

# Pavement Condition of New York's Highways



**2006**



**New York State Department of Transportation**

---

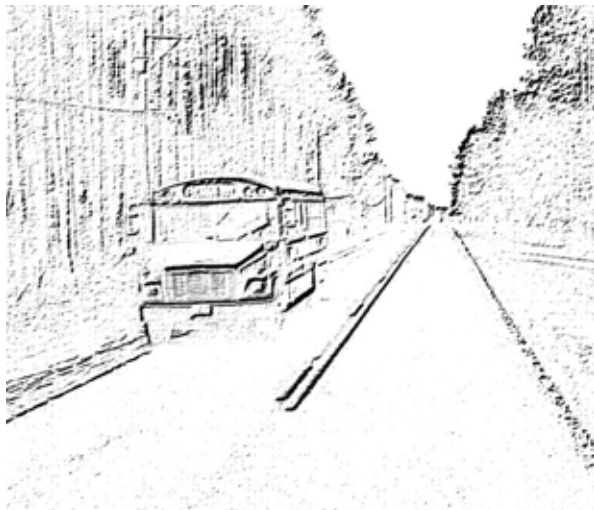
## Preface

The New York State Department of Transportation annually conducts a survey of State Highway pavement conditions which provides a consistent source of pavement data for New York's highway network. The survey results are a primary input to the Department's Pavement Management System as well as to the development of the pavement portion of the Department's Capital and Maintenance Programs.

Included in this report are various tables and figures which describe network conditions over time, by Region and County, and by pavement type. Also included are summaries of network-level needs, in terms of mileage requiring a particular treatment strategy. It should be emphasized that the condition survey is

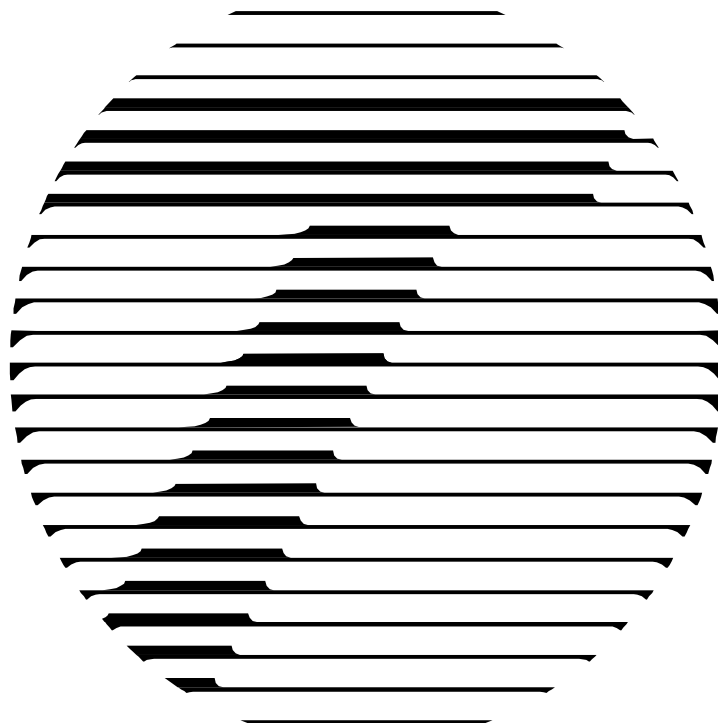


conducted in May and June and represents the condition of the system at that point in time. The impact of pavement improvement projects completed after the survey are therefore not reflected in the condition summaries.



For additional information on the contents of this report, please contact:

Pavement Management Unit  
New York State Dept. of Transportation  
50 Wolf Road – POD 33  
Albany, New York 12232  
(518) 457-4445



---

## Executive Summary

### State System Condition

Pavement conditions rebounded in 2006 after several years of steady decline. However the improvement is mostly attributed to a strong paving program in Region 4. Unique to Region 4's program was a large amount of paving completed early in 2006, allowing it to be captured in the survey. This has the effect of pushing up the statewide score, from 6.81 last year to 6.90 this year. Also, Excellent pavement increased 3.4% to 10.4% and Fair decreased 1.2% to 32.6%. Poor pavement remained relatively unchanged at 5.0%. Without Region 4's strong paving accomplishments, the statewide average score still increases, but only slightly.

### Condition by Region

Most regions have maintained condition levels or improved them slightly. Region 4 made a large improvement, increasing their average score by 0.44 point to 6.99. Regions 5, 9 and 10 are also in good condition and Region 7 continues to make good progress. Conditions in Region 6 declined sharply, falling 0.30 point to 6.45.

### Data Quality

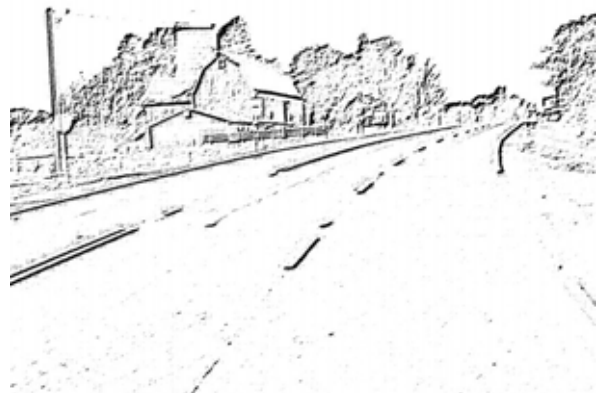
During the data quality analysis of the 2006 scores, an unusual number of segments increasing in score by one

point were identified. Since there is essentially no treatment that increases the score by one point, the occurrences were attributed to variability of the raters. A detailed analysis of the one point increases was performed and segments with inconsistent scores were adjusted back to the prior year score. The data and analyses presented in this report refers to the edited data.

