



# STATE OF NORTH CAROLINA

**NORTH CAROLINA DEPARTMENT OF  
TRANSPORTATION**

**HEAVY EQUIPMENT FLEET MANAGEMENT  
FOLLOW-UP**

**FINANCIAL RELATED AUDIT**

**JUNE 2013**

**OFFICE OF THE STATE AUDITOR**

**BETH A. WOOD, CPA**

**STATE AUDITOR**

## **EXECUTIVE SUMMARY**

### **PURPOSE**

This audit evaluates whether the Department of Transportation (DOT or Department) took appropriate corrective action to adequately address recommendations made in the *Heavy Equipment Fleet Management* performance audit issued in September 2010.

### **BACKGROUND**

DOT owns and manages a fleet of heavy equipment to maintain the State's 80,000-mile highway system. As of June 30, 2012, DOT owned about 22,000 pieces of heavy equipment with a cost of about \$627 million.

### **KEY FINDINGS**

- Recommendations made by the State Auditor in a 2010 audit and DOT corrective action plans have not been fully implemented.
- 560 pieces of equipment – more than one-fourth of the six equipment classes analyzed – were used less than 20% of the time.
- The annual process to analyze and take action on underused and idle equipment was not performed in 2012.
- Some equipment use and maintenance data is inaccurate.

### **KEY RECOMMENDATIONS**

- DOT should fully adopt the recommendations made by the State Auditor in 2010 and agreed to by the Department.
- DOT should set target dates for reporting what equipment is underused and idle, and to be disposed.
- DOT should formally identify and correct data entry errors for equipment usage.

The key findings and recommendations in this summary are not inclusive of all the findings and recommendations in the report.

## AUDITOR'S TRANSMITTAL

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June 5, 2013

The Honorable Pat McCrory, Governor  
Members of the North Carolina General Assembly  
Anthony J. Tata, Secretary, North Carolina Department of Transportation

This report presents the results of our financial related audit at the Department of Transportation (Department or DOT). Our work was performed by authority of Article 5A of Chapter 147 of the *North Carolina General Statutes* and was conducted in accordance with the performance audit standards contained in *Government Auditing Standards*, issued by the Comptroller General of the United States.

The objectives of our audit were to (1) determine if the Department took appropriate corrective action to adequately address recommendations made to management in the *Heavy Equipment Fleet Management* performance audit issued in September 2010, and (2) to identify other potential areas of improvement for fleet management.

The results of our audit determined that the Department took appropriate corrective action to address some recommendations made in the September 2010 report but have yet to take action to address others. Our audit also identified opportunities to improve data collection processes. These items are described in the Audit Findings and Responses section of this report.

*North Carolina General Statutes* require the State Auditor to make audit reports available to the public. Copies of audit reports issued by the Office of the State Auditor may be obtained through one of the ways listed in the back of this report.



Beth A. Wood, CPA  
State Auditor

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## BACKGROUND

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As authorized by Article 5A of Chapter 147 of the North Carolina General Statutes, we have conducted a financial related audit at the Department of Transportation (Department or DOT). The Office of the State Auditor initiated this audit to follow-up on the recommendations made in the September 2010 performance audit report and to identify other potential areas of improvement for fleet management.

*North Carolina General Statute 136-18* assigns responsibility for maintaining the State's 80,000-mile highway system to the North Carolina Department of Transportation (Department or DOT). To meet its statutory responsibility, DOT owns, maintains, and manages a fleet of heavy equipment. The Department supplements its fleet as needed by renting heavy equipment from commercial rental businesses. The Fleet and Material Management Unit, a centralized unit within DOT's Highway Division, has primary oversight of DOT's fleet of heavy road maintenance equipment.

After purchase, equipment is assigned to local DOT facilities within the 14 geographically clustered divisions in order to meet central and divisional road maintenance goals and objectives. Divisions, each headed by a Division Engineer and a Division Equipment Superintendent, are responsible for storing, scheduling, and maintaining their assigned fleet of heavy equipment. Each division performs an annual equipment needs and replacement assessment, at which time recommendations are made for disposals and new equipment purchases. Disposed equipment is sold at auction or as surplus property, transferred to other facilities, or scrapped for used parts. All disposals and purchases require approval from the Fleet and Material Management Unit.

