



# OFFICE OF MANAGEMENT & BUDGET

## *Office of Internal Audit*

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June 05, 2024

Mr. Peter Alviti  
Director  
Rhode Island Department of Transportation  
Two Capitol Hill  
Providence, RI 02908

Dear Director Alviti,

The Office of Internal Audit (OIA) has completed its audit of the Rhode Island Department of Transportation (RIDOT) Pavement Preservation Program. The audit was conducted by the authority given to the unit as stated in accordance with the Rhode Island General Laws (RIGL) §35-7.1-1.

The findings and recommendations included herein have been discussed with members of management, and we considered their response to the audit findings and recommendations in the preparation of this report. OIA may follow up regarding recommendations included in this report within one year following the date of issuance.

We would like to express our sincere appreciation to the RIDOT staff for the cooperation and courtesy extended to the members of our team during this audit.

Respectfully yours,

Andrew Manca  
Chief

cc: Internal Audit Advisory Group  
Representative Marvin Abney, Chairman, House Committee on Finance  
Senator Louis P. DiPalma, Chairman, Senate Committee on Finance  
Steve Whitney, Senate Fiscal Advisor  
Sharon Reynolds Ferland, House Fiscal Advisor

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## Introduction

The Office of Internal Audit (OIA) reviewed the Rhode Island Department of Transportation (RIDOT) Pavement Preservation Program. The goal of a pavement preservation program is to provide a more cost-effective approach to extending the overall service life and improving the safety of the transportation infrastructure by addressing road deterioration and other issues before they escalate and more extensive repairs are required, such as road rehabilitation or replacement. According to a report<sup>1</sup> released in 2022, Rhode Island ranked the highest for poor pavement conditions in the nation, with 15.1% of the pavements in poor condition.

## Background

RIDOT aims to maintain and provide a safe and efficient transportation network. A key component of this is ensuring that the pavements on state roads are properly managed and maintained. This typically involves routine inspections and the application of preventative treatments to protect and enhance the durability of roadways.

Pavement preservation extends the service life of roadways by making a pavement surface less permeable to reduce water penetration through cracks, which weakens the foundation and deteriorates the pavement. There are a variety of pavement treatments that can be utilized depending on the needs of the roadway and the availability of funds. Current treatments utilized by RIDOT include crack sealing, asphalt rubber chip seals, and thin overlays. These pavement preservation techniques can extend the service life of a road up to ten years, depending on the treatment.

### *Pavement Preservation Contracts*

The pavement preservation projects are derived from the State Transportation Improvement Program (STIP) and are based on strategic asset management. The STIP is a ten-year, intermodal program that outlines the transportation projects the state intends to implement using U.S. Department of Transportation funds. For RIDOT to allocate federal funding to the pavement preservation program, it must be included in the STIP.

RIDOT creates three contracts annually, one for each of the three pavement preservation treatments they utilize. There were nine contracts awarded to RIDOT contractors totaling \$20M during the three-year audit period.

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<sup>1</sup> United States Government Accountability Office (GOA). *GAO-22-104578, National Highways: Analysis of Available Data Could Better Ensure Equitable Pavement Condition*. <https://www.gao.gov/assets/gao-22-104578.pdf>

| Federal Fiscal Year | Budget per the STIP | Number of Contracts Opened | Sum of Original Contracts | Sum of Change Orders | Sum of Current Contract Amounts | Budgeted Amount Used |
|---------------------|---------------------|----------------------------|---------------------------|----------------------|---------------------------------|----------------------|
| 2021                | \$5.7M              | 3                          | \$3.9M                    | \$0.9M               | \$4.8M                          | 84%                  |
| 2022                | \$10.3M             | 3                          | \$4.8M                    | \$1.1M               | \$5.9M                          | 57%                  |
| 2023                | \$10.5M             | 3                          | \$9.4M                    | \$(0.1M)             | \$9.3M                          | 89%                  |
| <b>Totals</b>       | <b>\$26.5M</b>      | <b>9</b>                   | <b>\$18.1M</b>            | <b>\$1.9M</b>        | <b>\$20M</b>                    | <b>75%</b>           |

*Pavement Preservation Payments*

RIDOT paid 75 invoices for pavement preservation contracts during the audit period. The total dollar value of the invoice population is \$14,382,879.

| Federal Fiscal Year | Number of Invoices | Payments            |
|---------------------|--------------------|---------------------|
| 2021                | 29                 | \$3,250,578         |
| 2022                | 19                 | \$5,217,673         |
| 2023                | 27                 | \$5,914,628         |
| <b>Total</b>        | <b>75</b>          | <b>\$14,382,879</b> |

*Pavement Data Management System*

RIDOT utilizes the Deighton Total Infrastructure Management System (dTIMS) to manage the state’s pavement infrastructure. The dTIMS system is a strategic asset management software that is designed to measure asset conditions, make forecasts, quantify investments, and mitigate risks. RIDOT upgraded from the dTIMS 9.5 software to dTIMS BA at the beginning of 2024 to improve the capabilities of the pavement management system to assist in the selection and formulation of projects. RIDOT tracks an asset inventory of 1,322 miles of pavements (3,055 lane miles<sup>2</sup>) by a 0.1 mile basis in dTIMS. The system is used by RIDOT to track and report pavement distress data on a year-to-year basis as required by 23 CFR 490.