The Shadow Score results using the edited data are consistent with historical values: 97.3% of rater's scores were within +/-1 point of the benchmark rater, and the average scoring error was -0.13.

### Ride Quality

Using the most recent IRI data available, Region 3 has the best ride quality of 85 in/mi, and Region 11 has the roughest at 187 in/mi. While it will be still a couple years before there is sufficient data to identify meaningful trends in ride quality, the statewide average IRI in 2006 is 107 in/mi, compared to last year's 121 in/mi.



---

## Table of Contents

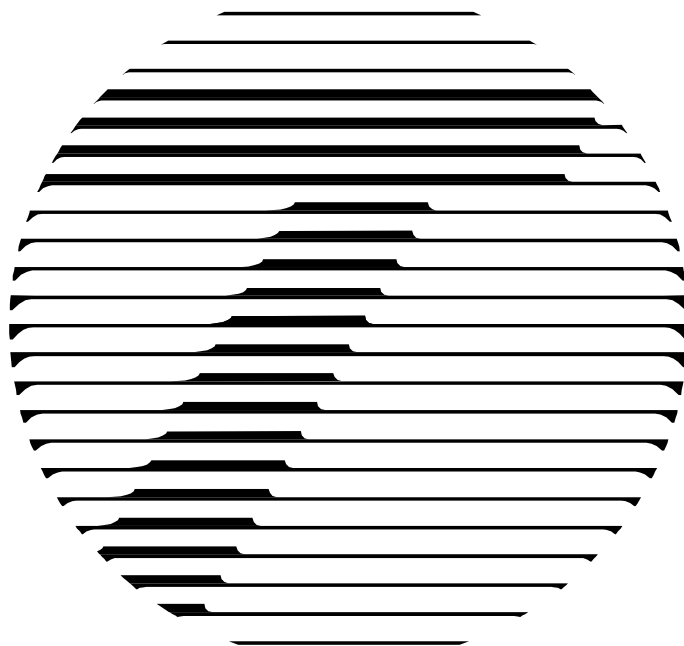
	Page
Preface .....	i
Executive Summary .....	iii
Table of Contents .....	iv
List of Tables and Figures .....	v
Introduction .....	2
Pavement Condition Rating Process .....	2
The Surface Condition Rating Scale .....	2
Dominant Distress Measures .....	3
Pavement Scoring with E-Score .....	4
Pavement Condition Survey Results .....	5
Extent of System .....	5
State Highway System .....	5
Surface Condition by Region .....	5
Surface Condition by County .....	13
Surface Condition by Pavement Type .....	13
National Highway System .....	13
Pavement Ride Quality .....	18
Background .....	18
Pavement Ride Quality .....	19
Network-Level Pavement Needs .....	27
Treatment Categories .....	27
Pavement Needs .....	28
Survey Quality Assurance Procedures .....	30
Annual Training Session .....	30
Shadow Scoring Activity .....	30
Statistical Measures & Analysis .....	30
Percent of Ratings Within +/- 1 Scale Point .....	31
Average Scoring Error .....	31
Absolute Scoring Difference .....	31



---

## List of Tables and Figures

	Page
Table 1: Touring Route System 2006 .....	8
Table 2: Surface Condition, 2002 - 2006, State Highway System .....	9
Table 3: State Highway System - 2006 Surface Condition by Region .....	11
Table 4: State Highway System - Regional Trends 2002 - 2006, Average Condition Ratings and Percent Below 6, Poor Pavement .....	12
Table 5: State Highway System - 2006 County Rankings .....	14
Table 6: State Highway System - 2006 Percent Lane-Miles by Pavement Type and Rating Category .....	16
Table 7: 2006 New York State National Highway System .....	16
Table 8: 2006 National Highway System: State Highways Only .....	17
Table 9: 2006 National Highway System: NYS Thruway Authority .....	17
Table 10: 2004-05 IRI by Category and County – Touring Route .....	22
Table 11: 2004-05 IRI by Category and County – Interstates .....	24
Table 12: 2005 IRI by Category and Division – Thruway .....	26
Table 13: Algorithm for Estimating Network-Level Pavement Needs .....	28
Table 14: State Highway System - 2006 Lane-Miles by Treatment Category .....	29
Table 15: 2006 Shadow Scoring Results .....	33
Figure 1: State Highway Condition Trends .....	10
Figure 2: Average Ride Quality (IRI) vs Average Surface Score .....	20
Figure 3: Average Ride Quality (IRI): Touring Route vs Interstates .....	20
Figure 4: Ride Quality (IRI) – Touring Route .....	21
Figure 5: Ride Quality (IRI) – Interstates .....	21
Figure 6: 2006 Shadow Scoring Results - Average Scoring Error .....	33





# **Pavement Condition of New York's Highways**

## **2006**



# Pavement Condition of New York's Highways: 2006

## Introduction

---

The New York State Department of Transportation annually conducts an assessment of the pavement condition of the New York State Highway network. The survey data is collected by regional rating teams who are trained in the use of carefully developed photographic scales of pavement conditions. Condition data is collected for both the pavement surface and for specific distress symptoms called dominant distress. The survey is conducted during the late spring and early summer with the results supplied back to the regions later in the fall.