The State Auditor issued a report titled "*North Carolina Department of Transportation – Heavy Equipment Fleet Management*" in September 2010 with recommendations to improve the heavy equipment fleet management practices. Specifically, the State Auditor recommended:

- DOT management should establish performance measures or expectations for heavy equipment usage rates that would justify the cost associated with continued ownership. The Department should periodically review and adjust performance measures to increase efficiency and achieve departmental goals;
- DOT management should develop written policies and procedures that clearly assign responsibility for identifying and reporting underused equipment. The Department should also develop written procedures to instruct managers about what corrective action to take when underused equipment is detected;
- The Department should identify and dispose of underused equipment. Classes of equipment that are used less than defined minimum use standards should be analyzed, by location, to identify the number of pieces that should be sold or transferred to other locations that need that type of equipment. Similarly, individual pieces of equipment that are routinely identified as idle or underutilized should be sold or transferred. Reasons for keeping underused equipment should be documented and approved by central managers;

## BACKGROUND

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- The Department should provide training to all equipment managers in order to expand their knowledge of efficient fleet management practices. The Department should continue its efforts to obtain the Association of Equipment Manager Professionals fleet manager certification for all equipment superintendents.

The Department agreed with the State Auditor's recommendations. In the agency response to the September 2010 report the Department stated it would take the following actions:

- Establish a 50% utilization goal for all heavy equipment. Revise utilization goals based on the results of the East Carolina University study expected to be completed October 1, 2010.
- Enhance the Fleet and Material Management Manual policy and procedures specifically related to equipment utilization to ensure the most efficient and economical equipment management.
- Review each piece of equipment contained in the audit to determine if any piece should be disposed of or transferred (i.e. use rates are below the minimum target).<sup>1</sup> Complete an immediate review by the State Highway Administrator of any piece of equipment not used in the past year to determine if the equipment needs to be sold or reassigned. Require any equipment not used and kept to be certified by the State Highway Administrator to remain in the fleet for safety or operational measures. Require monthly reporting of utilization be provided to division engineers, maintenance engineers, and equipment managers. Distribute annual reports to these engineers and require any piece of equipment with less than 15% use to be certified by the State highway Administrator to remain in the fleet.
- Partner with a community college and the Association of Equipment Manager Professionals (AEMP) to provide course work leading to an associate's degree in fleet management as well as the AEMP Fleet Manager Certification.

As of June 30, 2012, the Department held more than 22,000 pieces of heavy equipment with an acquisition cost of approximately \$627 million. At the conclusion of the September 2010 audit, DOT had approximately 25,000 pieces of heavy equipment with a cost of approximately \$633 million for a decrease of 3,000 pieces of equipment. It is unknown what portion of the reduction is attributable to implemented utilization procedures that are the subject of this audit.

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<sup>1</sup> In its response to the September 2010 audit, DOT set the minimum use rate at 15%. Since then, the Department raised its minimum use rate to 20%.

## AUDIT SCOPE AND OBJECTIVES

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The audit objectives were to 1) determine if the Department took appropriate corrective action to adequately address recommendations made to management in the *Heavy Equipment Fleet Management* performance audit issued in September 2010, and 2) identify other potential areas of improvement for fleet management.

Management is responsible for establishing and maintaining effective internal control. Internal control is a process designed to provide reasonable assurance that relevant objectives are achieved. Errors or fraud may nevertheless occur and not be detected because of the inherent limitations of internal control. Also, projections of any evaluation of internal control to future periods are subject to the risk that conditions may change or that compliance with policies and procedures may deteriorate. Our audit does not provide a basis for rendering an opinion on internal control, and consequently, we have not issued such an opinion.

The audit scope included a review of the Department's implementation of the State Auditor's recommendations made in the September 2010 performance audit report. Our scope included the Department's implementation efforts for the period July 1, 2011, to June 30, 2012. We conducted fieldwork from January 2013 to March 2013.



## METHODOLOGY

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To determine if appropriate corrective action was taken to address previous recommendations, we conducted interviews with Fleet and Material Management Unit personnel, reviewed policies and procedures as they related to equipment use and fleet management, and reviewed management reports. We also reviewed DOT management meeting minutes and Board of Transportation meeting minutes.

To determine if underused or idle equipment still existed, we analyzed DOT equipment use reports for six classes of DOT-owned heavy equipment for the year ending June 30, 2012. These six classes (excavators, crawler tractors, backhoes, motor graders, loaders and dump trucks) were the same classes that were reviewed in the September 2010 audit.

The equipment use data we analyzed was available to Department management and equipment managers during the audited period. We did not verify or validate this data. Therefore, we do not conclude as to the exact amount of idle or underused equipment.

The results of our analysis cannot be projected to the entire (approximately 22,000 piece) heavy equipment fleet because the sample of items analyzed was not intended to be statistically representative.<sup>2</sup> The results of any analysis performed under this audit are restricted to the specific pieces of equipment selected for testing.

