

# Attachment

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2014

The State of the Pavement Report



Director of Maintenance  
SC Department of Transportation

# The State of the Pavement Report

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## **Executive Summary**

South Carolina has the fourth largest highway system in the nation, consisting of approximately 41,414 centerline miles of roadway and a little over 90,530 lane miles. The primary funding source for the state transportation system is the motor fuel user fee, or gas tax. In SC, this fee has remained steady at only 16.8 cents per gallon since 1987. Fortunately, in 2013 the General Assembly redirected additional state general funds to SCDOT. Although this additional funding is helpful, it is still not sufficient to prevent the transportation system from further deterioration.

The aging transportation system coupled with an insufficient funding source intensifies the challenge faced by South Carolina Department of Transportation (SCDOT) to maintain and preserve the transportation infrastructure in a safe and acceptable condition. Further compounding the challenges of managing such a large transportation system is the increasing rate of deterioration. This rate of deterioration is accelerated by rapid population growth in the state. Growth and population data released by the Census Bureau in July of 2012 identified only 9 other states with a larger percent of population growth. Along with that population growth comes an increase in daily vehicle miles traveled (DVMT) and an increase in truck traffic. This increased traffic and aging system are sure to result in an accelerated deterioration of the state's transportation system. Unfortunately without a significantly increased investment, it is unlikely that SCDOT will be able to reverse the current trend and improve the condition of the transportation system.

In an effort to minimize future deterioration, SCDOT allocates funding for an efficient combination of road improvements and preservation. This report is intended to quantify the results and the effort to maintain the roadway system in the best possible condition given the funding limitations.

SCDOT's Pavement Management department collects pavement condition data and calculates a Pavement Quality Index (PQI) to communicate the pavement's condition rating. For this report, this condition rating has been converted to general terms such as "Good", "Fair", and "Poor"; or is expressed in terms of remaining service life (RSL). RSL is an indication of how many years can be expected out of a pavement before it reaches the minimum acceptable operating condition as defined by SCDOT management. In essence, RSL can be used to illustrate the condition of the highway system. Each year, the entire system would deteriorate by one service life year per lane mile of the system. As improvements are made to the system, service life years are added. To maintain a transportation system at its current service level, the same number of service life years need to be added as is lost. For example, in South Carolina, the road system is comprised of approximately 90,530 lane miles. Each year

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90,530 lane mile years of service life are lost. Therefore, 90,530 lane mile years of service life must be added back each year to prevent further deterioration of the system. Unfortunately, with the current level of investment, it is impossible to prevent further deterioration.

The Pavement Management department projects an average need of \$75 million per year to maintain an average level of service (LOS) "B" for interstates. (A LOS "B" correlates to a pavement condition that is qualitatively evaluated and determined to be in a "Good" condition.) For primary and secondary pavement conditions the projection is \$625 million per year of pavement investment to achieve and maintain a LOS of "C". (A LOS "C" correlates to a pavement condition that is qualitatively evaluated and determined to be in a "Fair" condition.) This results in a total need of \$700 million per year. Unfortunately, in fiscal year 2014, only \$264.5 million was invested in primary, secondary, and interstate pavements. As a result of this insufficient investment, there will be a net loss of approximately 56,004 lane mile years of service life for this year's program. The majority of this loss will be in the non-federal aid eligible secondary system. Improvements to this portion of the state's system can only be funded with state funds. In fiscal year 2014, approximately \$58.59 million of pavement improvement and preservation projects were awarded for the non-federal aid eligible secondary roads. Even though 46% of the state maintained lane miles are not eligible for federal aid, a little more than 22.15% of the investment was directed to this part of the system. The additional general fund appropriation discussed earlier in this report should improve this situation in the future, but it is anticipated that more service life will continue to be lost than added.

An alternative way to evaluate this pavement investment is by mileage. Of the \$264.5 million invested in 2014 \$215.02 million was invested in rehab/reconstruction or pavement improvement. This level of investment permitted the improvement of only 4.41% of the lane miles of the state maintained system. At this rate of investment, it will take an average of 23 years to address the entire system. This unfortunately is much longer than the life expectancy of pavement. The additional \$49.5 million was invested in preservation in an effort to maintain the pavements that are in relatively good condition, to extend their useful life and defer the need for an expensive rehabilitation or reconstruction.

The charts and graphs included in this report illustrate the challenges and the efforts to slow the deterioration of the state's pavement system. This report includes work and funding that is directly controlled through the SCDOT and does not include projects funded by County Transportation Committees (CTCs), or local governments. Investment and condition results are presented in numerous ways in this report. The

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obvious theme of each of the illustrations is that the investment in our states pavements is not sufficient to stop further deterioration.

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## **Basic Terminology**

**Fair:** A general term used to describe the condition of the pavement that has a RSL of five to nine years.

**Good:** A general term used to describe the condition of the pavement that has a RSL of ten or more years.

**Level of Service "LOS"B:** Is a descriptive term used to indicate that a road's pavement condition is considered "Good". This is a high level of service in which the associated features are in good condition. Very few deficiencies are present in safety and investment protection, but moderate deficiencies may exist in other areas. All systems are operational. Preventive maintenance is a high priority for safety-related activities, but is deferred for other areas, resulting in additional corrective maintenance activities.

**Level of Service "LOS"C:** Is a descriptive term used to indicate that a road's pavement condition is considered "Fair". This is a fair maintenance service level in which the associated features are in fair condition. Very few deficiencies are present in safety related activities, but moderate deficiencies exist for investment protection and significant aesthetic related deficiencies. Preventive maintenance is deferred for many activities except safety-related work. Corrective maintenance is routinely practiced for all activities. A backlog of deficiencies begins to build up that will have to be dealt with eventually, at a higher cost. Some roadway structural problems begin to appear due to long-term deterioration of the system.