This report presents a summary of the results of the 2006 survey effort. Unless otherwise noted, the various tables and figures reflect data for the State Highway System only. These are facilities under the jurisdiction of the New York State Department of Transportation, including NYSDOT Parkways and State-owned service roads. Ramp mileage is not included.

*Please note that the reassignments of Tioga County to Region 9 and Columbia County to Region 1 are not reflected in the analysis and tables of this report.*

## Pavement Condition Rating Process

---

The pavement condition of New York's highways is determined by two measures: the *surface condition rating* and the *dominant distress indicator*. These measures and the associated rating process are described as follows:

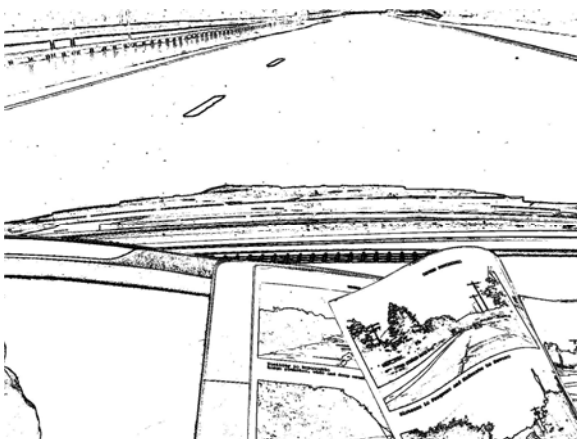
### The Surface Condition Rating Scale

The surface condition rating scale is a 1 to 10 point scale based on the prevalence of a surface - related pavement distress (e.g., cracking). The

Pavement Condition Rating Manual is the tool used to ensure consistency in obtaining the surface condition ratings. The manual includes photographs of each scale point and descriptions of the frequency and severity of distress associated with each scale point. Each photograph was selected by a panel of Department pavement experts based on the general treatments required by the pavement condition represented. There are three scales, one for each pavement structure type:

- *Rigid* (Portland Cement Concrete PCC)
- *Overlaid* (asphalt overlaid on PCC slabs), and
- *Flexible* (full depth asphalt)

When in the field, the survey teams determine the surface condition rating by comparing the surface condition of the highway section surveyed to the photographic scale for the appropriate pavement type. The scale point which most closely represents the condition of the highway evaluated is the surface rating for that section.



### **Dominant Distress Measures**

A dominant distress is defined as a specific distress symptom, observable at posted speeds, which will trigger a treatment category different from the treatment category based on the surface rating alone. For example, if a Portland cement concrete pavement is rated with a surface score of "7," the treatment category assigned on the basis of the surface rating alone is non-paving preventive maintenance. However, if this pavement were faulted (i.e., step formations at joints), a more costly corrective maintenance treatment is required. Therefore, faulting qualifies as a dominant distress for PCC pavement structures. Dominant distresses were determined for each pavement type by the panel of experts, and are shown in the following table:

Dominant Distress by Pavement Type		
Pavement Type	Dominant Distress	Frequency Measure
Rigid	Faulting	presence only
	Spalling (Isolated)	occurs infrequently over section (less than 20%)
	Spalling (General)	occurs over most of the section (more than 20%)
Overlaid	Alligator Cracking (Isolated)	occurs infrequently over section (less than 20%)
	Alligator Cracking (General)	occurs over most of the section (more than 20%)
	Widening Dropoff	presence only
Flexible	Alligator Cracking (Isolated)	occurs infrequently over section (less than 20%)
	Alligator Cracking (General)	occurs over most of the section (more than 20%)

### ***Special note on Alligator Cracking***

Alligator Cracking as a dominant distress is a load-related, fatigue-type distress indicating a weakness in the pavement structure. Raters will identify Alligator Cracking as a Dominant Distress only if the cracking appears in the wheelpath of an Overlaid or Flexible Pavement.

### **Pavement Scoring with E-Score**

E-Score (Electronic Documentation of Pavement Scores) captures field rating information directly in an electronic format. The system uses a tablet computer linked to a DMI (distance measuring instrument) and GPS for location referencing. Built into the software are real time edit checks to improve data quality at the source. E-Score has been used statewide since 2004.

## **Pavement Condition Survey Results**

---

### **Extent of System**

*Table 1* presents the jurisdictional classification in lane-miles for both State and non-State Highways which comprise the Touring Route System. The total mileage of the NYS Touring Route System is 41,189 lane miles, of which 38,159 lane miles are under State jurisdiction.

It should be noted that mileage under construction at the time of the survey, which can be several hundred miles, in the past have *not* been included in any of the condition summaries presented in this report. To help reduce the effect of this “unaccounted” mileage, in 2006 the raters were instructed to rate segments actively under construction and expected to be completed before the end of the season as new pavement (rating of 10) rather than “under construction.” Only pavements under multi-year construction with uncertain completion dates should be rated as “under construction.”

### **State Highway System**

#### ***Condition Trends - Statewide***

*Table 2* and *Figure 1* illustrate the statewide trends in pavement surface condition for State-owned highways from 2002 through 2006. Statewide pavement conditions have been in a

general decline since about 2002, but the Average Condition Rating took a significant upturn in 2006. This upturn however is driven almost entirely by improvements in Region 4, a result of strong paving programs in late 2005 and 2006 in the region.

