation:**

We recommend DOT continue replacing the inefficient (HPS) lighting with more efficient LED street lights. DOT should review its internal controls over how monthly BGE electricity costs are monitored and entered into the City’s accounting system to accurately report actual electricity costs per street light.

**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Finding #1 – Average Annual Electricity Cost Per Street Light (Efficiency) (Continued)**

**Auditee’s Response:**

To improve overall brightness and lighting efficiency throughout the City, since 2010, DOT has started to convert street light fixtures from HPS (High Pressure Sodium) to LED (Light Emitting Diode). LED lighting is long lasting (15+ years life expectancy), provides energy savings (40% energy savings from HPS), requires less maintenance, offers better illumination, meets dark sky compliance for astronomical purposes, improves color rendition for safety and facilitates better control of the lighting distribution.

During the previous LED conversion initiative, all BGE invoices for street lighting were submitted to the Department of Public Works Energy Office, copies of the invoices and any reports must be obtained from this office. Going forward the DOT will receive a copy of the invoices and develop a tracking sheet that captures data to be used in providing better targets and actual performance information regarding the annual average electricity cost.

**Finding #2 – Percentage of Inspected Streets Meeting City Roadway Lighting Standards (Effectiveness)**

**Condition:**

DOT reported that it did not meet its FY 2017 and FY 2016 performance targets related to the percentage of inspected streets meeting City roadway standards. The percentage of streets meeting City roadway lighting standards performance target was 60% in FY 2017 and 90% in FY 2016. Additionally, DOT was unable to provide supporting documentation for the actual percentages of 50% for FY 2017 and 49% for FY 2016, as reported in the FY 2019 Budget Book. The Department of Audits was unable to conclude on the accuracy of the actual percentage of inspected street lights meeting City roadway lighting standard.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

Slightly less than half of the City’s street lights are older inefficient (HPS) street lights.

**Effect:**

(HPS) street lights are less reliable than LED street lights and require more frequent maintenance.

**Recommendation:**

We recommend DOT continue replacing the inefficient HPS lighting to more efficient LED street lights.

**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Finding #2 – Percentage of Inspected Streets Meeting City Roadway Lighting Standards (Effectiveness) (Continued)**

**Auditee’s Response:**

Currently, LED lights comprise about 55% of our lighting inventory. The remainder of the inventory will be converted to LED by the end of calendar year 2020. With the full conversion of the lighting inventory to LED lights, all of the City lit roads should meet City lighting standards. With the Bmore Bright program, 6,000 LED lights will be added to the existing inventory to increase lighting foot candles in areas that are inadequately lit. Furthermore, DOT is currently piloting Smart Lighting nodes, which will allow for remote monitoring, remote measuring and proactive maintenance of the LED street lights. These nodes will detect street light outages, measure power consumption and dim and/or boost lighting output.

DOT plans to continue replacing HPS lighting to LED street lights. Contract activities are underway in order to move forward with this effort.

**Finding #3 – Percentage of Street Light Outages Repaired within 4 Days (Effectiveness)**

**Condition:**

DOT was unable to provide documentation to support the FY 2017 actual percentage of 99% street light outages were repaired within 4 days of being reported as listed in the FY 2019 Budget Book. The support provided by DOT reflected 92% as the actual percentage of street lights being repaired within 4 days of being reported. The performance target for was 89% for FY 2017.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

Administrative error caused the over reporting of actual results.

**Effect:**

The inaccurate reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

We recommend DOT report actual results for performance measures based on the supporting agency records.

**Auditee’s Response:**

While DOT will continue to track this performance they will be sure to perform QA/QC to ensure the data collected is not duplicative and contains complete information in order to accurately measure and report the performance.

**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Finding #4 – Percentage of Citizen Rating Street Lighting Services “Good” or “Excellent” (Outcome)**

**Condition:**

DOT was unable to provide supporting documentation related to the percentage of citizen rating street lighting services as “good” or “excellent” in FY 2017 and FY 2016. Based on the conversations during our fieldwork and a note included in the 2019 Budget Book, “A *current citizen rating of street lighting services is unavailable.*” Per DOT, the City of Baltimore switched from an annual to a biennial survey in FY 2015, then postponed the FY 2017 survey to initiate a rebid process aimed at a new survey design that facilitates national benchmarking. The next Baltimore Citizen Survey is scheduled for fall 2018. The performance target was 75% for both fiscal years.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

DOT did not have controls in place to track its performance as it relates to citizen ratings.

**Effect:**

DOT is currently unable to monitor and evaluate its reputation with the citizens of Baltimore and the services the agency provides.

**Recommendation:**

We recommend DOT expedite the process of awarding a contract to a vendor who can design and implement a system that is capable of facilitating national benchmarks and tracking citizen ratings.

**Auditee’s Response:**

As previously reported in item PBC 6 on June 14, 2018, measurement of this performance ceased years ago. However, the Mayor’s Office of Sustainable Solutions (MOSS) is planning to reinstate this survey and make available to the citizens of Baltimore.

**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Sustainable Transportation (Service 690)**

**PERFORMANCE MEASURES**

Type	Measure	FY14 Actual	FY15 Actual	FY16 Actual	FY17 Target	FY17 Actual	FY18 Target	FY19 Target
Output	# of miles of new bike infrastructure constructed	N/A	2.0	2.6	8.0	9.2	8.3	10.0
Efficiency	Average Circulator headway during rush hour (minutes)	12.4	15.6	17.0	16.4	19.3	13.4	15.0
Effectiveness	# of BikeShare members/accounts (monthly average)	N/A	N/A	N/A	New	N/A	1,580	1,738
Effectiveness	# of Circulator riders annually	4,353,728	3,759,842	3,395,992	3,842,000	3,395,995	3,857,000	3,857,000
Outcome	% of BikeShare rides replacing car trips	N/A	N/A	N/A	10%	N/A	10%	10%
Outcome	# of miles ridden through BikeShare (monthly average)	N/A	N/A	N/A	New	N/A	5,000	3,500
<small>This service exceeded its target for bike infrastructure construction in Fiscal 2017, building more than nine miles of bike lanes. Two new metrics will provide additional information to understand how City residents and visitors are using the BikeShare program: # of members/accounts and # of miles ridden.</small>								

**Background**

DOT encourages and provides cleaner forms of transportation to reduce citizen dependence on single-occupant vehicles. This service includes installation of bicycle facilities, marketing and development of ridesharing programs, the operation of the Charm City Circulator and the water taxi commuter service.

