

# ORANGE COUNTY TRANSPORTATION AUTHORITY INTERNAL AUDIT DEPARTMENT



## Revenue Vehicle Maintenance

### Internal Audit Report No. 20-506

May 26, 2020



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## **Conclusion**

The Internal Audit Department (Internal Audit) of the Orange County Transportation Authority (OCTA) has completed an audit of revenue vehicle maintenance. Based on the audit, internal controls in place to ensure compliance with revenue vehicle maintenance standards and OCTA policy and procedures for preventive maintenance inspection (PMI) activities are generally adequate; however, one recommendation was made to further enhance work order templates.

## **Background**

### Maintenance Program

The primary goals of the maintenance program include maintaining vehicles in a state of good repair with a goal of no more than 15 percent of buses on hold, maximizing the miles between road calls (MBRC) with a 14,000-mile goal, adhering to preventive maintenance service intervals with a 100 percent on-time goal, and maximizing vehicle useful life with a minimum 18-year life goal. Other goals include maintaining vehicles in a safe operating condition and their interior and exterior appearance, maintaining accurate vehicle service histories, minimizing the loss of accessibility due to equipment failure, and administering equipment warranty recovery programs.

### Preventive Maintenance

Buses are scheduled for a series of eight PMI's at intervals of 6,000 miles. Inspections are considered to be on-time if they are completed within 10 percent of 6,000 miles. The job templates for inspections are created and maintained by Maintenance Resource Management (MRM), based on instructions/specifications provided by the Transit Technical Services (TTS) section.

Mileage is tracked in the Fleetwatch fluid management system, and the HASTUS system is used for scheduling of buses each day. Daytime maintenance supervisors run Fleetwatch and HASTUS reports to identify buses due for inspection and then project total miles as of the end of the day. Based on the projected miles and anticipated manpower, the maintenance supervisors decide which PMI's to schedule for the next day. The maintenance supervisors then create and print out work orders in the Ellipse system for all the work associated with the PMI's, including supplemental inspections. The graveyard shift supervisors will place buses on hold in the HASTUS system. Typically, the PMI work orders are performed by the daytime shift mechanics, and supplemental inspections are performed by the later shifts. The supervisors sign all work orders.

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Mid-Life Program

The Revenue Vehicle Maintenance Plan Policy (Policy) identifies a mid-life program that serves to ensure that the major mechanical components are replaced prior to failure. The Policy spells out engine replacements and overhauls, transmission replacements, and differential overhauls, as part of the program; however, based on discussions, engine in-frame overhauls and differential overhauls are performed on an as-fail basis and when there are warning signs, respectively.

Road Calls

In a road call, the coach operator calls Central Communications to report a problem with the bus. The calls are logged in the Intelligent Transit Management System (ITMS) and reports are then run. Maintenance base management enters their determination of the validity of the road calls and the work order numbers for related work. On a weekly basis, MRM examines all road calls to confirm base management's determination of validity; based on review of work orders, the 30-day history of repeat issues, and whether there were any part replacements.

Quality Assurance

Once a year, TTS performs mock California Highway Patrol (CHP) inspections at the Santa Ana and Garden Grove bases. The inspections mirror CHP inspections, including inspection of a sample of five in-service buses and review of maintenance records. TTS emails inspection reports to maintenance management.

Compliance Monitoring

Monthly Maintenance Performance Key Indicator (MKI) reports that report on valid mechanical MBRC, percent of buses on hold, PMI's on-time, cost per mile-direct costs, and cost per mile-total costs, are prepared by Financial Planning and Analysis staff. The MKI reports are reviewed, approved, and then posted to the intranet. MBRC for directly-operated fixed-route service (DOFR) is also reported in the quarterly Bus Operations Performance Measurements Report (quarterly Operations report) that goes to the Transit Committee and Board of Directors (Board).

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## **Objectives, Scope, and Methodology**

The objectives were to evaluate the internal controls in place to ensure compliance with revenue vehicle maintenance standards and to test compliance with policy and procedures.

