



*Office of the Chief Internal Auditor*

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## ***Audit Report***

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*South Carolina Department of  
Transportation  
Road Data Services*

*April 19, 2012*

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**Office of the Chief Internal Auditor  
Audit of SCDOT's Road Data Services**

April 19, 2012

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# ***Transmittal Letter***



**OFFICE OF THE CHIEF INTERNAL AUDITOR**

April 19, 2012

Commission of the South Carolina Department of Transportation

The Honorable Lawrence K. Grooms, Chairman  
South Carolina Senate Transportation Committee

The Honorable Hugh K. Leatherman, Sr., Chairman  
South Carolina Senate Finance Committee

The Honorable Phillip D. Owens, Chairman  
South Carolina House Education and Public Works Committee

The Honorable W. Brian White, Chairman  
South Carolina House Ways and Means Committee

Dear Gentlemen:

The Office of the Chief Internal Auditor has completed our operational audit of SCDOT's Road Data Services as of February 2, 2012. Our objective was to ensure that the pavement and traffic count data is collected and administered in the most timely, efficient, and cost-effective manner and adequately supports ACT 114 and SCDOT Engineering Directive No. 50, and is in compliance with FHWA, AASHTO, and departmental guidelines and procedures. In accordance with Section 57-1-360, we are transmitting to you this report on our audit.

We conducted this audit in accordance with generally accepted governmental 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.

Please don't hesitate to contact us if you have any questions or comments.

Respectfully submitted,

Robert W. Wilkes, Jr., CPA  
Chief Internal Auditor

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## *Executive Summary*

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## **EXECUTIVE SUMMARY**

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The Road Data Services Department (RDS) within the Traffic Engineering Division of the South Carolina Department of Transportation (SCDOT) encompasses Pavement Management and GIS Collection and Inventory. These sections are responsible for the collection, processing, analyzing, and reporting of pavement condition and traffic counts for approximately 42,000 miles of Interstate, NHS (National Highway System), Primary and Secondary roads within the state of South Carolina.

An Amendment to Section 1-30-10 South Carolina Code of Laws, generally referred to as ACT 114, and SCDOT Engineering Directive Memorandum Number 50, promulgated regulations for the ranking process for non-interstate road resurfacing. Criteria for this ranking process is comprised of pavement condition collected by Pavement Management and traffic counts collected by GIS Collection and Inventory. In addition, Federal Highway Administration dictates annual reporting under the Highway Performance Monitoring System (HPMS) of traffic counts and pavement condition. The American Association of State Highway and Transportation Officials (AASHTO) provide guidance for the performance of pavement management through the Pavement Management Guide, Revised 2001.

Pavement Management utilizes a semi-automated methodology of data collection that requires a considerable investment in equipment, referred to as profilers, and trained personnel, engineers and raters. Observed pavement conditions and sophisticated technology in computer-assisted programs combined with the data recorded by the profiler lasers produce a representation of the pavement condition in the form of various objective measurements or indices. The important measurements of condition (PQI-Pavement Quality Index, PSI- Pavement Serviceability Index and PDI- Pavement Distress Index) are calibrated on a scale of overall road condition: Very Poor to Very Good 5-tier rating system. In 2011, 20% of the Interstate system, 44% of the Primary system, and 49% of the Secondary system are rated in Very Poor to Poor condition. The older the collected data, the more likely the actual pavement condition is worse than the models indicate.

Road Data Services is organizationally independent of the Maintenance and Construction Divisions of SCDOT, which provides for a self-managed and objective data collection/reporting function without outside influence. As “data brokers”, the function is to provide timely, accurate and reliable data for use by others in the decision making process and in compliance with required reporting. The type, format, and timeliness of the data, other than as required under HPMS, should be determined by the users with supporting justification. RDS should be provided the resources necessary to collect and report such data within a pavement management and highway management framework.