We conducted this audit in accordance with generally accepted government auditing standards applicable to performance audits. 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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<sup>2</sup> We judgementally selected the six classes of heavy equipment after consulting with Fleet and Material Management personnel because those classes were the most commonly used high-dollar-value classes of heavy equipment.

## **RESULTS AND CONCLUSIONS**

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This report contains the results of the audit including findings and recommendations. Because of the test nature and other inherent limitations of an audit, together with limitations of any system of internal and management controls, this audit would not necessarily disclose all performance weaknesses or lack of compliance.

The results of our audit determined that the Department took appropriate corrective action to address some recommendations made in the September 2010 report but have yet to take action to address others. Our audit also identified opportunities to improve processes. These items are described in the Audit Findings and Responses section of this report.

## AUDIT FINDINGS AND RESPONSES

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### 1. STATE AUDITOR RECOMMENDATIONS AND DOT ACTION PLANS NOT FULLY IMPLEMENTED

The Department of Transportation (DOT or Department) did not fully implement recommendations and its action plans from the performance audit “*North Carolina Department of Transportation – Heavy Equipment Fleet Management*” issued by the State Auditor in September 2010.

Similar to the September 2010 audit, DOT usage reports for the year ending June 30, 2012, show a significant number of underused or idle heavy equipment. An analysis of 2,049 pieces of heavy equipment,<sup>3</sup> costing approximately \$146 million, shows that two-thirds of the equipment (1,372 pieces) was utilized less than 50% of the time.<sup>4</sup> More than a quarter of the pieces (560) did not meet the 20% minimum use rate set by the Department,<sup>5</sup> with 48 pieces (2.34%) not used at all. However, it is worth noting that some of the use records have known errors (see finding #2).

The overall utilization rate for the equipment under review in 2012 was approximately 40%. This is an improvement over the utilization rates of 24%, 32%, and 29% for the years 2007 – 2009 covered in the original September 2012 audit.

In its written response, the Department agreed with recommendations made in the September 2010 report and outlined planned corrective actions. Two corrective action plans were partially implemented for 2012, and two action plans were fully implemented.

#### **Corrective Action Plan Partially Implemented for 2012**

The Department partially implemented the State Auditor’s recommendation to identify and take corrective action on underused and idle equipment during the year ending June 30, 2012.

Specifically, the Department did not:

- Provide each of the 14 divisions a list of its equipment that did not meet the 20% minimum use rate;
- Make a decision to sell or transfer underused and idle equipment to another location discovered in the above mentioned under 20% underutilized report;
- Document management approved reasons for keeping equipment used less than the minimum target.

The Department said that it would analyze and take action on underused equipment annually in its response to the September 2010 audit.

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<sup>3</sup> The audit focused on six classes of heavy equipment used for road maintenance: excavators, tractors, backhoes, motor graders, loaders and dump trucks. These classes were chosen during the September 2010 audit after consulting with Fleet and Material Management Unit personnel because those classes were the most commonly used high-dollar-value classes of heavy equipment.

<sup>4</sup> In its response to the September 2010 audit, the Department established an average utilization target of 50% for all class codes of equipment within a division.

<sup>5</sup> In its response to the September 2010 audit, the Department set the minimum use rate at 15%. Since then, the Department raised the minimum use rate to 20%.

## AUDIT FINDINGS AND RESPONSES

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The Department did not identify and take corrective action on idle and seldom used equipment in 2012 because the policies and procedures it developed do not clearly identify when this review process should take place. Additionally, management stated there was miscommunication about this process after an August 2012 restructuring and subsequent changes in the Department's administration following the November 2012 election.

After discovering the oversight, the Department decided to postpone the annual justification process until the second phase of an East Carolina University (ECU) equipment use study was complete.<sup>6</sup> At that time, management intends to use recommendations for minimum use to evaluate underused equipment for the 12 months ending December 31, 2012. Recommendations and justification about specific equipment are due by June 1, 2013.

The Department did provide monthly reports of equipment utilization to each of the 14 divisions. However, based on discussions with management, this is an informal monitoring of equipment in which no action is required on the part of Fleet Managers to address equipment not meeting minimum use rates.

The Department stated that it took corrective action on underused or idle heavy equipment in 2010 and 2011, however this period is outside the period selected for this audit. As a result, this audit offers no conclusion on the effectiveness of those procedures.

### **Corrective Action Plan Partially Implemented**

The Department partially implemented the State Auditor's recommendation to establish and periodically adjust usage rates that would justify the cost associated with continued ownership.

In September 2010, DOT set a benchmark that all classes of equipment should be used at least 50% of the available time.<sup>7</sup> However, the Department did not adjust the target at the conclusion of the ECU study as stated in its response to the prior audit.