Unique to Region 4’s 2006 paving program are a large number of lane miles that were paved in the early season and therefore included in the 2006 survey. While it is common to have some new paving included in the current year survey, the large amount done in Region 4 was enough to push up the statewide average. Without the Region 4 early accomplishments, the statewide Average Condition Rating improves only slightly.

Also unique to the 2006 Survey was a much larger than normal number of pavement segments that increased in score by one point. Since there is essentially no treatment that increases the score by only one point (in some rare cases permanent patching could conceivably result in a one point increase), the one point increases are considered variability of the raters.

A detailed analysis of the one point increases was performed by studying the score trends of each affected segment. In cases where the score had been the same for two or more years

and then increased by one in the current year, the scores were adjusted back to the prior year score. It should be noted that this is the first time scores have been changed as a result of the Quality Assurance Review.

While every region had some data edited, cases where the number of one point increases were significant enough to influence the summary statistics of the region were limited to Regions 4, 9, 10 and 11. The data presented in this report is the edited data.

One other unusual condition occurred in Region 10. The 2005 survey data showed a sharp increase in Fair pavement in the region. The score data was carefully reviewed at the time, and in light of the forecasting models predicting a decline in conditions in Region 10, a visual review of scores using the digital photolog and relative agreement of the region's scores with the Shadow Scores, the available information lacked compelling evidence to refute the scores. The 2006 Survey results, however, fit better with the overall condition trend in the region and present evidence that the scores from 2005 were likely too harsh. No changes will be made to the 2005 data, but users of the data should be aware of this situation.

Statewide, pavements rated Excellent increased by 3.4% to 10.4%, and Fair

decreased 1.2% to 32.6%, driven by the paving accomplishments of a few regions. Poor pavement remained about the same, decreasing 0.1% to 5.0%. The overall average condition rating rose from 6.81 last year to 6.90 in 2006.

Pavements rated 7 fell for the third year in a row, to 43.7%. Pavements rated 6 or 7, many of which are ideal candidates for preventive maintenance treatments, make up 76.3% of all state highway pavements, which is an improvement over last year's total of 78.6%.

### ***Surface Condition by Region***

*Table 3* presents the distribution of surface condition ratings by region for 2006, as well as the percentage and number of lane-miles in each condition category. The amount of Excellent pavement in a region is generally related to the strength of the region's paving program. Regions 4 and 9 have the most Excellent pavement, with 16.3% and 15.0% respectively.

A large and growing number of pavements rated 7 generally indicates a need for more preventive maintenance paving. Region 5 experienced a 5.5% increase in 7's, up to 50.6%, but also improved Fair and Poor pavement by almost 3%. Further, a decrease in 7's with a corresponding increase in 6's indicates pavements are slipping

beyond the preventive maintenance window. This seems to be occurring in Region 11, where 7's decreased by 9.9% and 6's increased by almost the same amount. The trend is also present in Region 6, where 7's decreased by 25.4%, and 6's increased by 20.8%. The other 5% slipped from 6 to 5 (Poor). A similar but less severe trend is also observed in Region 8.

Region 2 has a relatively high percentage of pavements rated 7 (59.2%), but this is a decrease of 6.2% from last year, and there is not a corresponding increase in Fair pavement. This seems to indicate that the region is addressing these pavements through an effective preventive maintenance program.

*Table 4* presents the average condition ratings and percent poor pavement by region for the years 2002-2006. Overall,

eight regions improved and three regions declined. Region 4 was the largest improver, raising their average surface score by 0.44 to 6.99 and reducing Poor pavement by 5.4%. Region 9 improved to the best overall average score at 7.20, followed by Region 10 at 7.14 and Region 5 at 7.12.

Region 6 conditions declined the sharpest, with the average score decreasing by 0.30 to 6.45 and Poor increasing 5.0% to 9.8%. (It should be noted that drastic changes in conditions are somewhat unusual. The survey results for the next year or two are needed to confirm the trend in Region 6.) Region 1 has the next lowest average condition rating at 6.62 and a corresponding 8.7% Poor. Regions 11, 10 and 5 have the lowest amount of Poor pavement, with 0.3%, 1.1% and 1.4% respectively.