On February 11, 2009, the Board of Estimates approved a five year transit agreement for the operation of the Charm City Circulator which began operations in January 2010, and the acquisition of 21 Design Line Eco Saver IV Buses. The City began the acquisition process and acquired 7 of the Design Line buses. However, the manufacturer of the buses filed for bankruptcy so DOT canceled the remainder of the bus order. DOT, then, leased 12 buses from ABD Leasing.

The service began with two routes serving the downtown area designed to operate on a 10 minute headway:

- Orange Route: Market Place to Hollins Market
- Purple Route: 33rd Street to Federal Hill

Shortly thereafter, the following routes were added:

- Green Route: Connects City Center to Johns Hopkins East Baltimore Campus area
- Banner Route: Connects Inner Harbor to Fort McHenry

**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Finding #5 - Circulator Buses Not Running at Full Capacity (Effectiveness)**

**Condition:**

The annual ridership targets per the Budget Book for FY 2017 and FY 2016 were 3.8M and 4.2M, respectively. DOT reported actual annual ridership of approximately 3.4 million passengers in the FY 2019 Budget Book for both fiscal years. The reported actual ridership figures were not supported by documentation, so the Department of Audits (DOA) was unable to conclude on the validity of the ridership totals. Therefore, DOA compared the actual annual ridership figures received from DOT to the performance targets and noted that the performance measures and noted that the performance measures were not met in either fiscal year.

**Criteria:**

The City's Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

The annual ridership performance measures related to efficiency were not met. The full fleet of Circulator buses was not available for the public's use because many of the originally fleet was rendered inoperable due to mechanical failures and lack of availability of replacement parts.

**Effect:**

The inaccurate reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

We recommend DOT procure a contract for a Circulator Service in order to restore the Circulator fleet to optimal operating efficiency.

**Auditee's Response:**

The Circulator buses are not running at full efficiency; and unfortunately most transportation services do not, particularly in Baltimore City. There are always peak times when demand is high, and slack times when demand is low. However, in regards to efficiency, DOT has a plan to improve efficiency of the system beginning in FY 2019.

As the Design Line buses began to break down, access to parts became a significant issue and thus rendered nearly half the fleet obsolete. While DOT did replace some of the Design Line buses with leased buses through Transdev, it was not enough to cover the original amount of buses purchased in 2009. As the Design Line buses went out of service, the headway slowly increased.

**Baltimore City Department of Transportation  
Biennial Performance Audit  
Audit Results, Findings and Recommendations  
Fiscal Years Ended June 30, 2017 and 2016**

**Finding #5 - Circulator Buses Not Running at Full Capacity (Continued)–**

**Auditee’s Response (continued):**

Currently, there are a total of 16 buses in operation. In order to meet a 10 minute headway, there should be 24 buses in operation at one time. As a result, operating 8 buses short, along with other external factors such as traffic, construction and development and no spare buses, have combined to increase headway to 25 minutes.

In February of 2018, DOT began the process of procuring a new contract for the operations of the Charm City Circulator. Over the last 8 months the procurement process has progressed and the City is in the Best and Final Offer (BAFO) negotiation stage of procurement with the selected vendor. The new contract requires the vendor to supply the City with 12 buses to operate in addition to the 12 City owned buses totaling 24 buses in operation with a goal of achieving a significant decrease in headways. The selected vendor will be required to enter operation data into the National Transit Database (NTD). The data generated from the NTD will be used to provide actual and target performance data for budgeting and analytical purposes.

**Finding #6 - The Current Fleet of Circulator Buses Not Operating Efficiently (Efficiency)**

**Condition:**

The performance target for the average head way for FY 2017 was 16 minutes 40 seconds and the average headway target for FY 2016 was 14 minutes and 50 seconds. DOT reported actuals in the FY 2019 budget book were 19 minutes and 30 seconds for FY 2017 and 17 minutes for FY 2016. DOT did not meet the performance measures in either fiscal year. Since the targets were not met, the Department of Audits (DOA) did not conduct further testing. However, DOA selected one AM and one PM route to recalculate the average headway time for FY 2017 and FY 2016 to compare the results to the actuals reported in the FY 2019 Budget Book. The DOA recalculation using the support provided by DOT noted a difference of 53 seconds in the FY 2016 PM route selection, and 13 seconds in the FY 2016 AM route selection. Therefore, DOA cannot conclude on the validity of the data for the overall averaged headway times reported in the City’s Budget Book.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

The annual ridership performance measures related to efficiency were not met because the full fleet of Circulator buses was not available for the public’s use due to many of the originally fleet was rendered inoperable due to mechanical failures and availability of replacement parts.



**Baltimore City Department of Transportation  
Biennial Performance Audit  
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Fiscal Years Ended June 30, 2017 and 2016**

**Finding #6 - The Current Fleet of Circulator Buses Not Operating Efficiently (Continued)**

**Effect:**

The inaccurate reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

We recommend DOT procure a contract for a Circulator Service in order to restore the Circulator fleet to optimal operating efficiency.

**Auditee's Response:**

As the Design Line buses began to break down, access to parts became a significant issue and thus rendered nearly half the fleet obsolete. While DOT did replace some of the Design Line buses with leased buses through Transdev, it was not enough to cover the original amount of buses purchased in 2009. As the Design Line buses went out of service, the headway slowly increased. Currently, there are a total of 16 buses in operation. In order to meet a 10 minute headway, there should be 24 buses in operation at one time. As a result, operating 8 buses short, along with other external factors such as traffic, construction and development and no spare buses, have combined to increase headway to 25 minutes.

In February of 2018, DOT advertised an RFP for a new contract for Circulator service which requested proposing vendors to respond to the pricing options listed below:

**Price Option A:** The City will provide 12 Orion buses plus an additional 12 used buses that have yet to be identified for a total fleet of 24 buses. The used buses will be less than 15 years old in sound mechanical condition and have less than 500,000 miles on them.

**Price Option B:** The City will provide 12 Orion buses and requires the contractor to provide 12 new or used buses to operate a total fleet of 24 buses.

**Price Option C:** Option C states the service will be operated with the City's 12 Orion buses only. This contract is on pace to be awarded by mid-July and in operation by the fall of 2018. We expect the headways will decrease exponentially after the contract is awarded since the fleet will increase to the amount of buses needed to operate on 10 minute headways.

The City is still negotiating the best price for the options presented in the Solicitation. The addition of 12 buses to the Circulator fleet will provide the number of buses needed to operate at maximum capacity on the 4 Circulator routes.