**Pavement Preservation:** Is a term used to describe a class of treatments that are applied to pavements in an effort to preserve the structural integrity and extend the useful life of the pavement. The treatment provides no significant structural capacity to the pavement, but typically provides one or more of the following benefit: seals the surface and prevents infiltration of storm water, provides a new wear course for the pavement surface, delays further oxidation and raveling. These treatments are typically cost effective and must be applied to pavements that are in relatively good condition.

**Pavement Quality Index:** A value that ranges from 0 (worst) to 5 (best) that is used to indicate the condition of the pavement based on the roughness and distresses as identified by the Pavement Management department's evaluators.

**Pavement Reconstruction:** Is a term used to describe a class of treatments that replaces the entire existing pavement structure by the placement of the equivalent or increased pavement structure. Reconstruction usually requires the complete removal and replacement of the existing pavement structure. Reconstruction may utilize either

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new or recycled materials incorporated into the materials used for the reconstruction of the complete pavement section. Reconstruction is required when a pavement has either failed or has become functionally obsolete.

**Pavement Rehabilitation:** Is a term used to describe treatments that result in structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capacity. Rehabilitation techniques include restoration treatments and structural overlays.

**Poor:** A general term used to describe the condition of the pavement that has a RSL of less than five years.

**Remaining Service Life "RSL":** Is an objective assessment of the number of years (under predefined conditions of traffic, environments, terminal level of service, and other factors) a given highway section or network will continue to exist in an acceptable condition.



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The table below is an itemized list of pavement investment by treatment type and funding program. Also displayed are the centerline miles (directional miles for interstate) accomplished with this investment. This table illustrates the wide variety of treatments that are performed in an effort to maximize the benefit of the available funds. Note that unit costs for treatments may vary depending on quantities of subordinate contract work such as full-depth patching and the possibility of multi-lane sections of roadway.

### **EXHIBIT 1**

#### **2014 Pavement Investment by Funding program and Treatment Type**

<b>Funding Program</b>	<b>Funding Amount</b>	<b>Treatment Classification</b>	<b>Treatment Type</b>	<b>Miles Treated</b>
Federal	\$23,354,868	Improvement	Reclamation	51.31
Federal	\$88,617,899	Improvement	HMA Structural Overlay	235.98
Federal	\$3,709,164	Preservation	Chip Seal	133.04
Federal	\$2,876,161	Preservation	Micro-surfacing	33.08
Federal	\$1,707,276	Preservation	Crack Seal	280.11
Federal	\$3,174,957	Preservation	HMA Thin Lift	42.03
Federal	\$14,569,297	Preservation	Interstate OGFC	37.75
Federal	\$2,888,445	Preservation	Interstate Concrete FDP	28.29
State	\$11,926,171	Improvement	Reclamation	42.69
State	\$23,370,855	Improvement	Rehab	121.81
State	\$11,665,086	Preservation	Chip Seal	339.79
State	\$939,576	Preservation	Micro-surfacing	13.85
State	\$720,545	Preservation	Crack Seal	168.86
State	\$3,740,438	Preservation	HMA Thin Lift	58.11
State	\$745,737	Preservation	Full Depth Pack	38.18
State Force Account	\$2,698,040	Improvement	Reclamation	48.35
State Force Account	\$2,781,106	Preservation	Chip Seal	127.67
State Force Account	\$4,303	Preservation	Crack Seal	0.31
Federal - STIP	\$65,055,000	Improvement	Rehab/Reconstruction	38

