

# Ranking of Pavement Preservation Practices and Methods

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## Introduction

The cost for maintaining and upgrading South Carolina's Department of Transportation (SCDOT) roadway system is costly, and deferring the timely maintenance of the infrastructure results in proportionately greater rehabilitation costs at a later date, while contributing to congestion and accident rates. In addition, deficient pavement conditions are the cause of the majority of the tort claims received by SCDOT, costing the DOT thousands of dollars each year that could be expended on maintenance and rehabilitation.

The most effective method for maintaining pavement serviceability is to implement a pavement preservation program, which is a planned system of pavement surface treatments designed to extend the life of a pavement using the fewest resources (money, materials, energy, and time). To sum up the objective of a pavement preservation program, it is deciding on *"the right treatment on the right pavement at the right time."* Pavement preservation techniques provide the opportunity for state departments of transportation to use their budgets efficiently to keep the greatest number of roadways at an acceptable condition.

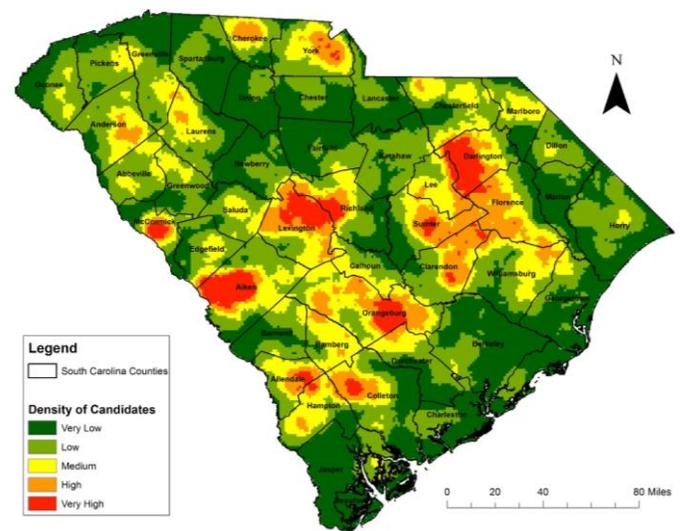
The primary objective of this study was to identify methods to improve the implementation of pavement preservation strategies on asphalt concrete roadways in South Carolina with specific attention to pavements in the Non-Federal Aid Secondary system.

## Conclusions

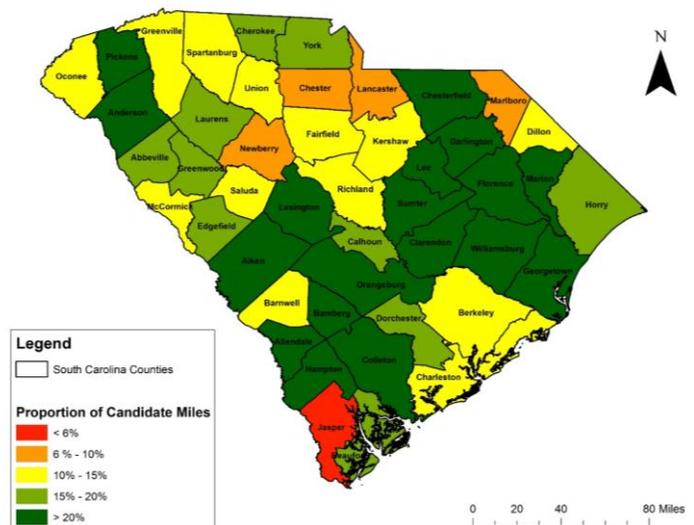
Currently, the South Carolina Department of Transportation does not have a pavement preservation component that is part of their Integrated Transportation Management System (ITMS) that is used to maintain comprehensive network information. From surveying those involved in pavement maintenance throughout the state, it became clear that the procedure for implementing pavement preservation needs to improve. The first step to being able to implement such changes was to assess the current practices by the SCDOT through the survey and investigation of the SCDOT ITMS. Comparing SCDOT current practices to other states with established pavement preservation programs revealed that the distress identification and treatment options in the South Carolina are comparable to other states. After looking at existing pavement software packages, it became clear the SCDOT was lacking in its ability to predict future pavement condition, identify which treatments to implement, and accurately budget for those treatments.