**Baltimore City Department of Transportation  
Biennial Performance Audit  
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**Dock Master Operations (Service 695)**

**PERFORMANCE MEASURES**

Type	Measure	FY14 Actual	FY15 Actual	FY16 Actual	FY17 Target	FY17 Actual	FY18 Target	FY19 Target
Output	# of marina dockings	1,397	1,137	1,003	1,517	614	1,517	750
Efficiency	# of "rascal" dockings per year	46	86	0	0	N/A	0	54
Efficiency	% of docking capacity booked during peak season	39%	34%	20%	37%	11%	37%	37%
Effectiveness	% of marina customers who said they were satisfied or very satisfied with service received	60%	60%	90%	100%	100%	100%	100%
Outcome	% of Dockmaster operations supported with docking fee revenue	50%	32%	30%	43%	27%	43%	50%

A rascal docking is a docked boat that has not paid the required fee. DOT believes this measure was tracked incorrectly in Fiscal Years 2016 and 2017.

**Background**

DOT provides for the coordination of dockside activities and the docking of vessels within the Inner Harbor. Funding includes the collection of docking fees from transient pleasure boats, scheduling of docking for charter boats, cruise ships and special ship visits, and promoting the dock availability to tourists. This service also provides for the coordination of maintenance and repair services necessitated by visiting vessels.

**Finding #7 – Number of Marina Dockings (Output)**

**Condition:**

The Department of Transportation reported actuals in the City’s Budget Books did not meet the target for the number of marina dockings in FY 2017 or FY 2016 year. The performance targets for marina dockings was 1,517 in FY 2017 and 2,000 in FY 2016. DOT reported actual marina dockings in the FY 2019 Budget Book as 614 in FY 2017 and 1,003 in FY 2016. Based on the Department of Audits review of the FY 2017 and FY 2016 docking logs, the actual number of dockings reported in the FY 2019 was overstated by 475 for FY 2017 and 230 for FY 2016, respectively.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

Administrative error caused the over-reporting of actual results. In addition we noted per discussion with DOT, they did not meet the targets because of competition from other marinas that offer boaters more amenities.

**Effect:**

The inaccurate reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

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**Finding #7 – Number of Marina Dockings (Continued)**

**Recommendation:**

We recommend DOT report actual results for performance measures based on the supporting agency records.

**Auditee’s Response:**

The Transit Bureau will continue to log all dockings and use the information to report target and actual dockings in preparation of the annual budget.

**Finding #8 - Percentage of Docking Capacity Booked During Peak Season (Efficiency)**

**Condition:**

Documentation supporting the docking capacity was requested, but DOT was unable to provide the appropriate support for this performance measure. The performance targets for the percentage of docking capacity booked during peak season was 37% in FY 2017 and 45% in FY 2016. The FY 2019 Budget Book reports actual docking capacity during peak season as 11% in FY 2017 and 20% in FY 2016.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

During our meeting with DOT officials, it was noted that this particular measure is very difficult to track due to how the Dock Master fees are calculated. The Dock Master charges fees based on the linear foot of each vessel. Since the sizes of the vessels vary drastically, the daily and annual docking capacity fluctuate accordingly.

**Effect:**

The inaccurate reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

Since the sizes of the vessels vary drastically, the daily and annual docking capacity fluctuate accordingly. Given these inherent capacity fluctuations, DOT should reconsider whether or not this particular performance measure should be tracked in the future.

**Auditee’s Response:**

DOT is undergoing a full evaluation of this service to arrive at a recommendation for more effective operating options moving forward.

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**Finding #9 - Percentage of Dock Master Operations Supported with Docking Fee Revenue (Outcome)**

**Condition:**

Dock Master Operations generated revenues of \$36,555 and \$62,572 in FY 2017 and FY 2016, respectively. The operating costs were \$199,593 in FY 2017 and \$317,778 in FY 2016. Based on the support provided by DOT, only 18% of the Dock Master Operations were supported with Docking Fee Revenue in FY 2017. In addition, only 20% of the Dock Master Operations were supported with Docking Fee Revenue in FY 2016. The performance targets were 37% FY 2017 and 45% FY 2016, respectively.

**Criteria:**

The City's Budget Books outline performance measures agencies are to achieve.

**Cause:**

In both fiscal years, DOT failed to include the revenues received in the month of June and the amount of expenditures provided by DOT in the calculation, did not tie to the general ledger detail.

**Effect:**

The inaccurate reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

We recommend when determining revenues and expenditures for reporting purposes use the General Ledger Detail to ensure that all transactions are captured. Even with the \$100K reduction in operating costs in FY 2017, Dock Master revenues only supported 18% of Dock Master Operations. We also recommend DOT evaluate options to either improve the amenities offered to compete with other Harbor docking options or subcontract out the dock operations to an organization who may be able to operate the dock more effectively and efficiently.

**Auditee's Response:**

The dock master office operates only during peak season, mid-May through end of October. All revenue generated at the Dock Master's Office is allocated to the General Fund. This collected revenue is insufficient to manage the operations of the Dock Master's Office. In FY 2016 & FY 2017 deficits were respectively, \$255,206 and \$163,038. In 2016, several measures were incorporated, which accounted for the \$100,000 reduction in expenses and a latter reduction in revenue. The measures primarily consisted of utilizing lower cost, temporary employees, and going to a seasonal operation. While the revenue generated is low there are a few contributing factors, such as the direct competition with private marinas along the Inner Harbor.

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**Finding #9 – Percentage of Dock Master Operations Supported with Docking Fee Revenue  
(Continued)**

**Auditee’s Response (continued):**

The amenities provided by the Dock Master Office are basic in nature in comparison to the amenities provided by private marinas. DOT is undergoing a full evaluation of this service to arrive at a recommendation for more effective operating options moving forward.

**Finding #10 – Number of Rascal Dockings (Efficiency)**

**Condition:**

DOT reported in the FY 2019 Budget Book that they believed rascal dockings for FY 2017 and FY 2016 were incorrectly tracked. During our audit, we determined that DOT’s statement was correct. DOT confirmed supporting documentation was not available for FY 2017 and reported zero rascal dockings for FY 2016 in the FY 2019 Budget Book. The Department of Audits (DOA) counted the number of rascal dockings on the rascal docking list provided and determined there to be 16 rascal dockings in FY 2017 and 59 in FY 2016. In addition, DOA was initially provided 16 receipts as support for this measure. Of those 16 receipts, 3 were attributable to FY 2016 and were not included on the rascal docking list. DOA noted missing information not listed on the receipts such as boat license number, boat name, or size. The docking fee charged is based on the size of the boat.

**Criteria:**

The City’s Budget Books outline performance measures agencies are expected to achieve.

**Cause:**

DOT failed to adequately track and maintain data related to rascal dockings.