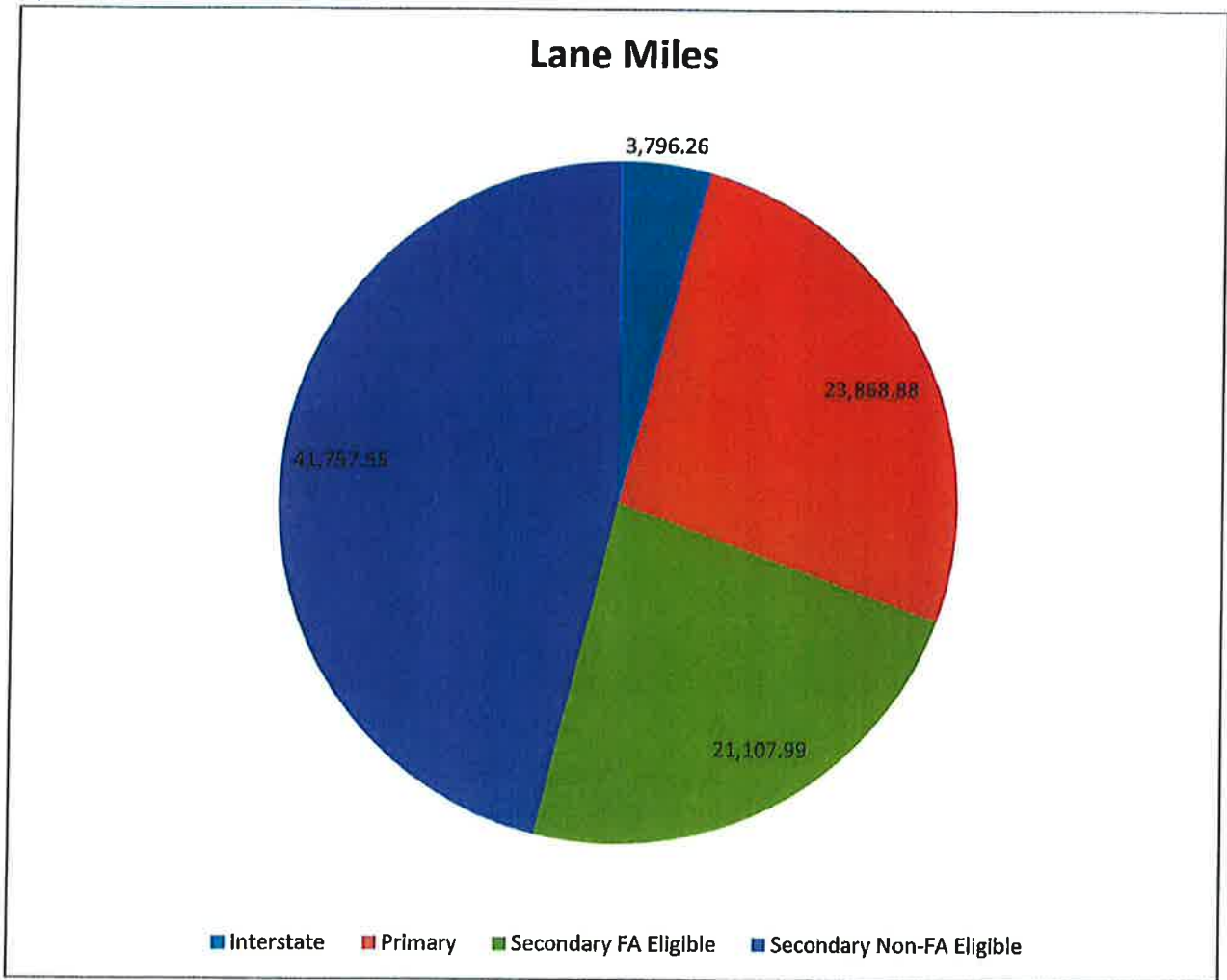
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The chart below illustrates the breakdown of lane miles for the state maintained transportation system. Even though South Carolina is a relatively small state geographically, SCDOT has a much larger responsibility for the transportation system than most states. SC maintains 63% of the state's roads compared to the national average of 19%. SC has a little more than 90,530 lane miles of responsibility. As the chart indicates below, the largest component of the system is non-federal aid eligible secondary roads. Although the traffic volumes are relatively low on this system, deteriorated pavements present a hazard to the motoring public and can present a liability for SCDOT if these roads aren't maintained at an acceptable level.

