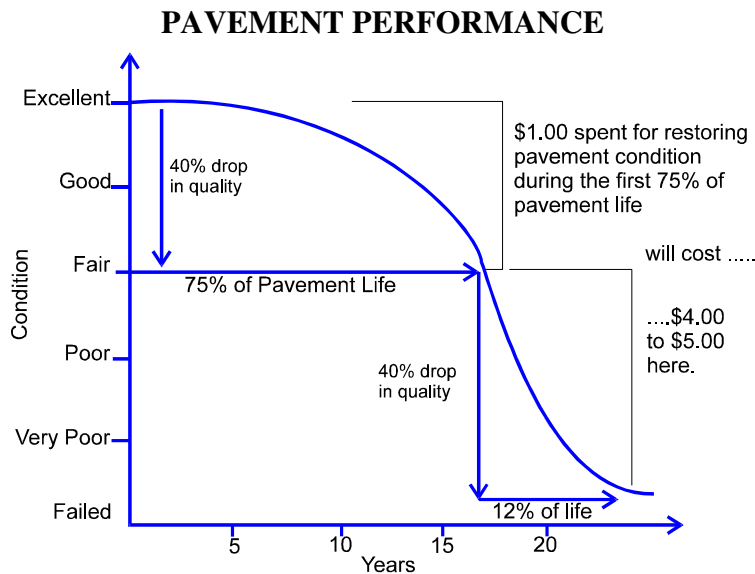


## PAVEMENT CONDITION AND PERFORMANCE

### Overview

A significant investment the State, cities, and towns make in the transportation infrastructure involves highway pavements. Because pavements represent such a large investment, they deserve constant attention to keep them in good condition to support the level of service for which they were designed. Poorly maintained roadways increase travel time, decrease the load carrying capacity of the road, create unsafe conditions for the traveling public, and increase maintenance costs for the State and the traveling public (personal vehicles). The cost to rehabilitate pavements increases dramatically when the restorative treatment is delayed beyond a reasonable time frame. The most cost effective treatments are determined using the Department’s computer based pavement management system (PMS).

New Hampshire’s pavement management plan depends on the experience and suggestions of maintenance personnel who “live” with the roads on a daily basis. Their observations, together with information provided by the Department’s data collection vehicle and the PMS are used to develop annual pavement resurfacing programs and strategies.



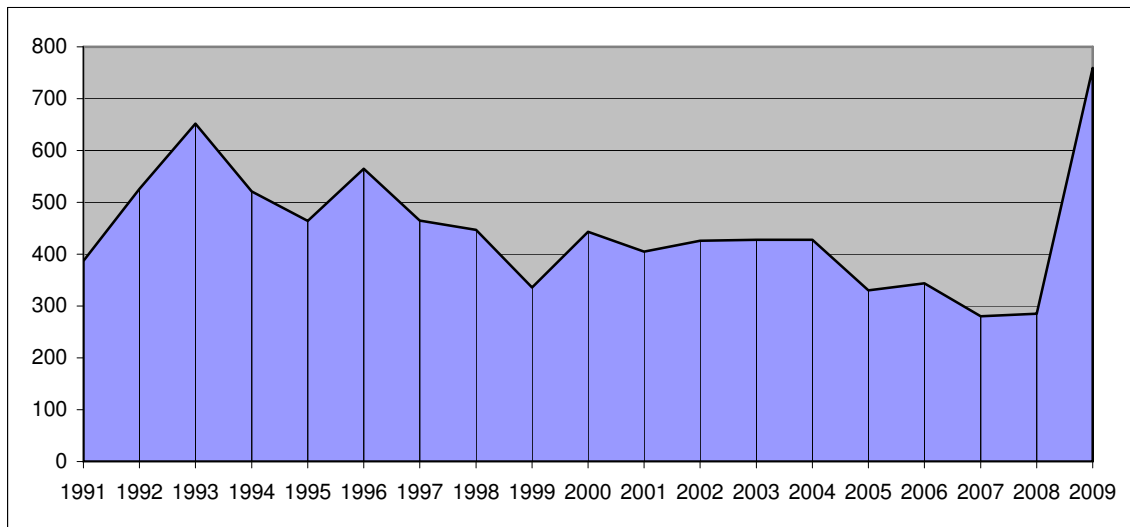
The above pavement deterioration curve demonstrates the advantage of applying the right treatment to the right road at the right time. The curve is representative for a road with a design life of about twenty years. After a roadway has been constructed, a slow decline in pavement condition is observed. As the roadway continues to age due to climate, traffic loading, etc., a much sharper decline is typical. Applying a pavement preservation treatment before year 15 will generally restore the pavement condition. If a treatment is delayed for another 3 years, a more costly rehabilitation treatment will be required to restore the pavement condition. The cost of the rehabilitation treatment is generally 4 to 5 times more than the cost of the preservation treatment. Consequently, allowing

roadways to deteriorate too far down the curve and applying a rehabilitation treatment “worst first philosophy” is not necessarily the most cost effective approach.