**Effect:**

The inaccurate recording and reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

We recommend that DOT staff fully complete docking invoices and ensure all invoices for rascal dockings are recorded on the rascal docking log.

**Auditee’s Response:**

In the summer of 2018, DOT developed a log for tracking rascal dockings and has trained staff how to record and report rascal dockings for budgeting purposes.

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**Street Cut Management (Service 696)**

**PERFORMANCE MEASURES**

Type	Measure	FY14 Actual	FY15 Actual	FY16 Actual	FY17 Target	FY17 Actual	FY18 Target	FY19 Target
Efficiency	Average # of hours between street cut SR received and inspection completed	N/A	N/A	72	24	72	24	24
Effectiveness	# of street cuts	4,815	7,036	24,423	8,236	25,457	24,423	24,423
Effectiveness	% of street cuts determined to be improper during inspection	2%	7%	4%	6%	2%	5%	5%
Outcome	Citywide Pavement Condition index	62%	62%	64%	64%	65%	64%	65%

Due to the City's aging infrastructure, including sewage systems and electric cables, this service has experienced a dramatic increase in the number of street cuts in recent years. The agency is working to better coordinate different types of projects, such as road work and lighting replacement, to minimize the number of street cuts.

**Background**

DOT inspects and monitors street cuts in the rights-of-way to insure that altered infrastructure is restored in compliance with City standards and specifications. Using infrastructure coordination technology, DOT coordinates project schedules with other agencies, utility companies and contractors to ensure minimal street cuts.

**Finding #11 – Average Number of Hours between Street Cut Service Request Received and Inspection Completed (Efficiency)**

**Condition:**

DOT reported that it did not meet its FY 2017 and FY 2016 performance targets related to the average number of hours between street cut service requests received and inspections completed. The performance measure target for both fiscal years was 24 hours. Additionally, DOT was unable to provide documentation that supported 72 hours as the actual number of hours from request receipt to inspection completion for both fiscal years, as reported in the FY 2019 Budget Book.

**Criteria:**

Proper control processes should be designed to provide reasonable assurance regarding the effectiveness and efficiency of operations and reliability of reported amounts.

**Effect:**

The inaccurate reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

We recommend that DOT report actual results for performance measures based on the supporting agency records.

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**Finding #11 – Average Number of Hours between Street Cut Service Request Received and Inspection Completed (Continued)**

**Auditee’s Response:**

Although the spreadsheet labeled PBC-14 provided on June 14th did not support data in the budget report, going forward DOT will use the information from the internal spreadsheet to report actual performance data and provide targets based on historical data.

**Finding #12 - Percentage of Street Cuts Determined to be Improper During Inspection (Effectiveness)**

**Condition:**

DOT was unable to provide documentation that supported the actual percentage of street cuts determined to be improper during inspection FY 2017 and FY 2016. The support provided by DOT during our audit did not agree to the 2% for FY 2017 and 4% for FY 2016 as reported in the FY 2019 Budget Book. The Department of Audits performed a recalculation of the support provided and the percentage for both fiscal years was less than 1%. The performance measure targets was 6% for FY 2017 and 2% for FY 2016.

**Criteria:**

Proper control processes should be designed to provide reasonable assurance regarding the effectiveness and efficiency of operations and reliability of reported amounts.

**Cause:**

DOT did not provide the same supporting documentation used to report the totals in the FY 2019 Budget Book.

**Effect:**

The inaccurate recording and reporting of actual results hinders the ability of those charged with evaluating City programs to make fully informed decisions.

**Recommendation:**

We recommend that DOT report actual results for performance measures based on the supporting agency records.

**Auditee’s Response:**

Going forward DOT will track this activity and use the results to provide actual and target data during the budget process.

**Baltimore City Department of Transportation  
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The following information is a summary of the status of the prior findings and recommendations included as part of the prior performance audit report of the Department of Transportation, dated November 20, 2015.

**STREET LIGHTING – SERVICE 500**

**PERFORMANCE MEASURE: PERCENTAGE OF INSPECTED STREETS MEETING CITY ROADWAY LIGHTING STANDARDS**

**Previous Finding #1 - No Supporting Documentation for Target Performance Measurements**

The Department of Transportation was unable to provide any documentation related to the budgeted targets for this measure. The target amount contained in the City budget has been rolled forward throughout the years and arbitrarily increased in FY2013 and FY2015.

**Auditee’s FY 2018 Response to Finding #1** - Historically, targets were established, using three (3) year averages of 311 complaints for inadequate street lighting (too dark or too bright). The analysis below shows how the performance targets were derived for FY11, FY12 & FY13.

To improve overall brightness and lighting efficiency throughout the City, since 2010, DOT has started to convert street light fixtures from HPS (High Pressure Sodium) to LED (Light Emitting Diode). LED lighting is long lasting (15+ years life expectancy), provides energy savings (40% energy savings from HPS), requires less maintenance, offers better illumination, meets dark sky compliance for astronomical purposes, improves color rendition for safety and facilitates better control of the lighting distribution.

Currently, LED lights comprise about 55% of our lighting inventory. The remainder of the inventory will be converted to LED by the end of calendar year 2020. With the full conversion of the lighting inventory to LED lights, all of the City lit roads should meet City lighting standards.

With the Bmore Bright program, 6,000 LED lights will be added to the existing inventory to increase lighting foot candles in areas that are inadequately lit. Furthermore, DOT is currently piloting Smart Lighting nodes, which will allow for remote monitoring, remote measuring and proactive maintenance of the LED street lights. These nodes will detect street light outages, measure power consumption and dim and/or boost lighting output.

Based on available funding, with this forthcoming smart lighting network, DOT is anticipating a reduction in the number of outage requests because these outages will be automatically detected and scheduled for repair. The overall efficiency of the lighting system will be measured by the lumen (brightness) output of the system, a direct correlation to the life expectancy of the light fixtures.



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Initially, a decrease in HPS lights (34,500) in the system will correlate to an increase in the monthly lumen output. Once full LED conversion is completed, the replacement work of the first generation of LED light fixtures will start to achieve/maintain a desired industry lumen output of at least 70% of initial output for the entire lighting inventory. Performance targets will be set based on the number of LED lights installed and/or replaced to maintain the desired lighting output.

**Follow-up Status #1**

**Partially Implemented.** DOT is making progress on its goal of upgrading older HPS street light to more efficient LED street lights by the end of calendar year 2020. As of June 2018, 55% of the street lights have been updated to LED street lighting.