**Objective and Scope**

This engagement is a detailed review of the processes connected to RIDOT's Pavement Preservation Program. Objectives of this audit were to determine if:

- The pavement preservation strategies, processes, and procedures in place align with best practices and comply with applicable laws, rules, and regulations.
- Source documents support and validate costs incurred using pavement preservation funding.

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<sup>2</sup>A lane mile is the total length of a single lane of road in miles. For example, a bidirectional roadway with single lane traffic in either direction spanning 1 mile would be equal to 2 lane miles.

- The pavement data management system is effectively utilized to assist in pavement preservation efforts.
- Pavement records are accurate, complete, and up to date.

The scope of this audit is the Pavement Preservation Program operation for federal fiscal years 2021 through 2023; from October 1st, 2020, through September 30th, 2023.

## Methodology

As part of the audit work, the OIA gained an understanding of the operations of the Planning, Financial Management, Project Management, and Construction Divisions at RIDOT related to their Pavement Preservation Program responsibilities. To address the audit objective, we performed the following:

- Researched and assessed compliance with Rhode Island General Laws and federal regulations.
- Researched federal guidelines, and industry best practices, including practices of other US states.
- Interviewed RIDOT personnel.
- Reviewed the RIDOT's policies and procedures, Transportation Asset Management Plan, and STIP.
- Performed testing and analytical procedures on different aspects of the preservation projects including budgeting, invoicing, and the quality assurance testing of materials used in pavement preservation.
- Obtained an understanding of the pavement data management system and analyzed pavement data.

## Findings, Recommendations and Management's Responses

### *Finding: Outdated Traffic Data in Pavement Management System*

Traffic data can help state DOTs forecast pavement deterioration and make informed decisions related to pavement preservation planning. Currently RIDOT does not use traffic data for strategies in pavement preservation efforts. The Annual Average Daily Traffic (AADT)<sup>3</sup> available in the pavement management system has not been updated since 2014. RIDOT does record and track more current traffic data in a separate traffic data management system and uses it for reporting purposes as required by 23 CFR 490.709(c). Outdated traffic data reduces RIDOT's ability to predict pavement deterioration as well as their ability to make informed decisions.

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<sup>3</sup> Annual Average Daily Traffic measures the total number of vehicles on a segment of road or highway over a year divided by 365 days.

*Recommendation:*

Create a process for regularly updating traffic data in the pavement management system to enable RIDOT staff to use it to make more informed decisions regarding pavement preservation activities.

*Management's Response:* The Pavement Preservation program has recently undergone an organizational restructure for the benefit of the program. Management will review the current process and make any changes needed so that the information is current. Processes and procedures will be updated as needed.

*Responsible Party:* Lori Fisette, Manager of Project Management, RIDOT

*Anticipated Completion Date:* 12/31/2024

***Finding: Incorrect & Missing Pavement Data***

Pavement data recorded in dTIMS is used by RIDOT for the planning and selection of pavement preservation projects. The OIA analyzed the complete set of pavement data tables provided for the audit period to determine if there was any missing or incorrect information and found the following.

- 46.0 miles of pavements had no record of the last date of resurfacing.
- 1.2 lane miles of pavements did not get surveyed due to routing errors.
- 0.8 lane miles of pavement records were improperly allocated to other pavements.
- 1.1 lane miles of pavements were extra records that are not a part of RIDOT's pavement assets.

Incorrect or missing pavement asset data could lead to less effective pavement preservation strategies and result in increased costs of maintaining pavements to the state.

*Recommendations:*

1. Review and update the current data sets to reflect actual pavement assets.
2. Correct the pavement data collection routes to be used for future pavement assessments.
3. Implement a process to ensure pavement data collected by the contracted vendors is complete and accurate.

*Management's Response:* Management will review the current process and make any changes needed so that the information is current. Processes and procedures will be updated as needed. For planning and selection of pavement preservation projects, dTIMS is only the first step in the process not the sole determining factor.