For the SCDOT to have the improved abilities to implement pavement preservation, this research developed a process to identify the candidates for preservation from current SCDOT data. This procedure can be utilized to not

only identify candidates, but through GIS, it can also provide the decision maker with a visual representation of the proximity of candidates within a network which can be useful when developing contracting plans or strategies for pavement preservation. Identifying the candidates can allow the SCDOT to allocate funding to appropriate counties or districts based on the need. It can also help track the overall progress of the pavement preservation program in increasing the number of lane-miles in good condition throughout a network.



Density of pavement preservation candidates (4 out of 5 consecutive 0.1 mile segments having a PQI  $\geq 3.0$ ).



Proportion of total miles of pavement preservation candidates (4 out of 5 consecutive 0.1 mile segments having a PQI  $\geq 3.0$ ).

Treatment selection for pavement preservation is typically the task of Resident Maintenance Engineers (RME) within a district and is frequently based on the experience of the decision maker with particular treatment types. Additionally, some districts have an in-house chip seal program, therefore, chip seals are commonly the treatment of choice in these areas. Another major factor that affects these decisions is available funds. In the survey, many respondents noted that there are not enough funds available to maintain or improve the network they manage. In an effort to address the need to make informed decisions, the research team developed a treatment decision support tool that accounts for life extension, treatment cost, available funds, and the current health of the network in terms of the number of lane-miles considered to be pavement preservation candidates. This tool will enable the decision maker to identify network level strategies that will maximize the available budget while improving the overall network health based on the Remaining Service Life concept.

Post-treatment tracking and evaluation was found to be limited in South Carolina and the performance of most treatments is frequently anecdotal. A likely cause for this gap is the limited resources (equipment, personnel, and funds) available to maintain such a large inventory of pavements, especially in the secondary roadway system. To address this, the research identified a simplified procedure to monitor the condition of select roadways within a local network (e.g., county level).

The SCDOT maintains data related to all pavements that can lay the groundwork for supporting a pavement preservation treatment tracking system, however, there is still more data that needs to be included in this record keeping. By adding to the data collected, decision makers will be armed with all of the necessary information to make more data-driven decisions related to pavement preservation.

There is very limited information related to the benefits and costs of pavement preservation treatments in South Carolina. In most cases, the benefit (pavement life extension) of individual treatments is assigned a single value regardless of the condition of the pavement that it is applied to or the location or traffic conditions. While these values are within the typical ranges of preservation treatments experienced by DOTs throughout the US, there should be a more specific range of benefit for South Carolina that accounts for the pre-treatment pavement condition. This limitation was addressed by the research team with the adaptation of a method to quantify the benefit-cost ratio of pavement preservation treatments that accounts for the actual life extension of the pavement based on pavement condition as measured by PQI or some other metric based on distress evaluations at the local level (e.g., PCI).

The practices outlined in this research are designed with the South Carolina Department of Transportation current practices in mind. This system should allow for an efficient use of funds to improve the roadway network health in South Carolina and increase the number of pavement sections in good condition over time.

## **Recommendations**

Based on the results of this research, the following recommendations have been developed to help the SCDOT increase the effectiveness of its pavement preservation program.

1. Include more educational opportunities for decision makers related to pavement preservation to focus on long-term network preservation and planning.
2. Consider implementing the decision support concept based on Remaining Service Life to continuously increase the number of lane-mile-years included in the pavement preservation candidate pool (i.e.,  $PQI \geq 3.0$ ).
3. Document additional information on preservation treatments to adequately track pavement preservation treatments.
4. Implement a more detailed pavement condition evaluation protocol to monitor the actual life extension of pavement preservation treatments. This process should include pre- and post-treatment condition assessment followed by routine evaluations on an annual basis.
5. Consider implementing the system to quantify the benefit-cost ratio of pavement preservation treatments to better understand the effectiveness of different treatments in particular situations.

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