**Previous Finding #2 - Incomplete and Unsupported Data Relating to Actual Performance Measurements**

The Department of Transportation was unable to provide data to support the actual performance measurements reported for FY 2011 to FY 2013. CitiStat did not track data for this performance measure in FY 2011 and auditors are unaware of any mechanism to do so. Auditors calculated the actuals based on data tracked in CitiStat from 311 calls for FY2012 and 2013 and found significant differences from the reported actuals. Based on auditor’s calculations it appears that only 60% and 65% in FY 2012 and FY 2013, respectively, of inspected streets met roadway lighting standards versus the 85% and 90% reported.

**Auditee’s FY 2018 Response to Finding #2 -** In FY2012, 272 TRM-Street lighting inadequate/too bright Service Requests were received. Of the 272 SRs received, all were field inspected and verified and 87% of these SRs met the established DOT lighting standards. In FY 2013, 306 TRM-Street lighting inadequate/too bright Service Requests were received. Of the 306 SRs received, all were field inspected and verified and 80% of these SRs met the established DOT lighting standards.

**Street Lighting Inadequacy Statistics-Actual Values (FY 12 & FY 13)**

<b>Street Lighting Inadequate Service Requests</b>	<b>Values</b>
Fiscal Year 2011 Total SL SRs	217
Fiscal Year 2011 Inadequate SL SRs	No Data Available
Fiscal Year 2012 Total SL SRs	272
Fiscal Year 2012 Inadequate SL SRs	35
Fiscal Year 2013 Total SL SRs	306
Fiscal Year 2013 Inadequate SL SRs	60

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**Follow-up Status #2**

**Partially Implemented.** While DOT was able to provide support for how it tracks street lighting inadequacy statistics, the support indicated that the process is not an automated one and is still driven by citizen complaints. The initial support provided was only a spreadsheet with each service request for FY 2016 and FY 2017 listed. DOT has a data analyst individually reviews the results of each service request and then creates the Street Lighting Inadequacy Statistics Table above.

**Previous Finding #3 - Actual Performance is Not Accurately Reported in Budget Document**

The actual method and the amount recorded are only driven by calls from residents that are received by the 311 system reporting that lights are “too bright” or “too dark”. The entirety of the City’s street lights are not evaluated, only those reported to have an issue. The actual performance measured is a reactive procedure, not a proactive one. There is no practice currently performed to measure the percentage of all the street lights within the City meeting the roadway lighting standards as required by the measure.

**Auditee’s FY 2018 Response to Finding #3** - Due to severe staffing shortage in DOT Street Lighting inspections group, resulting from budgetary constraints, DOT’s approach has always been based on citizens’ reporting of inadequate – either too dark or too bright - street lighting. The Street Lighting Inspection Group has one (1) street light inspector providing nightly inspection coverage for the entire city. DOT will be able to shift gears from a Reactive Approach to a Proactive Approach provided it receives adequate funding to implement the Smart Lighting System as explained in response #1, and to supplement its staff and resources. Improving the overall City’s street lighting system will drastically reduce the requests for nightly street lights inspections for adequate lighting. This motive, among several other goals, has prompted the department to proceed with the upgrading of the City’s street lighting system to Light Emitting Diode (LED) to improve the quality of light throughout the City. The emphasis is on brighter, more efficient street lighting that will consist of the conversion of the remaining 34,500 High Intensity Discharge (HPS) lights to LED lights.

**Follow-up Status #3**

**Partially Implemented.** DOT is making progress on its goal of upgrading older HPS street light to more efficient LED street lights by the end of calendar year 2020. As of June 2018, 55% of the street lights have been updated to LED street lighting.

**Baltimore City Department of Transportation  
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**Previous Finding #4 - Lack of Internal Controls/Policy for Maintaining Performance Measurements.**

The Department of Transportation provided no evidence of policies, procedures, internal controls, or accountability for the measure including recording, reviewing, and reporting the performance measure.

**Auditee's FY 2018 Response to Finding #4** - The Department has a Standard Operating Procedure (SOP) in place for investigating TRM – Street Lighting inadequate Too Bright service requests along with a guide for establishing an average foot-candle measurement for standard minimum, lighting levels. In addition, the SOP incorporates the BC DOT Street Lighting and Photometric design guide, which is a modification of Illumination Engineering Society (IES) RP-08 (Recommend Practices for Roadway Lighting). Most major cities across the country adopt RP-08. BC DOT uses this guide to determine lighting levels for streets, based on roadway classifications and pedestrian conflict levels.

**Follow-up Status #4**

**Implemented.** DOT provided the Department of Audits with a copy of the Standard Operating Procedure (SOP) for investigating TRM. We reviewed the SOP in place for investigating TRM – Street Lighting Service Requests and determined that the previous recommendation has been implemented.

**STREET MANAGEMENT – SERVICE 683**

**PERFORMANCE MEASURE: PERCENTAGE OF STREETS MEETING ACCEPTABLE PAVEMENT CONDITION STANDARD**

**Previous Finding #5 - Budgeted Target Reported Different from Supporting Documentation**

Other than reducing the target to 58% in FY 2012, the budgeted target has remained at 59%, which represents the actual pavement conditions in FY 2009. This is inconsistent with the FY2012 budget which describes an increase in the number of lane miles resurfaced and the Pavement System Preservation Report issued for 2009 which detailed estimates of subsequent year's conditions if certain repairs were made of 59% in FY 2010 and 60% in FY 2011. DOT representatives were unable to provide any documentation to support the reported targets.

**Auditee's FY 2018 Response to Finding #5** - Common practice for transportation agencies is to adopt a Pavement Management System (PMS) which consists of a methodology for evaluating pavement performance on a routine basis and assigning a rating to reflect the pavements overall condition. Regularly scheduled pavement inspection or evaluation is critical for any PMS in order to record the progressive deterioration of a roadway or network of roadways. Having a comprehensive PMS allows agencies to assess the roadway network and determine maintenance and rehabilitation priorities.

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A PMS that is widely used by transportation agencies nationwide to measure the roadway condition is the Pavement Condition Index (PCI) or Pavement Condition Rating (PCR). PCI or PCR is a methodology of quantifying pavement condition through manual or automated surveys. The pavement network is divided into identifiable segments, such as a particular roadway or street, in which pavement condition can be evaluated and recorded. Based on pavement condition survey a numerical rating is determined. In the case of PCI the range would be from 0 to 100, where 0 is the worst possible condition and 100 is the best. The pavement condition survey assesses the severity, type and quantity of pavement distresses. Distress types used to determine PCI rating varies depending on pavement type and agency testing procedures. Common distress types for asphalt pavements include alligator cracking, edge cracking, depressions, rutting, potholes, patching & utility cuts, shoving, longitudinal & transverse cracking, among others. Common distress types for concrete pavements include blowup/buckling, corner breaks, faulting, joint seal damage, divided slab, durability cracking, among others.