The Office of the Chief Internal Auditor (OICA) reviewed the collection process to determine that data is collected in a timely, controlled, and cost-effective manner in accordance with applicable FHWA, AASHTO and internal guidelines and procedures. We conducted this audit in accordance with Generally Accepted Government Auditing Standards including, but not limited to, the review of regulations and guidelines, internal policies, procedures and controls, cost analysis, and surveys of Departments of Transportation of neighboring states in order to provide a reasonable basis for our opinions.

# ***Audit Findings and Recommendations***

## **AUDIT FINDINGS AND RECOMMENDATIONS**

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### **HPMS AND AASHTO COMPLIANCE**

#### **Finding 1:**

Although organized and functioning within AASHTO guidelines, Road Data Services did not have a copy of the revised (2001) AASHTO Pavement Management Guide on file for reference and guidance.

#### **Recommendation 1:**

We recommend that Road Data Services obtain and review the revised AASHTO Pavement Management Guide in order to comply with the guidelines and to reference issues as needed. The OICA acquired and provided a copy of these guidelines to management of Road Data Services for reference.

#### **Finding 2:**

Currently Pavement Management is not in compliance with FHWA Highway Performance Monitoring System (HPMS) Reassessment 2010 which requires the collection and reporting annually on a universe basis of the International Roughness Index (IRI) for the National Highway System (NHS) network. During 2010 we collected only 50% of the required miles for reporting, with the remaining scheduled for 2011.

#### **Recommendation 2:**

We recommend that necessary action be taken to achieve full compliance with HPMS reporting and that the IRI data for the NHS be collected and reported annually.

### **EFFICIENCY AND EFFECTIVENESS**

#### **Finding 3:**

Personnel within RDS are being held to a strict nine (9) or nine and a half (9.5) hour daily work schedule. This is effectively reducing the workday to two to three (2-3) hours on those days in which travel to the pavement segment is required. This procedure not only requires additional hours to complete the task, but also adds to operating and maintenance costs of profilers-vans and increases our liability for significant additional miles in travelling to and from the site. These are exempt employees who, with management approval, should be able to effectively manage their work schedules to get the tasks completed in the most efficient manner.

#### **Recommendation 3:**

We recommend that daily work schedules be reviewed with Human Resources and be adjusted in order to allow for the additional hours required for the efficient and effective collection of pavement data. SCEIS should be effective in reporting of daily work schedules. Consideration should be given to allow for overnight travel in those instances warranted. This is especially significant with the current reduced staffing levels.

**Finding 4:**

The current staffing levels are not adequate to allow for the completion of outlined collection schedules and additional necessary re-evaluations, reporting, or special work which may be required. There have been long-term staffing deficiencies. We currently have more profilers (eight collection vans) than raters on staff, thus grounding equipment that has required significant investment.

While Pavement Management has met the objective of annual collection of the Interstate miles, it is not in compliance with the schedule for Primary nor Secondary collections. SCDOT continues to fall farther behind on the completion of the Primary and Secondary routes by county, which are scheduled on a three-year cycle. The universally accepted principle of pavement management is that the more current the data, the better the decision model.

**Recommendation 4:**

We recommend that necessary action should be taken to achieve compliance with the collection schedule for Interstate, Primary and Secondary routes as required. This may involve an evaluation of the current schedules and objectives so that available resources ensure compliance.

**Finding 5:**

Specially requested evaluations of pavement data, referred to as “re-do’s” originate primarily within the Maintenance Division or District Offices. These “re-do’s” are requested on pavement segments in which the data reflected is being questioned or newer data reflecting current conditions is needed. These requests are top priority items within Pavement Management and require considerable resources for the results achieved. Due to the timeliness and perceived importance, they are handled by the most experienced rating staff from Headquarters. These requests are submitted by email by various personnel at various times and are not screened or approved in any manner. The current process is quite inefficient and ineffective due to this method of submission and selection and the considerable resources required for what could be a very small segment of pavement data. We were informed that discussions with Maintenance regarding a new procedure are already in progress.