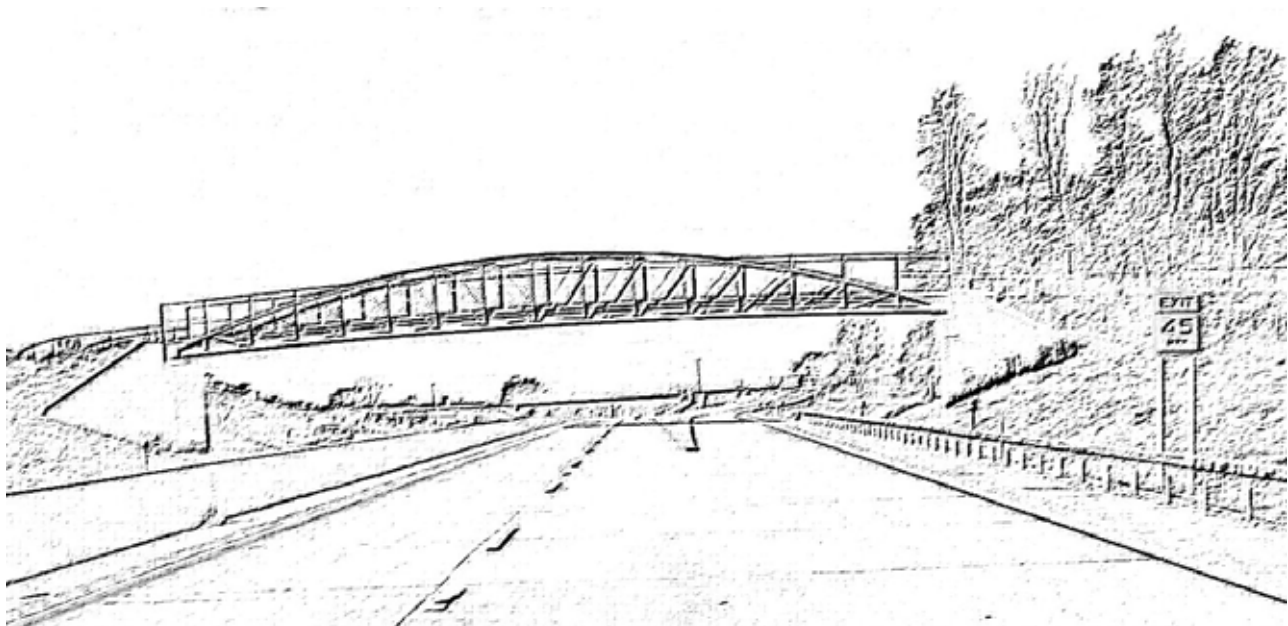




Table 1

<b>Touring Route System 2006</b> <b>Total Lane-Miles by Region and Jurisdiction</b>						
Region	Rated			Under Construction		Touring Route System 3
	State 1	Non-State 2	Total	State	Non-State	
<b>1</b>	4,798	223	5,021	7	0	5,028
<b>2</b>	2,973	50	3,023	42	1	3,066
<b>3</b>	3,591	175	3,766	0	0	3,766
<b>4</b>	4,065	356	4,422	8	0	4,429
<b>5</b>	3,664	471	4,134	114	3	4,251
<b>6</b>	2,574	26	2,601	17	0	2,618
<b>7</b>	3,472	116	3,588	44	2	3,633
<b>8</b>	5,331	450	5,781	3	0	5,784
<b>9</b>	3,877	147	4,024	23	0	4,047
<b>10</b>	2,727	209	2,937	5	0	2,942
<b>11</b>	825	800	1,625	0	0	1,625
<b>State</b>	37,897	3,024	40,921	262	6	41,189
Notes: 1. State Includes Interstates, State Highways, State-DOT Parkways, and State-owned service roads. 2. Non State Includes Non-DOT Parkways, local roads, institutional roads and authority mileage on the Touring Route System, but not the NYS Thruway. 3. Touring Route System does not include NYS Thruway mileage.						

Table 2

Surface Condition, 2002 - 2006 State Highway System										
Condition Level	2002		2003		2004		2005		2006	
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%
Excellent 10	1,108	3.0	623	1.7	743	2.0	731	1.9	1,354	3.6
	2,940	7.9	1,513	4.0	1,402	3.7	1,894	5.0	2,619	6.9
Subtotal	4,048	10.9	2,136	5.7	2,145	5.7	2,625	7.0	3,973	10.5
Good 8	4,952	13.3	4,649	12.4	3,996	10.7	3,483	9.3	3,140	8.3
	16,174	43.6	17,998	47.9	17,606	47.0	16,795	44.8	16,557	43.7
Subtotal	21,126	56.9	22,647	60.2	21,602	57.7	20,278	54.1	19,697	52.0
Fair 6	9,888	26.6	10,927	29.1	11,948	31.9	12,688	33.8	12,344	32.6
Subtotal	9,888	26.6	10,927	29.1	11,948	31.9	12,688	33.8	12,344	32.6
Poor 5	1,990	5.4	1,793	4.8	1,675	4.5	1,786	4.8	1,755	4.6
	86	0.2	87	0.2	95	0.3	129	0.3	127	0.3
	0	0.0	1	0.0	1	0.0	2	0.0	1	0.0
	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Subtotal	2,076	5.6	1,881	5.0	1,771	4.7	1,917	5.1	1,883	5.0
Total	37,138	100.0	37,591	100.0	37,466	100.0	37,508	100.0	37,897	100.0
Avg Score	7.00		6.86		6.82		6.81		6.90	