Based on measurements of the various distress types, pavements are assigned a rating that reflects their overall condition. This rating can be used by transportation agencies to determine which roadways require treatment, estimate future pavement condition of a roadway, determine the extent and estimated cost of repairs, determine the overall condition of a roadway network, and compare the condition of different pavement types within the roadway network.

In 2013, DOT completed a Pavement Management Report to determine the PCI of its roadway system, following industry best practices as described above. The report outlays the three (3) scenarios outlined below for the City roadway network state of good repair:

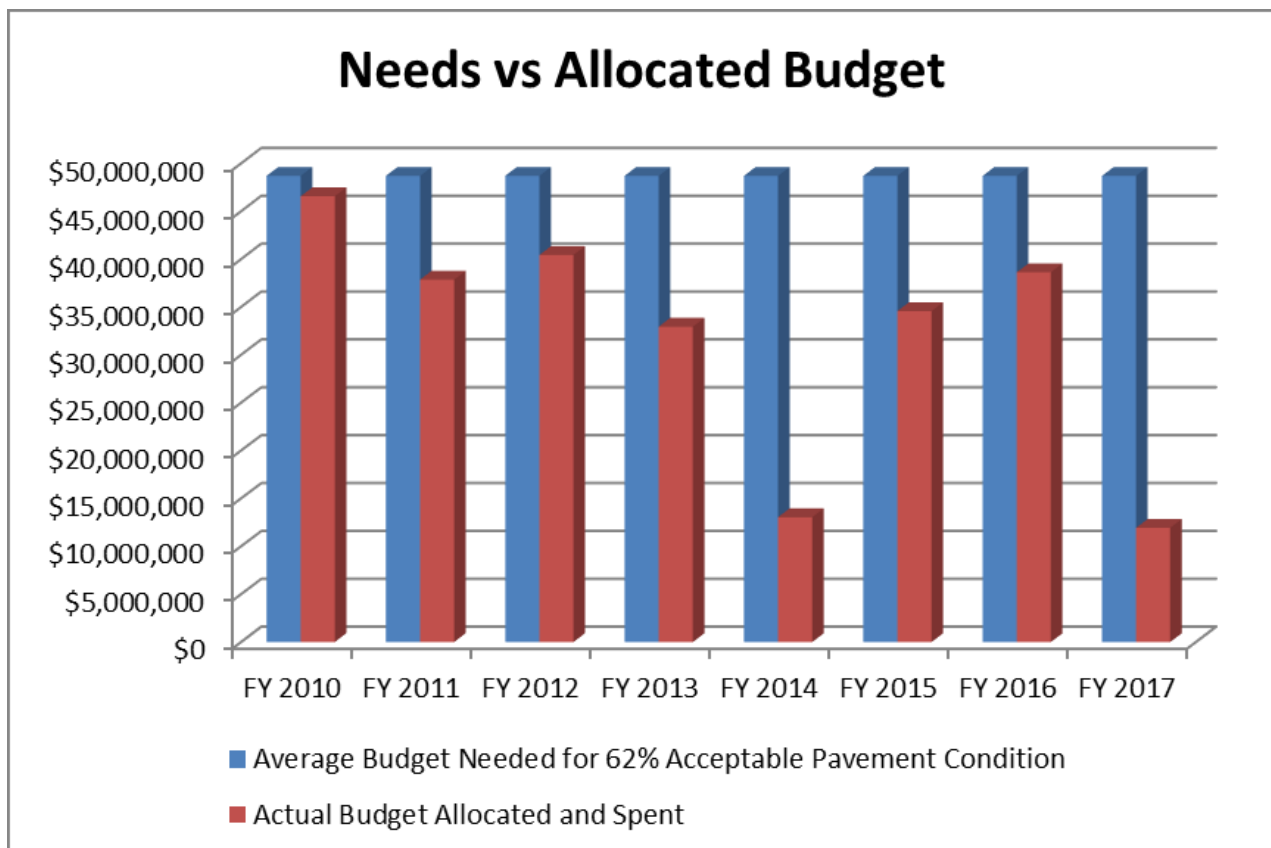
- A. What funding levels are required to maintain the level of acceptable condition roadways at the 2013 level of 62%?
- B. What would the percentage of acceptable condition roadways be if the funding level was kept constant?
- C. What funding level is required to raise the level of acceptable condition roadways to 80% over a period of 10 years?

In anticipation of decreased funding, caused by declining Highway User Revenue (HUR) funds received from the State, DOT decided to proceed with scenario A for future targets for the performance metrics. The chart and graph below show the actual spending vs. the recommended level of spending to keep 62% of the roadway network at acceptable condition.

As illustrated below, actual allocated and spent budget levels do not match recommended funding levels from the 2013 DOT Pavement Management Report. In 2013 and 2016, local CIP funding levels for DOT were extremely low, respectively \$4 million and \$4.4 million. As a result, roadway pavement work completed in 2014 and 2017, mainly included the resurfacing work performed by DOT maintenance department from the operating budget.

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 <b>Department of Transportation</b> <b>ORANGE CONE LIST</b> <b>Project Cost and Total Lane Miles</b> 			
<i>Fiscal Year</i>	<i>Lane Mile</i>	<i>Average Budget Needed for 62% Acceptable Pavement Condition</i>	<i>Actual Budget Allocated and Spent</i>
FY 2010	179.17	\$48,700,000	\$46,568,635
FY 2011	150.59	\$48,700,000	\$37,855,260
FY 2012	188.17	\$48,700,000	\$40,429,026
FY 2013	179.55	\$48,700,000	\$32,940,175
FY 2014	88.91	\$48,700,000	\$13,041,287
FY 2015	123.66	\$48,700,000	\$34,564,790
FY 2016	124.52	\$48,700,000	\$38,619,057
FY 2017	63.78	\$48,700,000	\$11,928,003



Moving forward, to produce a more accurate percentage of acceptable condition roadways target, based on the available level of funding, DOT is proposing to update the pavement management report annually with the previous years' achievement and the upcoming years anticipated funding levels.

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**Follow-up Status #5**

**Not Implemented.** Due to funding limitations, it has not been economically viable to update the pavement management report annually. DOT is proposing to update the report annually, but these annual updates have not been implemented as of FY 2018.

**Previous Finding #6 - Incomplete and Unsupported Data Relating to Actual Performance Measurements**

CitiStat did not track any data for this performance measurement and we are unaware of any mechanism in place to do so. No evidence was provided to support the actual performance measures reported. The Pavement System Preservation Report issued for 2013 reported actual condition levels of 64%, while the Department of Transportation reported 62%.