The Department did not adjust utilization benchmarks for the six classes of heavy equipment as recommended in the October 2010 ECU study because it expanded the study to include utilization recommendations for all equipment classes. The Department postponed implementing specific performance measures until after the second phase of the ECU study is completed in April 2013. The ECU study's project manager stated the Department's decision to delay adjustment of the utilization benchmarks for the six classes of equipment reduces the possibility of significant revisions later when benchmarks are set for all classes of equipment.

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<sup>6</sup> In July 2009, DOT contracted with East Carolina University to analyze heavy equipment use and assist the Department in determining minimum use standards for six major classes of heavy equipment. At the conclusion of the first study, DOT continued the research project with East Carolina University to expand the project to develop the recommendations across all equipment class codes. Project completion is expected in April 2013.

<sup>7</sup> Yearly available time begins with 1,974 hours (40 hours per week less holidays) and is further reduced by the amount of maintenance performed on a piece of equipment. Utilization rates were calculated by dividing hours of actual use by available time. Equipment use during emergency conditions (nights and weekends) is included in the actual use, but does not increase the total available time.

## AUDIT FINDINGS AND RESPONSES

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### **Corrective Actions Implemented**

The Department implemented the State Auditor's recommendation to develop written policies and procedures directing managers to identify and report underused equipment. The Department also implemented the recommendation to develop procedures that instruct managers on what corrective action to take when underused equipment is detected.

In May 2011, the DOT Fleet Management Manual was revised in to include *Section 4 - Equipment Complement, Shop Equipment and Utilization Policies*. Included in this section are policies over collecting, reporting, and monitoring equipment utilization data "to assure efficient utilization of Division of Highways' equipment assets." However, as noted above, this policy could be further enhanced by specifying the time frame for conducting this analysis.

The Department also implemented the State Auditor's recommendation to continue its efforts to obtain the Association of Equipment Manager Professionals (AEMP) fleet manager certification for all equipment superintendents. The Department established a Fleet Management training curriculum through the Equipment Management Technical Service Program and Ferris State University. The first training session was held February 2013 and was attended by 16 Department fleet managers and superintendents. Equipment managers completing this curriculum will be eligible to take the AEMP exam to earn certification as Certified Equipment Managers.

This certification signifies advanced experience and knowledge in all areas of fleet management. Having managers trained in efficient fleet management practices is a major step in maintaining an efficient fleet.

### **Recommendations**

The Department should identify and dispose of underused equipment. Classes of equipment that are used less than defined minimum use standards should be analyzed, by location, to identify the number of pieces that should be sold or transferred to other locations that need that type of equipment. Similarly, individual pieces of equipment that are routinely identified as idle or underutilized should be sold or transferred. Reasons for keeping underused equipment should be documented and approved by central managers.

The Department should identify specific due dates and time frames for procedures performed during the annual identification and reporting of underused and idle equipment. The Department should include the due dates in Section 4 of the DOT Fleet Management Manual.

The Department should develop policies and procedures to periodically review and adjust performance measures for heavy equipment usage rates to increase efficiency and achieve departmental goals.

## AUDIT FINDINGS AND RESPONSES

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### Agency Response

NCDOT appreciates your review and recommendations and agrees that the department should continue to evaluate underused equipment needs to be assessed and disposed of when appropriate. To address the audit recommendations, the following information is offered.

- The department is pleased to report that the review of equipment utilized less than 20% is complete for calendar year 2012.
- The department will continue to conduct auctions to dispose of aged and underutilized equipment. Four auctions were conducted during fiscal year 2012 in which 830 pieces of equipment were sold for a total of \$4,691,350. In addition to the auctions, 437 items were sold through sealed bid.
- The department will continue to evaluate utilization and equipment needs and transfer equipment as appropriate. For fiscal year 2012, there were 2,877 equipment transfers between user departments.
- The department will continue to provide monthly utilization reports for all equipment class codes to division engineers, maintenance engineers, and equipment managers.
- The department will provide division engineers, maintenance engineers, and equipment managers a report indicating equipment utilized less than 20% biannually. A mid-year report will be provided in July based on the previous 12 month period and an end-of-year report will be provided in January based on the previous 12 months.
- The annual certification will be completed by June 1<sup>st</sup> of each year.
- The department will update Section 4 of the DOT Fleet Management Manual to reflect specific time frames and periodic reviews.
- The department will continue to implement the results of the ECU/UNCC research project and develop utilization, fleet right-sizing and efficiency goals based on equipment modeling capabilities.