**Figure 1**  
**State Highway Condition Trends**

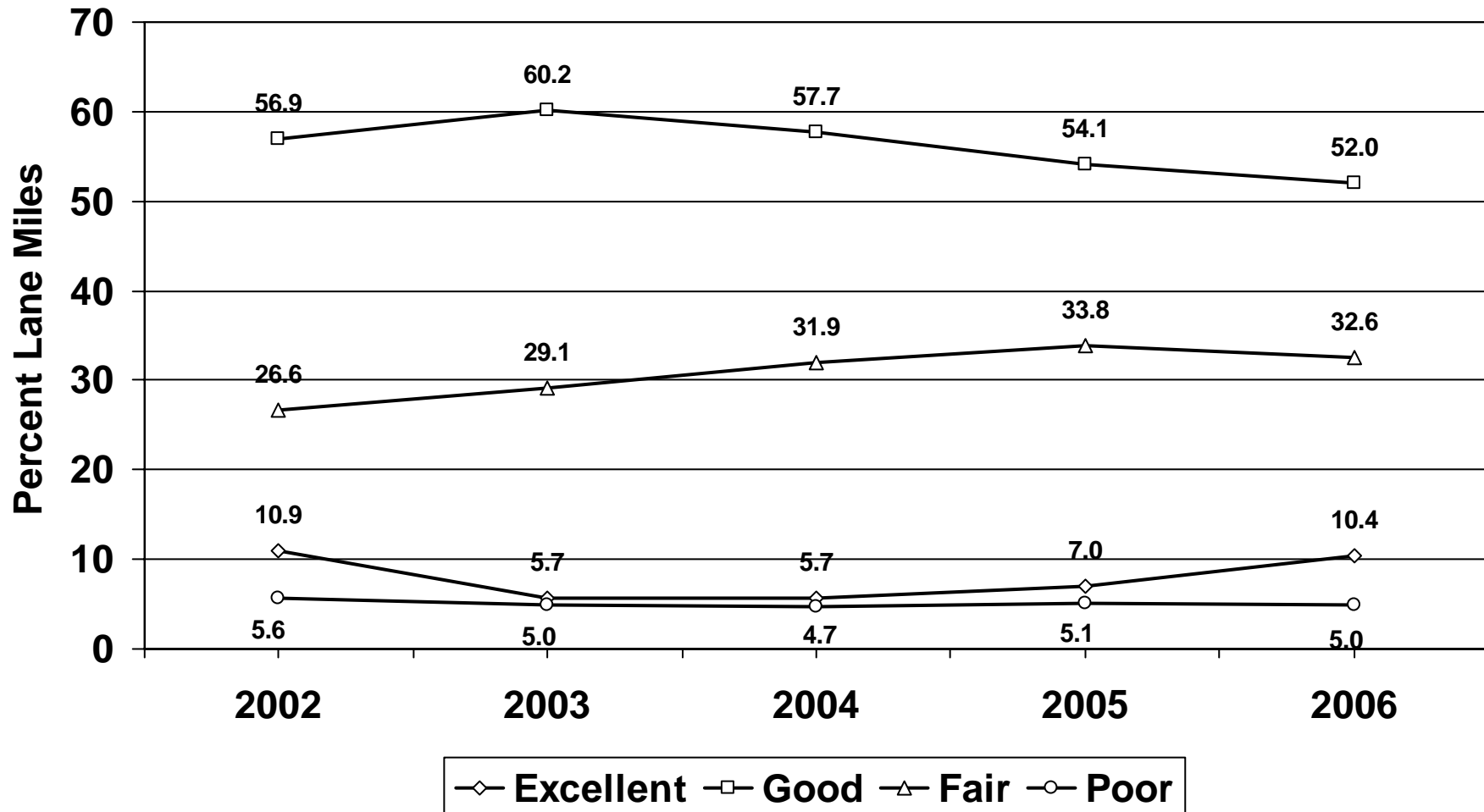


Table 3

State Highway System 2006 Surface Condition by Region in Lane-Miles											
Region	Surface Condition Ratings										Total
	1	2	3	4	5	6	7	8	9	10	
<b>1</b>	0	0	0	69	351	2,127	1,474	406	322	49	<b>4,798</b>
<b>2</b>	0	0	1	14	77	697	1,761	154	205	64	<b>2,973</b>
<b>3</b>	0	0	0	0	82	1,375	1,316	395	408	15	<b>3,591</b>
<b>4</b>	0	0	0	12	374	1,286	1,439	292	268	394	<b>4,065</b>
<b>5</b>	0	0	0	0	51	808	1,856	608	278	62	<b>3,664</b>
<b>6</b>	0	0	0	0	253	1,464	551	116	144	47	<b>2,574</b>
<b>7</b>	0	0	0	13	89	2,059	508	394	292	117	<b>3,472</b>
<b>8</b>	0	0	0	15	279	1,141	3,336	168	111	282	<b>5,331</b>
<b>9</b>	0	0	0	5	169	806	1,837	478	297	285	<b>3,877</b>
<b>10</b>	0	0	0	0	29	313	1,973	116	257	39	<b>2,727</b>
<b>11</b>	0	0	0	0	2	268	505	13	37	0	<b>825</b>
<b>State</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>127</b>	<b>1,755</b>	<b>12,344</b>	<b>16,557</b>	<b>3,140</b>	<b>2,619</b>	<b>1,354</b>	<b>37,897</b>
Percentage						Lane Miles					
Region	Poor 1-5	Fair 6	Good 7-8	Excellent 9-10	Average Condition	Region	Poor 1-5	Fair 6	Good 7-8	Excellent 9-10	Total
<b>1</b>	8.7%	44.3%	39.2%	7.7%	<b>6.62</b>	<b>1</b>	420	2,127	1,880	371	<b>4,798</b>
<b>2</b>	3.1%	23.5%	64.4%	9.1%	<b>6.95</b>	<b>2</b>	92	697	1,914	269	<b>2,973</b>
<b>3</b>	2.3%	38.3%	47.7%	11.8%	<b>6.92</b>	<b>3</b>	82	1,375	1,711	423	<b>3,591</b>
<b>4</b>	9.5%	31.6%	42.6%	16.3%	<b>6.99</b>	<b>4</b>	385	1,286	1,731	663	<b>4,065</b>
<b>5</b>	1.4%	22.1%	67.3%	9.3%	<b>7.12</b>	<b>5</b>	51	808	2,464	340	<b>3,664</b>
<b>6</b>	9.8%	56.8%	25.9%	7.4%	<b>6.45</b>	<b>6</b>	253	1,464	667	191	<b>2,574</b>
<b>7</b>	2.9%	59.3%	26.0%	11.8%	<b>6.73</b>	<b>7</b>	101	2,059	903	409	<b>3,472</b>
<b>8</b>	5.5%	21.4%	65.7%	7.4%	<b>6.90</b>	<b>8</b>	293	1,141	3,504	393	<b>5,331</b>
<b>9</b>	4.5%	20.8%	59.7%	15.0%	<b>7.20</b>	<b>9</b>	174	806	2,315	582	<b>3,877</b>
<b>10</b>	1.1%	11.5%	76.6%	10.8%	<b>7.14</b>	<b>10</b>	29	313	2,089	296	<b>2,727</b>
<b>11</b>	0.3%	32.4%	62.8%	4.5%	<b>6.78</b>	<b>11</b>	2	268	518	37	<b>825</b>
<b>State</b>	<b>5.0%</b>	<b>32.6%</b>	<b>52.0%</b>	<b>10.4%</b>	<b>6.90</b>	<b>State</b>	<b>1,883</b>	<b>12,344</b>	<b>19,697</b>	<b>3,973</b>	<b>37,897</b>