**Auditee's FY 2018 Response to Finding #6 -** Actual values of the performance measure, percentage of streets meeting acceptable pavement condition, are determined every three (3) to five (5) years when the pavement management surveys are done. This time consuming and expensive effort is the only way to get "actual" values for this measure. DOT proposes to institute a process to develop estimates for this measure in the years between pavement management surveys as follow:

- The results of the previous year's resurfacing and reconstruction projects will be incorporated into DOT pavement database
- The deterioration that the balance of the City roadway would have gone will be estimated using the regression model provided in the Pavement Management Report
- These two effects will be combined to produce an estimated, updated value for this performance measure.

**Follow-up Status #6**

**Not Implemented.** Based on DOT's response, due to the level of financial and operational resources required, it is not feasible to adjust the regularity of obtaining the actual values for this performance measure. DOT will work on developing a process to estimate this measure in the years between the pavement management surveys.

**Previous Finding #7 - Lack of Internal Controls/Policy for Maintaining Performance Measurements**

The City of Baltimore and the Department of Transportation provided no evidence of policies, procedures, internal controls, or accountability for the measure including recording, reviewing, and reporting of the performance measure.

**Auditee's FY 2018 Response to Finding #7 -** Previously DOT calculated actual values for this measure every 3 to 5 years when the Pavement Management Survey was performed. Moving forward, DOT will develop estimates for this measure on an annual basis as described in the previous response.

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**Follow-up Status #7**

**Not Implemented.** Based on DOT's response, due to the level of financial and operational resources required, it is not feasible to adjust the regularity of obtaining the actual values for this performance measure. DOT will work on developing a process to estimate this measure in the years between the pavement management surveys.

**TRAFFIC MANAGEMENT – SERVICE 684**

**PERFORMANCE MEASURE: COST PER TRAFFIC CONTROL SIGN INSTALLED**

**Previous Finding #8 - No Supporting Documentation for Actual Performance or Budgeted Target Amounts**

The Department of Transportation representatives were unable to provide any documentation to support the actual measures reported in CitiStat or budget documents. Hamilton Enterprises, LLC noted no documentation to substantiate the targeted estimates as well.

**Auditee's FY 2018 Response to Finding #8 -** The Traffic Division deploys investigators to field locations based on citizens' requests. In the field, these investigators determine proper placement of signage, look for faded signs along with evaluating the condition of crosswalks and pavement markings.

Once the field investigation is completed, a work order is developed and transmitted to the maintenance division for sign fabrication and installation. Sign fabrication requires mold design, materials such as metal with reflective sheets, banding materials, metal poles, nuts and bolts.

Sign installation involves a two person crew, ladders, at times traffic control and a drill truck. The level of traffic control needed, which is directly related to the roadway type or the vehicular capacity and speed, determines the time, materials and related costs for the sign installation.

As such, the breakdown of the signage costs includes the following: labor (field investigation and installation), equipment and materials. On an annual basis, DOT fabricates an estimated 3,000 to 4,000 signs, with an all-inclusive cost range of \$153.34 - \$235.34. The sign fabrication shop has eleven (11) employees and sixteen (16) installers.

**Follow-up Status #8**

**Implemented** – DOT provided support with the responses to the FY2010-FY2013 audit report which displayed the materials and labor cost to produce each type of sign.

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**VEHICLE IMPOUNDING AND DISPOSAL – SERVICE 689**

**PERFORMANCE MEASURE: NUMBER OF PROPERTY DAMAGE CLAIMS FILED**

**Previous Finding #9 - No Supporting Documentation for Actual Performance or Budgeted Target Amounts**

The Department of Transportation representatives were unable to provide any documentation to support the actual measures reported in CitiStat or budget documents. Hamilton Enterprises, LLC noted no documentation to substantiate the targeted estimates as well.

**Auditee's FY 2018 Response to Finding #9** - Beginning Fiscal Year 2018, the Towing Division began tracking claims in an effort to provide a better estimate for the performance measure target and to reduce the number of claims for damaged vehicles or articles stolen from towed cars. Citizens, desiring to file a claim for a damaged vehicle or stolen articles, must visit the Towing Division's headquarters located at 6700 Pulaski Highway.

After the release of the towed vehicle, the citizen is interviewed by the claim investigator and instructed to complete a claim form. The claim investigator will take pictures of the vehicle and review the surveillance camera footage to assess the basis of the claim. The claim investigator compiles a file and forwards the file information to the law department for final determination.

The Towing Division follows up accordingly with the law department regarding the results of the claim. The Towing division maintains a spreadsheet of all claims initiated in their office and files are available for review.

**Follow-up Status #9**

**Implemented** – DOT provided support with the responses to the FY10-FY13 which displayed the details for towing claims FY 2018 from July 2017 through April 2018.

**Previous Finding #10 - Lack of Internal Controls/Policy for Maintaining Performance Measurements**

The City of Baltimore and the Department of Transportation provided no evidence of policies, procedures, internal controls, or accountability for the measure including recording, reviewing, and reporting of the performance measure.

**Auditee's FY 2018 Response to Finding #10** - The Towing Division is developing a comprehensive Standard Operating Manual (SOP) for impounding and disposal of vehicles.

**Follow-up Status #10**

**Not Implemented.** The SOP for impounding and disposal of vehicles is still in the development stage.



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**BRIDGE AND CULVERT MANAGEMENT – SERVICE 692**

**PERFORMANCE MEASURE: PERCENTAGE OF BRIDGES MORE THAN 50 YEARS OLD WITH A BRIDGE SUFFICIENCY RATING BELOW 50**

**Previous Finding #11 - No Supporting Documentation for Actual Performance or Budgeted Target Amounts**

The Department of Transportation representatives were unable to provide any documentation to support the actual measures reported in CitiStat or budget documents. Hamilton Enterprises, LLC noted no documentation to substantiate the targeted estimates as well.