*Responsible Party:* Lori Fisette, Manager of Project Management, RIDOT

*Anticipated Completion Date:* 12/31/2024

***Finding: Limited Pavement Data Tracking by RIDOT***

A robust pavement management system includes many kinds of pavement attributes other than pavement distress data. RIDOT does not track skid resistance, load capacity, pavement type or service life expectancy of the pavements in their pavement management system. Their system, dTIMS BA, is capable of creating additional attributes to pavement data. Tracking additional pavement attribute data would enable RIDOT to make more informed decisions regarding pavement preservation activities, improving RIDOT's ability to establish effective performance targets and forward planning for pavement preservation projects.

***Recommendation:***

Expand the pavement data RIDOT tracks in the pavement management system to include data such as skid resistance, load capacity, pavement type or service life expectancy.

***Management's Response:*** RIDOT uses pavement condition elements to determine its pavement index and this process is consistent with Federal Highway performance reporting requirements. Management will review the current process and make any changes needed so that the information is current. Processes and procedures will be updated as needed.

***Responsible Party:*** Lori Fisette, Manager of Project Management, RIDOT

***Anticipated Completion Date:*** 12/31/2024

***Finding: Lack of Audit Trail in Pavement Management System***

Data audit trails are valuable for ensuring the integrity and accountability of databases. Currently, dTIMS BA has the capability to track the date of last modification of pavement data and who last modified it, but it is not being utilized. The method by which RIDOT updates pavement condition data, by copying the new data tables over the old ones, does not record the date of last data modification. Without a functioning system to track and manage changes, data is not protected against improper maintenance, modification, or alteration.

***Recommendation:***

Implement new methods for importing data and tracking changes in dTIMS that allows for utilization of the system to track data modification.

***Management's Response:*** The Pavement Preservation program has recently undergone an organizational restructure for the benefit of the program. Management will review the current process and implement new methods that will allow improvements to areas of the system that have been previously overwritten.

***Responsible Party:*** Lori Fisette, Manager of Project Management, RIDOT

***Anticipated Completion Date:*** 12/31/2024

### ***Finding: No Training Received in the Field of Pavement Preservation***

Although there is no federal requirement for training specific to pavement preservation processes or techniques, one of the strategies identified by FHWA<sup>4</sup> to achieve its primary objective for the program is to increase fundamental understanding of pavement preservation by facilitating education and training. RIDOT staff did not receive training specific to pavement preservation during the period reviewed. Due to reorganization within the department at the beginning of 2024, staff with no prior training or experience in pavement preservation are currently responsible for the program. Without specialized pavement preservation training, the primary objectives of the program, to help states improve and extend the service life of pavements, may not be achieved.

#### ***Recommendation:***

Establish a training program specific to pavement preservation for the staff responsible for the program.

***Management's Response:*** The Pavement Preservation program has recently undergone an organizational restructure for the benefit of the program. This restructuring allows RIDOT to utilize the engineering expertise and decades of experience executing pavement projects within the group of members that make up the Pavement Committee. These representatives include members from Project Management, Construction Management, and Materials Management. Several members of this committee are registered professional engineers as well as members of national committees, such as AASHTO.

***Responsible Party:*** Lori Fiset, Manager of Project Management, RIDOT

***Anticipated Completion Date:*** This Pavement Committee was implemented in 2023.

### ***Finding: No Tracking of Impacts of Declared Emergencies on Pavement Assets***

The 2022 Transportation Asset Management Plan risk analysis of vulnerable assets includes details of bridges impacted by declared emergencies in Rhode Island from 1997 to 2022 resulting from evaluations required by 23 CFR 667. However, RIDOT was unable to provide a list of pavements impacted by emergency events nor documentation of their process for tracking them. The risk of pavement deterioration is increasing as Rhode Island has experienced more extreme weather in recent years, resulting in declared emergencies in 2023 and 2024 from flooding and excess water on roads from overwhelmed storm drains. Lack of information regarding road damage caused by emergencies will lead to inefficiencies in planning and selection of pavements for preservation and managing other types of pavement projects.

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<sup>4</sup> Federal Highway Administration. *FHWA Pavement Preservation Strategic Plan 2020*.  
[https://www.fhwa.dot.gov/preservation/pdfs/hif\\_pvmnt\\_prsvr\\_strategic\\_plan\\_12\\_10\\_2020.pdf](https://www.fhwa.dot.gov/preservation/pdfs/hif_pvmnt_prsvr_strategic_plan_12_10_2020.pdf)



*Recommendation:*

Track the impacts on pavement conditions caused by damage from extreme weather and emergency events.

*Management's Response:* The tracking of emergency events on pavement assets is not a pavement preservation activity. The response to these events is led by the Materials or Maintenance section depending on the severity of the event. Once either group evaluates the pavement asset, a recommendation to the Pavement Committee is reviewed. If any immediate action is necessary, the work will be prioritized as part of the Transportation Improvement Plan.

*Responsible Party:* Lori Fiset, Manager of Project Management, RIDOT

*Anticipated Completion Date:* Ongoing