### **EXHIBIT 2**

#### **System Lane Miles Chart**

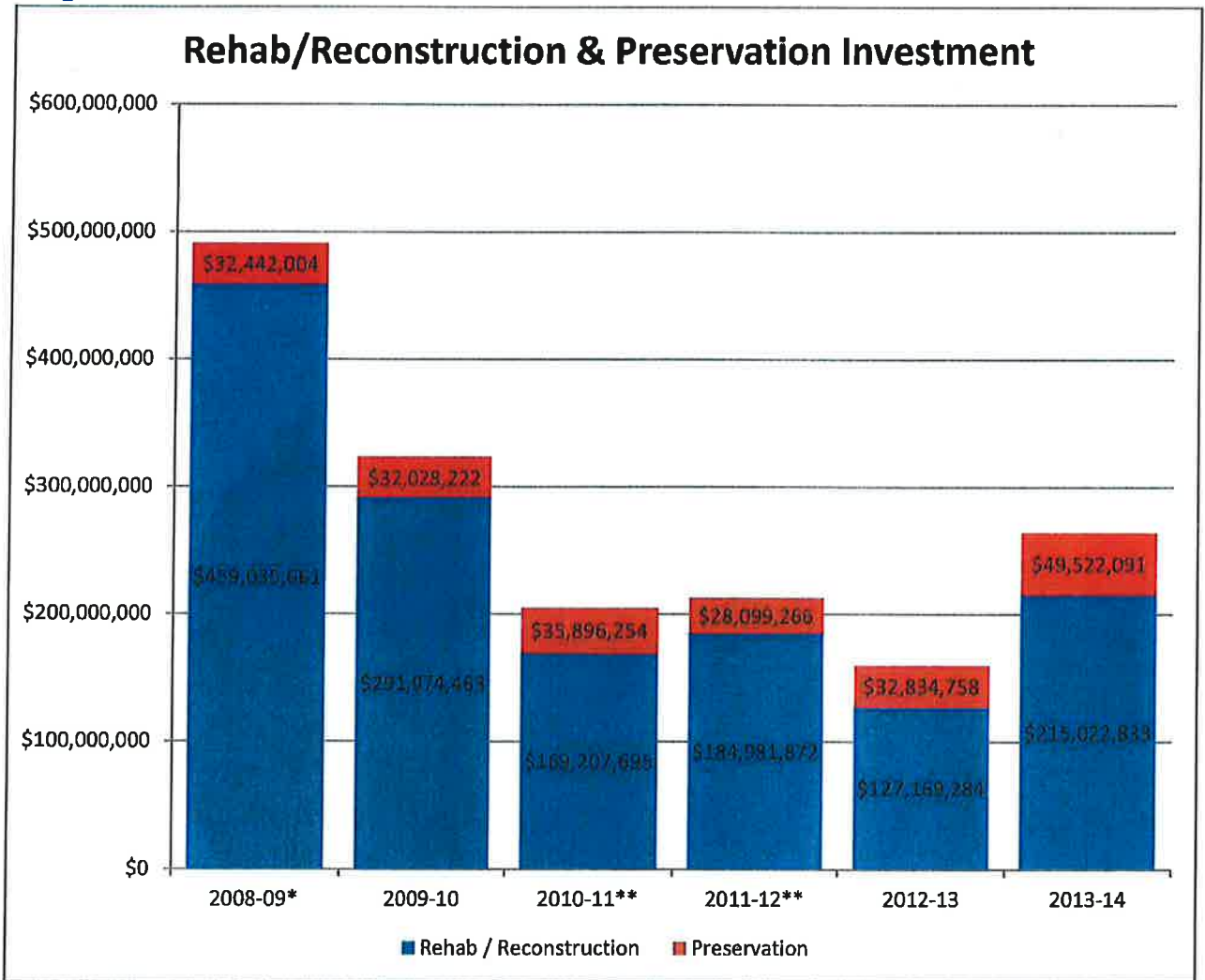


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The chart below illustrates the amount of resources allocated for rehab/reconstruction on all roads. Rehab/reconstruction includes structural asphalt overlays, roller-compacted concrete, and reclamation. Preservation includes micro-surfacing, chip seal, ultra-thin lift asphalt overlay, crack seal, and full-depth patching. This includes both contract and work performed by SCDOT forces.

### **EXHIBIT 3**

**Program Investment Chart**



\*Increase in this fiscal year due to ARRA.

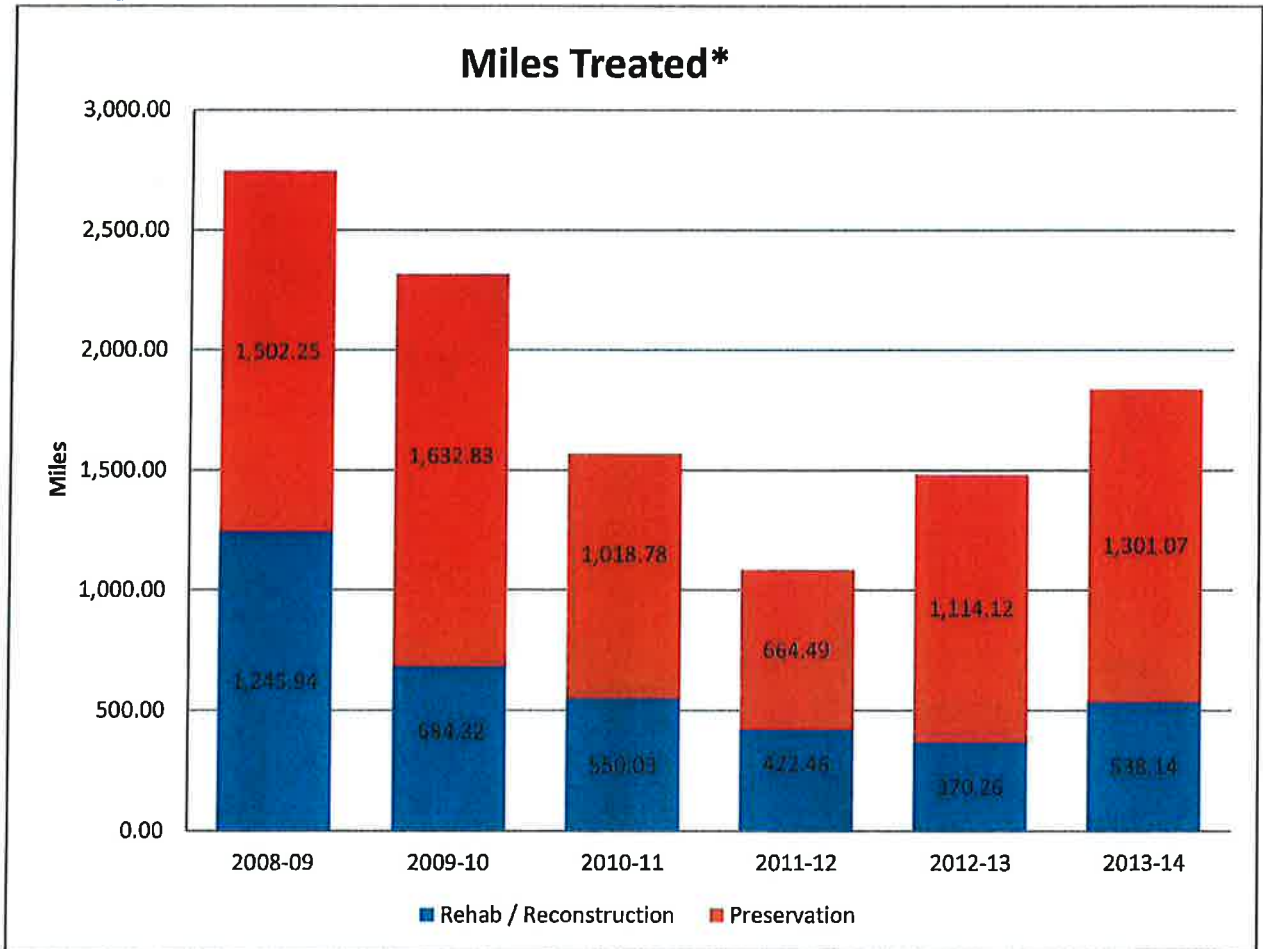
\*\*Change in this fiscal year due to updated data.

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The chart below illustrates the number of miles that have been, or are scheduled to be repaired. The types of rehab/reconstruction repairs include: resurfacing, roller-compacted concrete, and reclamation. Preservation treatments include micro-surfacing, chip seal, ultra-thin lift HMA overlay, crack seal, and full-depth patching.