**Table 4**

State Highway System Regional Trends 2002-2006					
Average Condition Ratings					
Region	2002	2003	2004	2005	2006
<b>1</b>	6.94	6.81	6.58	6.53	<b>6.62</b>
<b>2</b>	6.98	6.89	6.87	6.81	<b>6.95</b>
<b>3</b>	7.03	6.74	6.81	6.90	<b>6.92</b>
<b>4</b>	6.91	6.75	6.78	6.55	<b>6.99</b>
<b>5</b>	7.24	7.01	7.14	7.14	<b>7.12</b>
<b>6</b>	6.84	6.67	6.76	6.75	<b>6.45</b>
<b>7</b>	6.70	6.45	6.26	6.50	<b>6.73</b>
<b>8</b>	7.13	7.10	6.95	6.89	<b>6.90</b>
<b>9</b>	7.06	6.97	7.08	7.13	<b>7.20</b>
<b>10</b>	7.12	7.14	7.01	6.93	<b>7.14</b>
<b>11</b>	7.03	6.86	6.89	6.83	<b>6.78</b>
<b>Total</b>	7.00	6.86	6.82	6.81	<b>6.90</b>
Percent Below 6, Poor Pavement					
Region	2002	2003	2004	2005	2006
<b>1</b>	9.5%	7.8%	10.0%	8.6%	<b>8.7%</b>
<b>2</b>	3.1%	2.9%	3.1%	3.4%	<b>3.1%</b>
<b>3</b>	4.2%	3.4%	2.5%	2.4%	<b>2.3%</b>
<b>4</b>	9.7%	9.0%	9.3%	14.9%	<b>9.5%</b>
<b>5</b>	3.3%	5.3%	2.9%	2.8%	<b>1.4%</b>
<b>6</b>	4.7%	6.1%	5.5%	4.8%	<b>9.8%</b>
<b>7</b>	5.9%	4.4%	4.8%	3.3%	<b>2.9%</b>
<b>8</b>	4.0%	3.9%	4.0%	3.9%	<b>5.5%</b>
<b>9</b>	5.8%	4.4%	2.8%	2.4%	<b>4.5%</b>
<b>10</b>	4.3%	1.2%	0.6%	3.3%	<b>1.1%</b>
<b>11</b>	2.3%	2.8%	0.0%	0.3%	<b>0.3%</b>
<b>Total</b>	5.6%	5.0%	4.7%	5.1%	<b>5.0%</b>

## Surface Condition by County

*Tables 5A and 5B* rank the counties in the State by average surface condition and percent poor for 2006. Schoharie and Otsego Counties have the highest average condition ratings (7.56 and 7.45), followed by Genesee (7.35), Broome and Erie, both at 7.33. Four of the five boroughs in Region 11 plus Seneca, Tompkins and Clinton Counties report no poor pavement. There are 15 counties with 1% or less poor pavement (one more than last year) compared to 11 counties with 10% or more (three more than last year). Putnam (20.3%), Rensselaer (18.4%) and Ontario (16.1%) have the highest percentage of poor pavement. Rensselaer County has the lowest average surface condition at 6.29, followed by Washington at 6.30 and Tioga and Yates at 6.34.

## Surface Condition by Pavement Type

*Table 6* provides a statewide summary of condition by pavement type and rating category. The State System is comprised of 6.6% rigid (PCC) pavements, 56.2% overlaid (composite) pavements, and 37.2% flexible (asphalt) pavements. The average condition rating of PCC pavement increased substantially, from 6.63 last year to 6.86 this year. The increase comes mostly from the completion of a large CPR project on I-88 in Region 9. Flexible pavements are now in the lowest condition at 6.82, and overlaid pavements, the most common

type of pavement on the state highway system, are the highest at 6.96.

## National Highway System

Established in 1995, the *National Highway System* (NHS) is an interconnected system of principal arterial routes serving major population centers, interstate and interregional travel, international border crossings, ports, and other intermodal facilities and national defense needs. The NYS Thruway Authority mileage is part of the NHS.