### 2. **INACCURATE DATA IS USED FOR MAKING MANAGEMENT DECISIONS**

The heavy equipment use rates reported in the Department's fleet maintenance system are not accurate. Specifically, information used to determine the number of hours equipment is available, as well as the number of hours equipment is in use, are not accurately reported in the system. Equipment available hours and use hours are used to determine equipment utilization rates. If these hours are not accurate, then the calculated utilization rate cannot be accurate.

A review of the June 30, 2012, year-end utilization reports noted above showed there were 140 (6.83%) pieces of equipment with utilization rates above 100%. In other words, the Department reported that these 140 pieces of equipment were used more hours than they could have possibly been used. For example:

- 10 pieces of equipment were reported as unavailable for use for the entire year. However, they were reported as being used for as many as 1,100 hours (110,000% utilization);

## AUDIT FINDINGS AND RESPONSES

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- 2 pieces of equipment were reported as being available for 48 and 43 hours. However, reports indicate the equipment was used 1,157 (2,410% utilization) and 585 hours (1,360% utilization), respectively.

In all, these 140 pieces of heavy equipment were reported as having 252,401 rental hours during the audit period but being available for only 215,484 hours to use (117% utilization).

The Government Accountability Office states that management should ensure that management and financial information is reliable and properly reported.<sup>8</sup>

The heavy equipment utilization rates are inaccurate because utilization data is not collected in a consistent manner. For example, Department management noted that fleet maintenance data entry staff do not properly record when equipment is available for use. Data entry staff do not consistently close maintenance work orders in the system after equipment had been in the shop for repair. When a maintenance work order is open on a piece of equipment, the system considers it unavailable for use. As a result, available hours were erroneously reduced, resulting in an overstatement of utilization rates.

A study of heavy equipment utilization conducted by ECU<sup>9</sup> also identified inconsistencies in how rent hours for assets are being recorded in the system. For example, it is normal for some asset types to be on a job site for an eight-hour day, although it would only be operated for two hours. The study noted some fleet maintenance staff would record the asset as being used eight hours, while other staff would record the asset as being used for two hours.

The report goes on to state “data entry procedures related to equipment operation and utilization were not consistent for the four year time period of our study data...it is important that clear manuals and appropriate training and auditing are emphasized.”

Because utilization rates are not accurate, the Department does not have reliable information to use when making management decisions regarding equipment fleet management. As a result, the Department could retain equipment that should be disposed of, or conversely, dispose of equipment that it should have kept.

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<sup>8</sup> “Government Auditing Standards.” December 2011 Version. United State Government Accountability Office by the Comptroller General of the United States. Section A1.08(d).

<sup>9</sup> “Research Project 2010-04, Fleet Management Criteria: Disposal Points and Utilization Rates.” October 1, 2010. East Carolina University, Engineering.

## AUDIT FINDINGS AND RESPONSES

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### **Recommendations**

The Department should document clear procedures to ensure that rent hours are being recorded properly and consistently for assets in use and that staff properly records when equipment is available for use.

The Department should require fleet maintenance staff to attend training to ensure an adequate understanding of the importance of equipment utilization monitoring and the proper and consistent method to record equipment use.

The Department should implement a system of checks and balances that formally identifies, tracks, and corrects utilization data entry errors on a timely basis.

### **Agency Response**

NCDOT appreciates your review and audit recommendations and agrees that data integrity is a key component of any fleet management system. To address the issue of data integrity, the department has implemented the following measures.

- In accordance with the September 2010 Heavy Equipment Fleet Management Audit, NCDOT updated the Fleet and Material Management Manual in 2011.
- The manual specifically references policies for rental hour capture and was implemented to more accurately report actual use of equipment rent for tracking of utilization and more accurately track actual use and downtime.
- The department has developed training to address work order and reporting inaccuracies. In February 2012, the Fleet and Material Management Unit Training Section deployed course STT-550, entitled "VERTS Order Training". This course covers work order create, display, and change functionality and the role of work order confirmation in data integrity.
- The department has developed reports as a measure of checks and balances to address data integrity. In 2011 two reports entitled "Open Order Analysis" and "Active Orders with no Confirmations" were designed to allow the review of work orders and equipment utilization timing based on report status.
- The department has included utilization for review on the Internal Management Dashboard available at NCDOT Workplace.
- The department will continue to train fleet and user department employees on proper rent hour reporting.
- The department will continue to review existing reports that identify data inconsistencies and address directly with user departments through awareness and/or additional training.



## ORDERING INFORMATION

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Copies of this report may be obtained by contacting the:

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This audit required 812 audit hours at an approximate cost of \$58,464. The cost represents 0.04% of the \$146,000,000 purchase price of the heavy equipment reviewed in this audit.