According to generally accepted government auditing standards, internal control is the system of processes that an entity's oversight body, management, and other personnel implement to provide reasonable assurance that the organization will achieve its operational, reporting, and compliance objectives. The five components are control environment, risk assessment, control activities, information and communication, and monitoring.<sup>1</sup> The components and principles that were evaluated as part of this audit are:

- Risk Assessment
  - OCTA specifies objectives with sufficient clarity to enable the identification and assessment of risks relating to objectives.
  - OCTA identifies risks to the achievement of its objectives across the entity and analyzes risks as a basis for determining how the risks should be managed.
- Control Activities
  - OCTA selects and develops control activities that contribute to the mitigation of risks to the achievement of objectives to acceptable levels.
- Information and Communication
  - OCTA internally communicates information, including objectives and responsibilities for internal control, necessary to support the functioning of internal control.
- Monitoring
  - OCTA selects, develops, and performs ongoing and/or separate evaluations to ascertain whether the components of internal control are present and functioning.
  - OCTA evaluates and communicates internal control deficiencies in a timely manner to those parties responsible for taking corrective action, including senior management and the Board, as appropriate.

The methodology consisted of testing OCTA's PMI standards for compliance with OCTA policy and the manufacturer's preventive maintenance guidelines, testing a sample of inspection work orders for compliance with policy and evidence of supervisory review, testing the mid-life program for compliance with policy, assessing internal controls in determining road call validity and testing a sample of road calls, testing TTS' mock CHP inspections for evidence of monitoring, and testing the monthly MKI reports and quarterly Operations report for consistent communication to management and/or the Board.

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<sup>1</sup> See U.S. Government Accountability Office publication, "Standards for Internal Control in the Federal Government," available at <http://www.gao.gov/products/GAO-14-704G>, for more information.

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The scope is limited to revenue vehicle maintenance for DOFR revenue vehicles. The scope included review of manufacturer's preventive maintenance guidelines for the New Flyer 5700 and 5800 series, review of evidence of the mid-life program for the New Flyer buses that underwent the fiscal year 2017-18 engine repower, testing of all TTS's mock CHP inspections for the last two years, and testing of all MKI reports and quarterly Operations reports posted in the last two years. The scope also included review of 25 road calls selected with a bias towards mechanical road calls and road calls with changes in validity determinations. For a judgmental sample of 25 buses selected to ensure coverage across all bus series, Internal Audit reviewed the Ellipse history to ensure that a full cycle of the eight PMI's was performed along with the supplemental inspections, with testing of the work orders for all PMI's performed in the last six months; one supplemental inspection haphazardly selected; and one repair job haphazardly selected, for evidence of supervisory review. Since the samples are non-statistical, any conclusions are limited to the sample items tested.

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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**Audit Comment, Recommendation, and Management Response**

**Preventative Maintenance Work Orders Should be Enhanced to Include all Manufacturer Guidelines or Variances Should be Documented**

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OCTA's maintenance work order templates did not include several preventive maintenance tasks recommended by the manufacturer: inspection of air compressor discharge lines for carbon buildup every 30,000 miles; replacement of air strainer every 36,000 miles; headlight aim inspection every year; changing of wheelchair ramp hydraulic fluid every year; rebuilding of fire extinguishers every six years and hydrostatic testing every 12 years; and certain component replacements at intervals of five years, six years, and ten years. Additionally, the work order templates are set up to replace power steering fluid every 48,000 miles, instead of the 36,000-mile interval recommended by the manufacturer. Finally, various operating and leakage tests are recommended by the manufacturer, but are not specifically defined in the work orders.

**Recommendation 1:**

Internal Audit recommends that management either incorporate these tasks into the work order templates or document variances from the manufacturer guidelines with justification.

**Management Response:**

The Maintenance Department (Maintenance) acknowledges that various work order templates do not include certain preventive maintenance tasks recommended by the manufacturer as outlined in the audit. Maintenance believes that the deviation from the manufacturer recommendations is warranted and has not led to the deterioration of assets or reduced performance.

Maintenance concurs with Internal Audit's recommendation to incorporate these tasks into the work order templates or document variances from the manufacturer recommendation with justification. Maintenance will apply the recommended solution to the items outlined in the audit within the next six months and adopt this procedure for all subsequent deviations going forward.