**Resurfacing History**

Following 1991, increased funding allowed more resurfacing work to be accomplished with more extensive treatments. Subsequently, with increased costs and other priorities the mileage of resurfacing work has leveled off and has declined since 2004. The 2006 and 2008 paving seasons saw marked increases in pavement costs, which has attributed to a further reduction in resurfacing miles. In 2009, the American Recovery and Reinvestment Act (ARRA) program allowed the State to increase the proposed number of miles from 250 to 750 miles. The additional resurfacing focused on preserving the Interstate system with nine additional projects above and beyond the two that were already planned. The annual District resurfacing program was also supplemented with ARRA funds to address additional needs on the Federal Aid eligible secondary road system. The following chart shows the number of resurfacing miles each year since 1991:

**Annual Resurfacing Miles**



**Resurfacing Goals and Funding**

In general, the Department’s goal is to resurface 500 miles each year, which equates to resurfacing every state maintained roadway on an approximate 8-10 year cycle. In recognition of the need to sustain this investment level, and the condition of NH highways, and counter the affects of the 2006 and 2008 price increases, the Legislature increased the level of Betterment Program Funding in the 2010-2011 State budget. This has allowed the Department to increase funding for the District resurfacing program from \$12 M/year to \$18 M/year starting in Fiscal Year 2011. Also, starting in Fiscal Year 2011, the Department has dedicated \$6 M/year (\$1 M/District) for rehabilitating sections of the secondary road system that are in dire need of repair.

The following table along with the accompanying map illustrates pavement condition in the state based on the year 2008 pavement condition data.

<b>Pavement Condition</b>	<b>Miles</b>	<b>Color</b>
No Work Required	751	Green
Some Work Required	1,902	Yellow
Major Work Required	1,532	Red
Unrated	374	Gray
<b>Total</b>	<b>4,559</b>	

### **Resurfacing Strategies**

The expected future condition of NH’s pavements is based on a number of factors. These include, but are not limited to, the type and depth of base material, the most recent date of construction, traffic and heavy truck volumes, and roadway drainage features. If this information is known for a particular roadway, some assumptions can be made to predict a pavement’s future condition. Many roads in the state have evolved from old wagon trails or cow paths, with little done over the intervening years to address subgrade issues. For those roads that are newer, designs include good base structure and material to support the pavement on top.

Pavements built with substantial base courses generally require little work until 15 years after construction. If the road is maintained and resurfaced every 8-12 years, the pavement should remain in a good condition nearly indefinitely.

Pavements that evolved out of some former type of trail or path typically have little or no structural support under the pavement. Because of this, maintenance is required more frequently. Roads like these will typically be in fair condition at best or in poor condition at worst. Unless there is complete reconstruction, it is unlikely the road will be in good or excellent condition. Typically, any resurfacing or other maintenance project will show only an improvement for a very short period of time (perhaps 5 years) before it is back to fair/poor condition again.

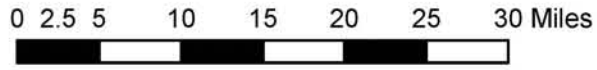
The NHDOT’s current philosophy is to keep roadways that are the most widely used in good condition. These roads are most likely to have been constructed or reconstructed with a good base, due to the amount of traffic using the road. Previous levels of funding for the Statewide Interstate Pavement Preservation Program (IPPP) and Federal Resurfacing Program are maintained in the Plan to keep up with these needs.

Less traveled, poor condition roads, though treated regularly, are seldom in better than fair condition. The prohibitive cost of complete reconstruction prevents a better solution to the problem. The Highway Maintenance Districts have begun a plan of “Low Cost Reconstruction” to





address these roads. Less expensive than normal reconstruction, this approach includes upgrading highway drainage, recycling pavement, resurfacing, and a process called sandwiching. Sandwiching is a cost effective treatment that involves the placement of 6-12 inches of crushed gravel over an existing pavement and then repaving the surface. Otherwise these roads receive periodic thin overlays, which are intended to seal and bind together to the degree possible the existing pavement, in an effort to keep the road passable. Funding has been included in the Plan to continue to address these needs.

A major objective for the future will be to upgrade those roads in poorer condition, while maintaining and preserving those in good condition. Newer technologies and maintenance techniques, such as thicker overlays, the use of paving fabrics/reinforcement, and preservation treatments such as micro-surfacing and chip seals, are being investigated, to increase pavement service life. The Department has also started to include crack sealing as part of the yearly resurfacing program. Studies have shown that crack sealing can extend the life of a pavement by 2 years. Continued funding and local project ranking will remain important elements in addressing low volume highways on the State's system.

# PAVEMENT CONDITION



Map Based on Year 2008 Data

-  No Work Required (RCI 3.5-5.0)(751Miles)
-  Some Work Required (RCI 2.51 - 3.49) (1902 Miles)
-  Major Work Required (RCI 0 - 2.50) (1532 Miles)
-  Not Rated 374