## EXHIBIT 4

### Accomplishment Chart



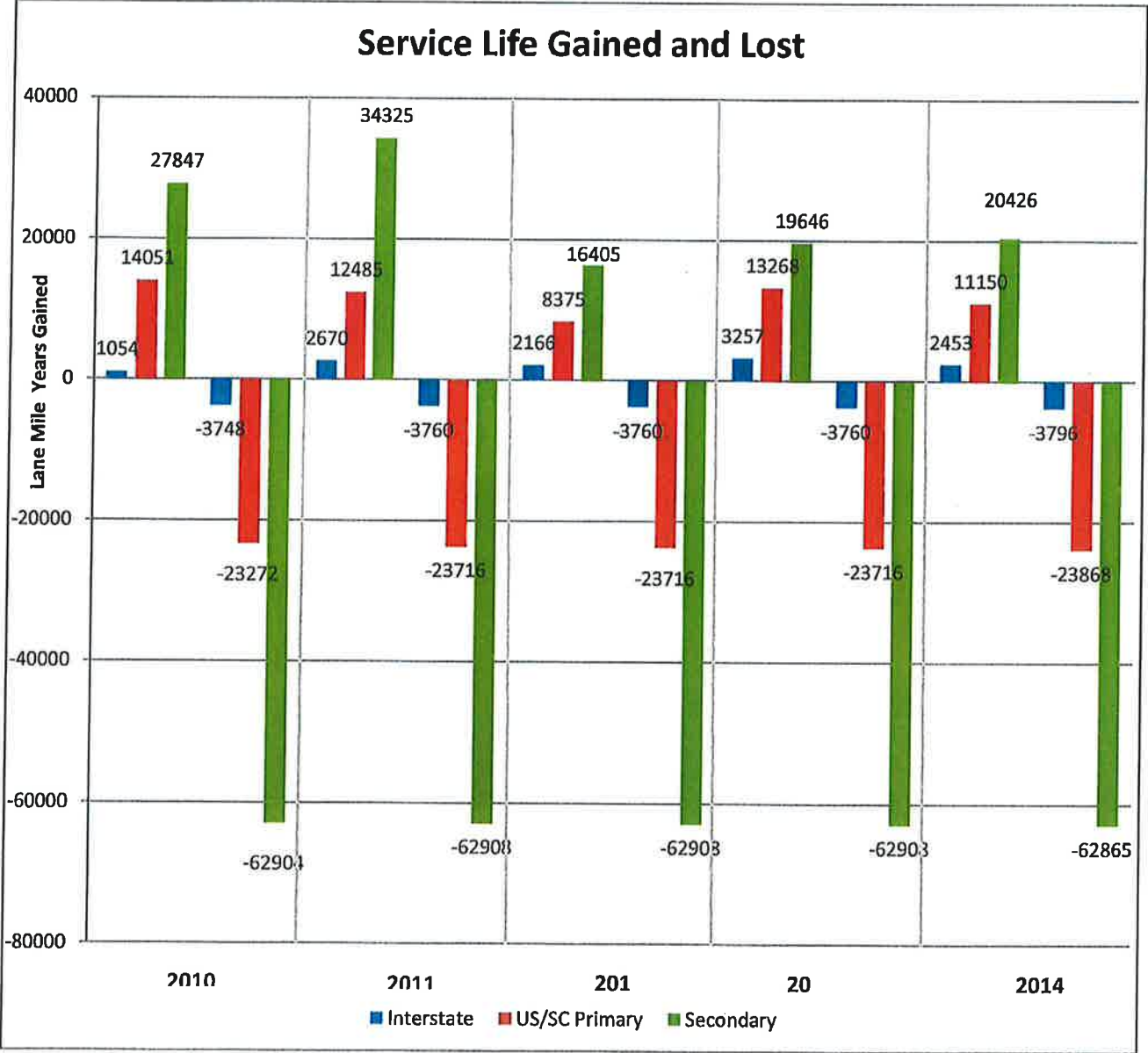
\*Directional miles are counted for interstate projects and centerline miles are counted for all other roads.

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The chart below illustrates the number of service life years added to the system and lost from the system. The service life gained reflects projects that have completed construction and will not correlate directly with each year's funded program. The take away from this chart is that many more service life years are lost than are gained each year. Additional investment is needed to reverse this trend.