**Recommendation 5:**

We recommend the current procedure for “re-do’s” be evaluated with applicable personnel from Maintenance with a goal of making this process more efficient and effective. “Re-do” requests should funnel thru Maintenance for approval and prioritization to allow Pavement Management to utilize limited resources to complete these requests in an efficient and effective manner.

**Finding 6:**

In addition to the current staffing levels and equipment issues, Pavement Management is facing the loss of significant expertise in the very near future. This is a specialized area which utilizes highly technical equipment and computer software and requires experience in order to be functional and beneficial to SCDOT.

As evidenced by surveys of DOT in neighboring states, technology is ever-changing and additional resources are available in order to accomplish the objectives. Long-range planning is necessary to provide the required resources in the short term as well as the long term. This involves staffing and training, succession plans for management, evaluations of new technology, equipment, vendors, and software.

### **Recommendation 6:**

We recommend the development of a Capital Management Plan within Pavement Management of Road Data Services. This plan would involve the development of detailed staffing plans, training requirements, management succession planning, equipment retirements and purchasing schedules. This should encompass current staff and equipment, as well as planning for future retirements and other replacement of staff and equipment. The Division of Human Resources has offered assistance in the development and execution of such plan which should support future mission or objectives of Pavement Management and should be completed in conjunction with the agency FTE evaluation and manpower requirements. Consideration should be given to the use of private contractors for data collection activities in some areas of Pavement Management.

## **POLICY AND PROCEDURES**

### **Finding 7:**

While Pavement Management does have quite voluminous policies, procedures, and other documentation concerning the technology and methodology employed, they are not organized in a comprehensive manner. Current procedures and documentation consist of various files, forms, screen shots, report examples, etc. which could be better organized.

### **Recommendation 7:**

We recommend that the current operating documentation be organized into a comprehensive policy and procedure manual. This should be accomplished in conjunction with any re-establishment of pavement management mission or objectives. This would provide an invaluable training tool as well as quick reference, especially for field personnel.

## **OBJECTIVES AND GOVERNANCE**

### **Finding 8:**

SCDOT developed a dedicated Pavement Management Office and began collection of pavement condition data in the early 1990's. Based upon our surveys of other states, it would appear that South Carolina was "on the cutting edge" of pavement management not only in methodology, but also in technology. Resources were committed to accomplish the objectives as well as expanding the role to include collection and mapping with images, and enhanced results through new technology and automation.

In our opinion, the Pavement Management Office is at a crossroads, which provides the opportunity to re-evaluate the mission, objectives, technology, resources, and reporting. RDS currently operates eight (8) profilers (technology-equipped collection vans) with each of these vans costing up to \$250,000 per van. However, SCDOT does not employ the staff necessary to complete our annual collection efforts. Existing staff with many years of experience at SCDOT and significant expertise in our methodology and technology are fast approaching retirement without replacement plans in place for continuity of operations. Our surveys of pavement management within DOT's of neighboring states revealed evolving technology, more dependence on private contractors for collection activities and a shared level of frustration in "having to do more with less". Most states are struggling to accomplish the mission in light of budget cuts, personnel issues, new reporting requirements, and ever evolving technology.

**Recommendation 8:**

We recommend the creation or re-establishment of a Pavement Management Group, comprised of key personnel of Engineering, including Construction, Maintenance, Traffic Engineering and Materials and Research. This group should evaluate and aid in the establishment of mission and objectives of pavement management and recommend as to what data to collect, collection schedules, the methodology and technology to be utilized, necessary reporting and reporting formats. This should be accomplished within the framework of HPMS requirements, AASHTO guidelines, and agency directives.

We recommend that RDS and pavement management organizationally remain an entity within Traffic Engineering, to ensure objective and independent collection and reporting of pavement data. The Capital Management Plan as per Recommendation Number Six (#6) would be implemented in support of the mission and objectives developed.