**Auditee’s FY 2018 Response to Finding #11** - The Federal Aid Highway Act of 1968 mandated the Secretary of Transportation to establish a national bridge inspection standard. In 1971, the National Bridge Inspection Standards (NBIS) was established. NBIS set national policy regarding bridge inspection frequency, inspectors’ qualifications, report formats and inspections and rating procedures. The Bridge Sufficiency Rating (BSR) is a score assigned to a bridge to determine the appropriate remedial actions to bring the bridge up to sufficient standards. The BSR scale is from 0-100. DOT annually extracts BSR data from the InspectTech database. This BSR data is manually entered into the performance measure spreadsheet created by DOT Bridge Section Chief. The flash drive provided, with this report, includes the spreadsheet, which shows the data and the details on how to calculate both the actual and target values for this performance measure. See below the formulas to generate those values. The formula for the target value is as follows:

$$\frac{[(\text{Total number of bridges over 50 years old with BSR less than 50}) - (\text{Total number of bridge over 50 years old under construction})]}{[\text{Total number of bridges older than 50 years old}]}$$

The data for the target value is extracted the spring (March/April) prior of the start of the Fiscal Year (July 1st). The formula for the actual value is as follows:

$$\frac{[\text{Total number of bridges with BSR less than 50}]}{[\text{Total number of bridges older than 50 years old}]}$$

The data for the actual value is extracted the spring (March/April) of the current Fiscal Year.

Additionally, the Department maintains a file of every inspected bridge, which was provided during the FY10-FY13 audit. The bridge inspection reports remain readily available to be reviewed upon request in the bridge section, located on the 7th floor of the Charles L. Benton Building during normal business hours Monday – Friday 8:30 am to 4:30 pm.

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**Follow-up Status #11**

**Implemented.** We performed a walkthrough with Scott Weaver, Chief of Bridge Engineering to gain an understanding of the Bridge Sufficiency Rating (BSR) and associated inspections. During the walkthrough we selected a random sample of bridges that were at least 50 years old with a BSR of 50 or less. There were no exception noted in any of the 5 samples.

**Previous Finding #12 - Lack of Internal Controls/Policy for Maintaining Performance Measurements**

The City of Baltimore and the Department of Transportation provided no evidence of policies, procedures, internal controls, or accountability for the measure including recording, reviewing, and reporting of the performance measure.

**Auditee's FY 2018 Response to Finding #12** - Every bridge that is 20 feet or longer in length and carries vehicular traffic must be inspected at least once every two (2) years in accordance with the National Bridge Inspection Standard that was established in 1971. The inspection of these structures and the management of the inspection program is the responsibility of the agencies that owns and is responsible for the structure in question. The Federal and State Highway Administrations oversee these inspection programs to ensure compliance with all federal and state regulations.

DOT uses engineering consultants to perform these required biennial bridge inspections. Upon receiving an inspection report from an engineering consultant, each report is reviewed by the Chief of Bridge Engineering for the Department of Transportation. This ensures that the Chief of Bridge Engineering can speak accurately about each structure for which the Department is responsible. Upon review, the Chief of Bridge Engineering issues a memo to the author of the inspection report(s) with comments, clarifications, or corrections that are required for approval of the report(s). After all comments, clarifications or corrections are made the Chief of Bridge Engineering approves the report in the online, Inspectech database. A hard copy of each approved inspection report is submitted to the City for retention. After approval, the Chief of Bridge Engineering, or another qualified and experience Bridge Engineer conducts a series of field visits wherein the information in 10-15% of the approved inspection reports is verified for completeness and accuracy.

As a part of each bridge inspection report, data that is required by the Federal and State Highway Administrations is collected and presented. This data is used to by the State Highway Administrations to provide the official Bridge Sufficiency Rating (BSR) for each eligible structure. The information in these bridge inspection reports and the BSR's are used by the Bridge Engineering Section to establish a maintenance and replacement program for the bridges that are the responsibility of the Baltimore City Department of Transportation. The Bridge Engineering section also uses this information to help recommend and decide which bridge structures require extensive Rehabilitation or even Replacement as a part of the Capital Improvement Plan (CIP) for the City of Baltimore.

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Typically BSR over 80 is considered in good condition and no repairs are required. Bridges with BSR less than 80 and greater than 50 are considered in average condition requires rehabilitation and programed for work in the CIP. Bridges with BSR less than 50 are considered in poor condition and are programed for replacement in the CIP. Critically needed repairs are performed as needed to keep the bridges safe for the travelling public. Attachment F is a sample of the Structure Inventory and Appraisal Report (SIA). These forms are required in every bridge inspection report. The information contained is used by SHA to provide the official BSR.

**Follow-up Status #12**

**Implemented.** We performed a walkthrough with Scott Weaver, Chief of Bridge Engineering to gain an understanding of the Bridge Sufficiency Rating (BSR) and associated inspections. During the walkthrough Mr. Weaver explained the key metrics related to the BSR and how it affects the replacement and rehabilitation decisions. The BSR also impacts eligibility for federal and state funding.

**Baltimore City Department of Transportation  
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**FY10-FY13 AUDIT RECOMMENDATIONS FROM HAMILTON ENTERPRISES, LLC**

The lack of oversight, accountability, and internal controls surrounding the measurement of performance within DOT undermines the intent of the performance measurement process as a whole. To achieve the full benefits of outcome budgeting, significant changes are needed. A system of accountability and oversight at DOT level needs to be implemented that requires all measures be valid, reliable, and verifiable. The reliability and validity of the performance measures are critical to their usefulness in budgeting and measuring performance to achieve strategic goals.

DOT should develop procedures in coordination with each service to link the performance measurement to its mission and strategic goals, and confirm its usefulness in measuring achievement of those goals. Performance targets should be defined with funding and resource availability in mind. The methods and reporting mechanisms needed to capture each performance measure and the frequency in which that data will be captured should be defined with the understanding that the cost and effort of obtaining the performance data should not exceed the value of the data so obtained. For example, in the case of street maintenance, obtaining an actual PCI every 3 years may be sufficient to plan street maintenance, set performance targets, and estimate actual PCI (based on the completion of planned maintenance) during the convening years. The procedures should also include how the measures will be verified for data validity and reliability.

To enhance the evaluation of performance measures that capture actual costs, DOT would benefit by creating a total cost comparison approach. Measuring only direct material and labor cost does not provide a complete picture of the amount of expenditures incurred in completing each performance measure in a cost efficient manner. By developing an enhanced timekeeping system, a direct charge methodology of directly associated costs, and an indirect cost allocation method, DOT could make logical comparisons between budget and actual cost associated with each performance measure. Consistent development of budget and actual cost will improve the validity of the cost data for reliable performance comparisons.

Each measure should have a service representative (with the appropriate knowledge, experience, and/or training) responsible for the measurement, recording, and reporting of budgeted and actual performance. The representative should be required to document all supporting information in a manner that could be evaluated by a third-party for accuracy, validity, and correctness.

DOT should consider implementing quarterly reviews with the services to provide oversight into the performance measurement process and accountability for the achievement of performance objectives. Quarterly reviews would allow DOT to identify problems early, take necessary corrective action, and adjust strategies and resource allocations accordingly.