**EXHIBIT 5**

**Service Life - Gained and Lost**

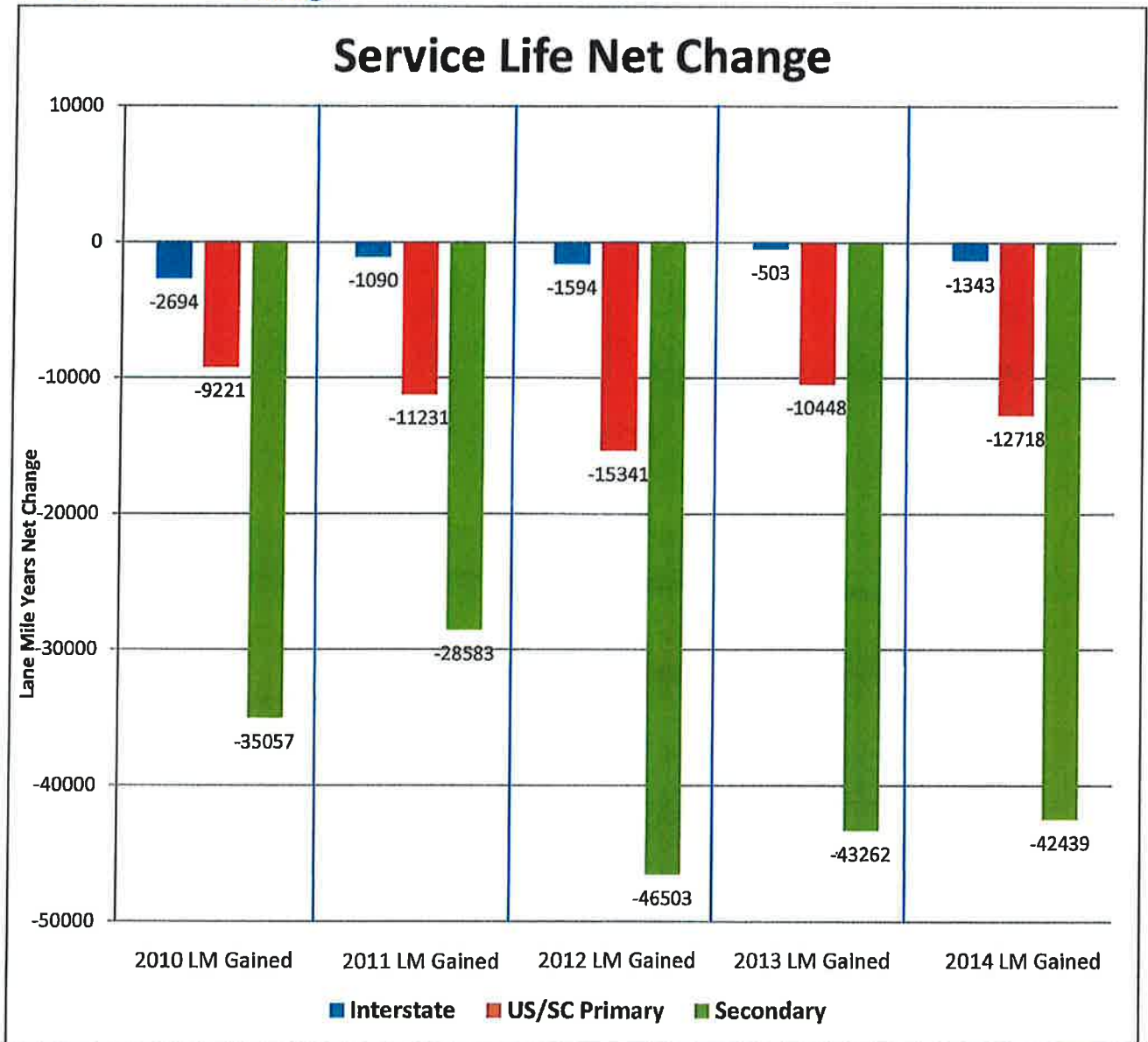


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The chart below illustrates the net effect to SC's transportation system. In each of the past five years, there has been a negative net service life change for all systems except the interstate system. This indicates that the pavement systems are further deteriorating each year.

### EXHIBIT 6

#### Service Life - Net Change





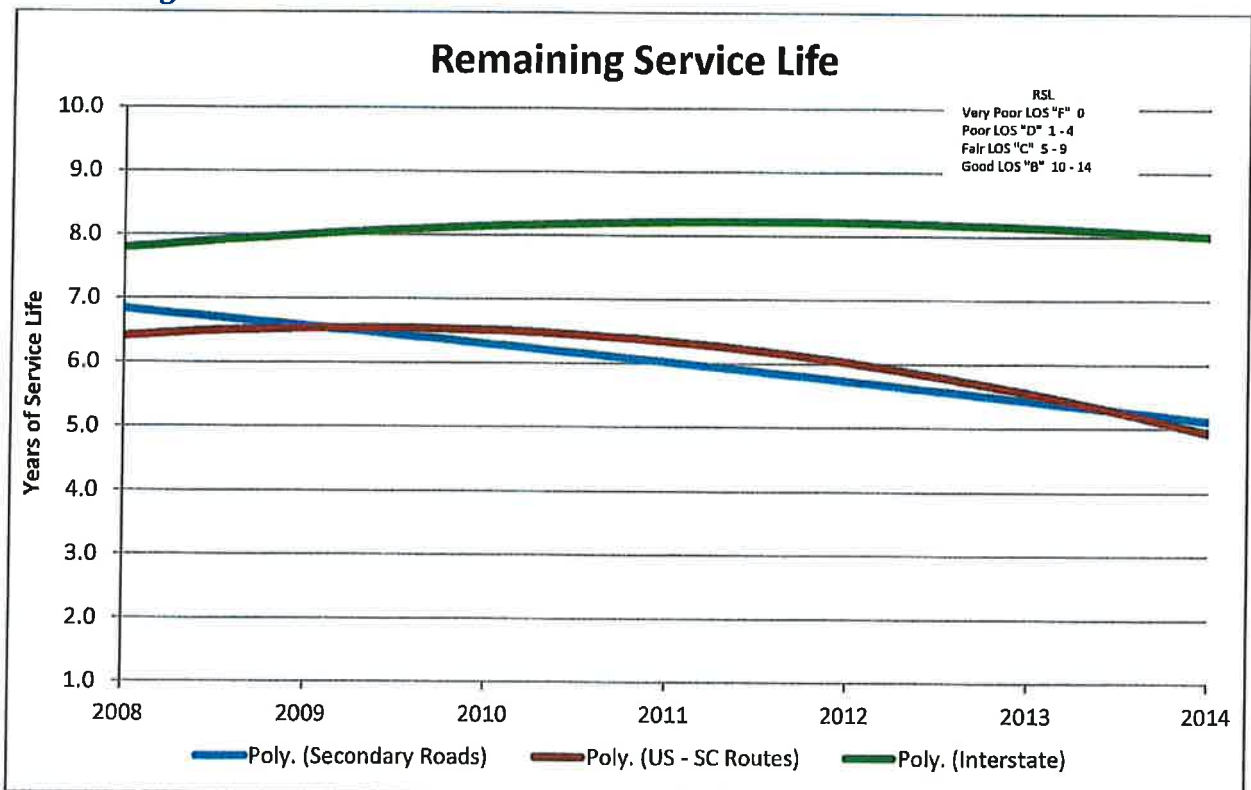
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The chart below displays average remaining service life (RSL) of the system pavement before it reaches the minimum acceptable operating condition. The trends for each system are displayed separately. It is very clear that the secondary routes have been on a steady decline throughout the past five years. The trend line for the primary routes is slightly skewed by the injection of the ARRA (American Recovery and Reinvestment Act) funds that were included in the 2009 program. Even with that additional investment, the condition for primary routes is continuing to decline as well. Only the interstate system has a positive trend.