## ***Department Response***

**MEMORANDUM**

**TO:** Robin Wilkes, Chief Internal Officer  
**FROM:** J. C. Watson, Chief Engineer for Operations *JCW*  
**DATE:** April 5, 2012  
**SUBJECT:** Pavement Management Office Audit

We are pleased to have the opportunity to review and comment on the Pavement Management Office (PMO). When the OCIA asked for management input on the 2010 Enterprise Risk Assessment, we recognized this would be an important area of review since our pavement management data is such an integral part of the project ranking process.

Some of the concerns management had regarding the PMO was whether we were following FHWA and AASHTO guidance, does the unit reside in the appropriate location of the agency, and are the resources and technology appropriate, or is there a different approach that should be considered. The audit will assist us in implementing changes we have been considering regarding the PMO. The following is our response to the audit findings:



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Comments to Pavement Management Office Audit:

**To Finding #1:** While a copy of the AASHTO Pavement Management Guide was not readily available during the audit, the PMO was established based on The AASHTO Pavement Management protocols contained in the AASHTO Pavement Management Guide (revised) as well as other guidance and they are incorporated into the operations. Pavement rating, pavement life models, profiler concepts and so forth that are part of Pavement Management at the SCDOT parallel the AASHTO Guide as well as the Strategic Highway Research Program (SHRP) Manual.

**To Finding #2:** We concur that we have not met the annual report due to staff vacancies. Whenever pavement management data is not current, the system provides projections to key index values as well as IRI. With the limited staffing, we have prioritized our workload to collect data on the interstate system every year. As noted earlier, we have been delaying changes to the office until this report came out. We will now be in a better position to evaluate manpower and outsourcing options to improve productivity (See response to finding #4).

**To Finding #3:** We will consider the recommendation of daily work schedules during our evaluation of the office. Overnight travel will be weighed against the cost to the agency and the operating budget.

**To Finding #4:** When the audit began in July of 2011, there were significant shortfalls with staffing levels. However, as the hiring restrictions have been relaxed, staffing is approaching a full complement of raters/operators. In the past, we had retained several profilers that were scheduled to be turned-in. This action was based on a potential to bring additional FTE slots into the PMO. With the on-going Manpower Taskforce review, we have identified that this option of additional slots will not be viable and are evaluating methods of out-sourcing data collection in order to meet established goals.

**To Finding #5:** We concur. When PMO began to rerun highway segments on demand, The Director of Maintenance office agreed to be the clearing point for these requests. At some point, PMO began to carry out re-evaluations and then send them on to the requestor and copy Director of Maintenance office at that point. Certainly, Pavement Management would benefit by re-establishing the Director of Maintenance office clearing point idea for all requests regardless of origin.

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**To Finding #6:** We concur and these activities will be considered within the framework of the manpower management study underway.

**To Finding #7:** We concur. PMO has voluminous policies and procedures. A comprehensive training manual does exist and is utilized by the PM office. This was provided on CD saved as "Final Manual". Note that other files, Appendixes A, B, C, D and "Edge Cracking" should be consulted in conjunction with the manual. A shortened version of this manual was written for reference in the field. Currently (in-house) PMO is:

1. Developing SOP's for processing, quality control, loading, and images for the new WIN Report Processing System.
2. Standardized document for WIN Report software settings for old profiler and new profiler processing.
3. New quality control standardized blue print for all engineers to process / load / quality control MDR distress and roughness data.

However an established "warehouse" for guidelines and training would be a benefit to the office.

**To Finding #8:** We concur. As noted earlier, we are currently evaluating the potential of outsourcing data collection activities. With this approach, we will involve our internal DOT customers to ensure the level of confidence in the overall effort.

JCW:mbw

ec: Robert J. St. Onge, Jr., Secretary of Transportation  
John V. Walsh, Deputy Secretary for Engineering  
Wendy Nicholas, Chief of Staff  
Tony S. Sheppard, Director of Traffic Engineering

File: DSE/JCW