**Note:** Pavement condition data is collected from evaluations performed by the Pavement Management Department. The evaluation cycle is annually for National Highway System (NHS) routes and every three years for all other route classifications. Also, keep in mind that there is a lag time between a program investment, actual construction of the program, and then the evaluation of the improved roadway.

## EXHIBIT 7

### Remaining Service Life Trend

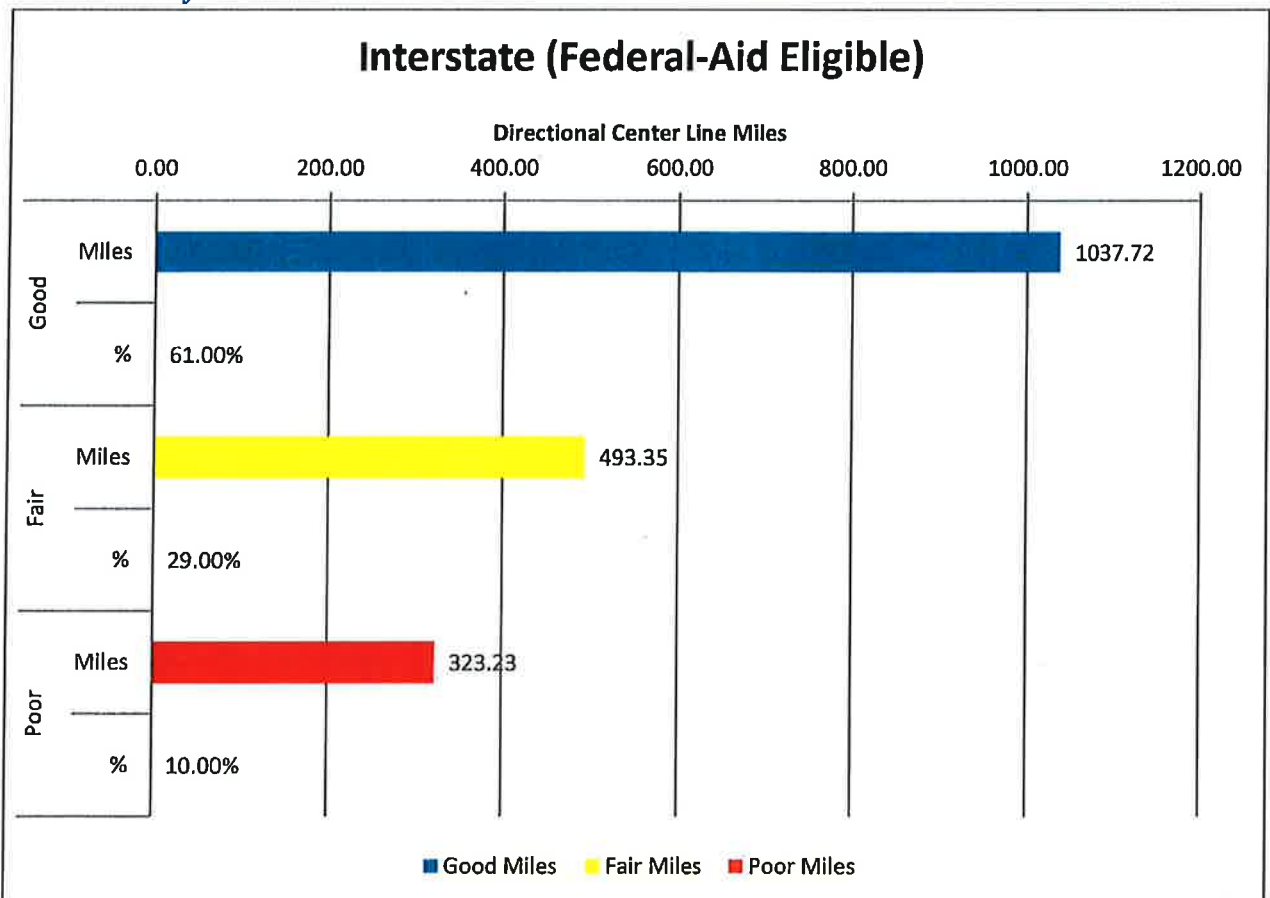


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The following charts summarize the pavement condition for the state's interstate, primary, and state maintained secondary routes. The charts illustrate the number of miles and the percent of the state's overall system mileage that falls into each of the three general condition categories ranging from good to poor. This condition rating is determined by regular evaluations performed by the Pavement Management Department.

### **EXHIBIT 8**

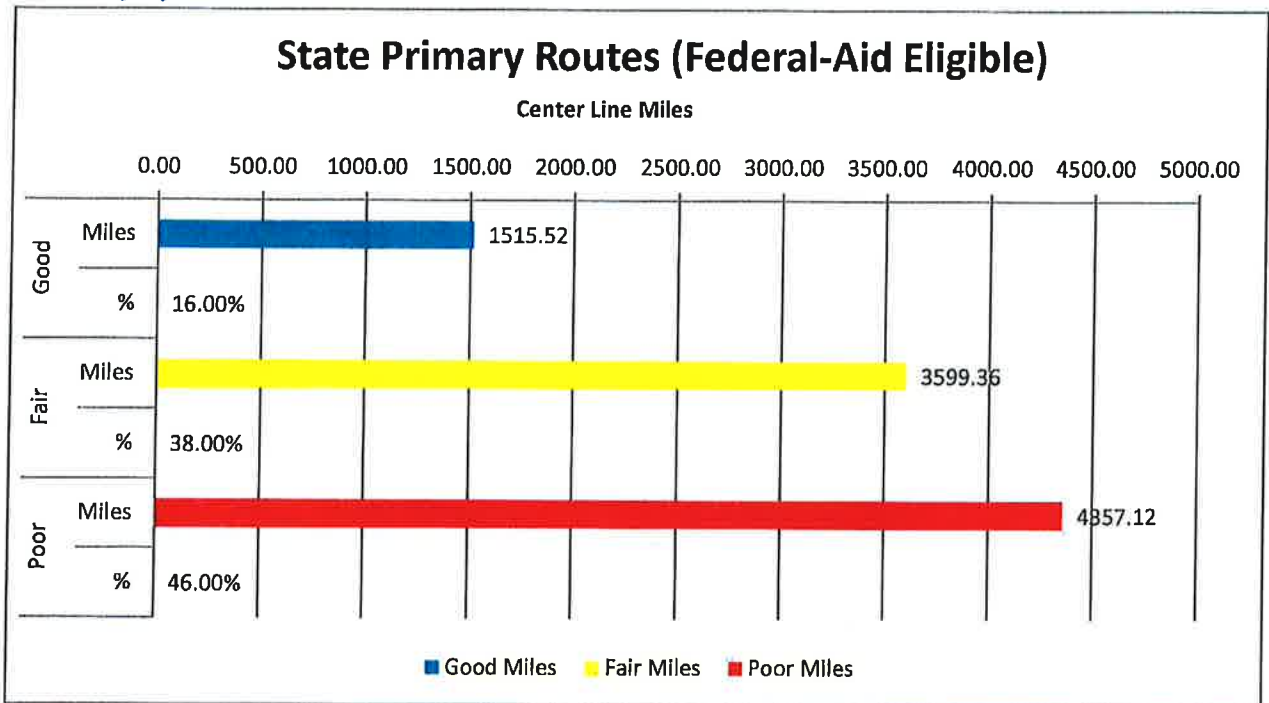
#### **Interstate System Pavement Condition - Directional Centerline Miles**



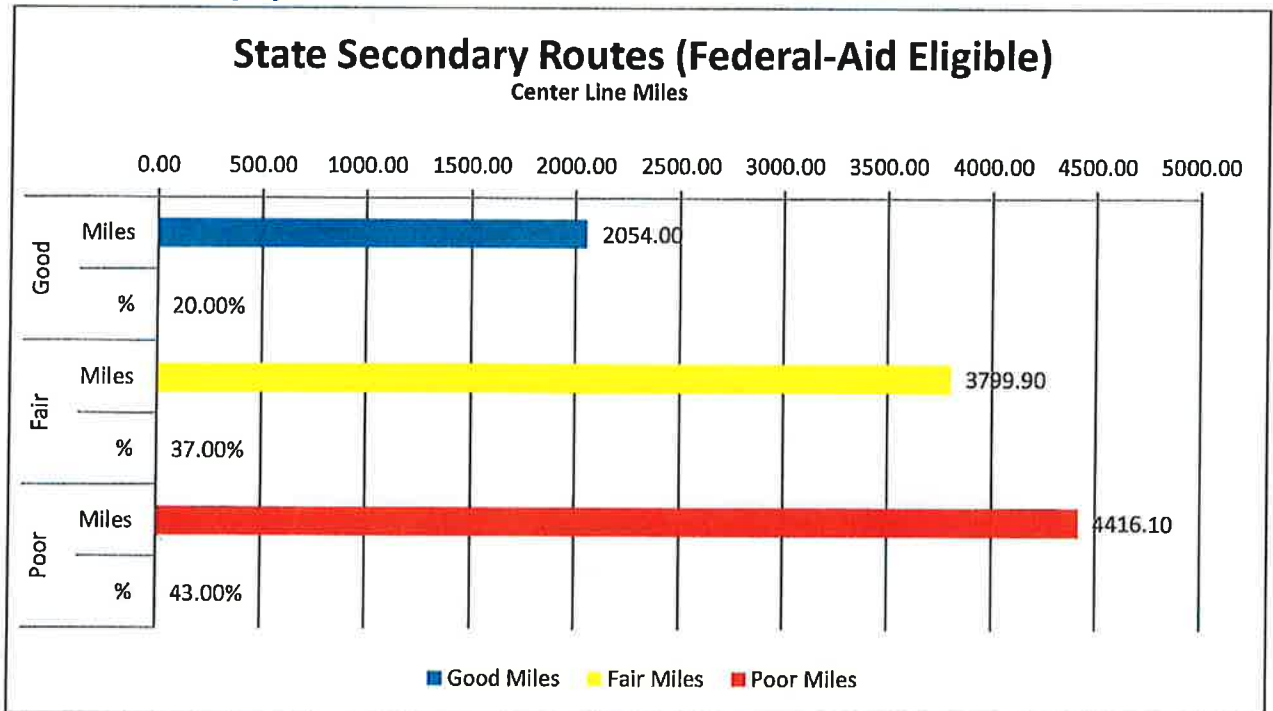


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## Primary System Pavement Condition - Centerline Miles



## State Secondary System Pavement Condition - Centerline Miles



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## State Secondary System Pavement Condition - Centerline Miles