*Table 7* through *Table 9* present the number of lane-miles by pavement condition category for the National Highway System (NHS) by region and jurisdiction. *Table 7*, which includes the NYS Thruway Authority mileage, shows that approximately 76.7% of the entire NHS is in good to excellent condition, with only 3.5% in poor condition.

Comparing the data for State Highways in *Table 8* to the condition data for all State Highways in *Tables 2 and 3* shows that statewide and for all regions except Regions 5 who miss just slightly (but have the second highest amount of Good and Excellent pavement at 76.6%), conditions on the NHS are higher than the conditions for all State Highways. Good and Excellent pavement on the NHS is 74.3% vs 62.4% for all state highways, and 4.1% Poor vs 5.0%. This demonstrates that priority is being given to the higher functional class highways.



Table 5A

State Highway System 2006 County Rankings by Average Condition and Percent Poor							
Region	County	Name	Lane Miles	Average Condition	State Rank	% Poor (< 6)	State Rank
1	1	Albany	817	6.79	39	8.9%	49
1	2	Essex	785	6.40	58	11.7%	57
1	3	Greene	415	6.50	54	7.8%	45
1	4	Rensselaer	623	6.29	62	18.4%	61
1	5	Saratoga	730	7.17	11	3.0%	30
1	6	Schenectady	400	6.73	42	2.2%	23
1	7	Warren	563	6.58	47	2.8%	28
1	8	Washington	466	6.30	61	13.5%	59
1			4,798	6.62	10	8.7%	9
2	1	Fulton	287	6.71	43	0.6%	13
2	2	Hamilton	360	6.82	37	7.5%	44
2	3	Herkimer	503	6.86	32	6.5%	42
2	4	Madison	369	7.19	10	0.9%	15
2	5	Montgomery	388	6.92	27	3.5%	32
2	6	Oneida	1,066	7.04	18	1.3%	18
2			2,973	6.95	5	3.1%	6
3	1	Cayuga	574	6.87	31	4.2%	35
3	2	Cortland	466	6.80	38	2.5%	24
3	3	Onondaga	1,187	6.88	29	3.4%	31
3	4	Oswego	684	7.19	7	0.8%	14
3	5	Seneca	329	7.02	19	0.0%	1
3	6	Tompkins	350	6.67	46	0.0%	2
3			3,591	6.92	6	2.3%	4
4	1	Genesee	424	7.35	3	3.9%	34
4	2	Livingston	618	6.48	56	10.2%	53
4	3	Monroe	1,411	7.13	13	11.3%	56
4	4	Ontario	500	6.68	45	16.1%	60
4	5	Orleans	317	7.27	6	5.4%	39
4	6	Wyoming	420	7.06	16	3.8%	33
4	7	Wayne	376	6.96	24	8.7%	48
4			4,065	6.99	4	9.5%	10
5	1	Cattaraugus	727	6.98	21	4.6%	38
5	2	Chautauqua	812	6.91	28	1.2%	17
5	3	Erie	1,533	7.33	5	0.4%	8
5	4	Niagara	592	7.06	17	0.4%	9
5			3,664	7.12	3	1.4%	3

Table 5B

State Highway System 2006 County Rankings by Average Condition and Percent Poor							
Region	County	Name	Lane Miles	Average Condition	State Rank	Poor (< 6 )	State Rank
6	1	Allegany	536	6.51	52	12.1%	58
6	2	Chemung	321	6.50	53	10.7%	54
6	3	Schuyler	217	6.51	51	10.1%	52
6	4	Steuben	913	6.45	57	8.6%	47
6	5	Tioga	370	6.34	60	10.9%	55
6	6	Yates	218	6.34	59	5.7%	41
6			2,574	6.45	11	9.8%	11
7	1	Clinton	651	6.77	41	0.0%	3
7	2	Franklin	540	6.55	48	8.1%	46
7	3	Jefferson	917	6.96	25	0.5%	10
7	4	Lewis	296	6.93	26	2.6%	26
7	5	St. Lawrence	1,067	6.53	49	4.2%	36
7			3,472	6.73	9	2.9%	5
8	1	Columbia	609	6.79	40	9.4%	51
8	2	Dutchess	951	6.97	22	2.6%	25
8	3	Orange	1,023	6.85	35	2.7%	27
8	4	Putnam	349	6.50	55	20.3%	62
8	5	Rockland	273	7.10	15	1.8%	22
8	6	Ulster	631	6.97	23	0.6%	11
8	7	Westchester	1,495	6.99	20	7.0%	43
8			5,331	6.90	7	5.5%	8
9	1	Broome	890	7.33	4	3.0%	29
9	2	Chenango	555	7.19	8	4.4%	37
9	3	Delaware	774	6.83	36	9.1%	50
9	4	Otsego	679	7.45	2	5.7%	40
9	5	Schoharie	465	7.56	1	1.5%	20
9	6	Sullivan	514	6.87	30	1.6%	21
9			3,877	7.20	1	4.5%	7
10	3	Nassau	1,065	7.19	9	0.6%	12
10	7	Suffolk	1,662	7.10	14	1.3%	19
10			2,727	7.14	2	1.1%	2
11	1	Bronx	203	6.85	34	1.1%	16
11	2	Kings	138	6.51	50	0.0%	4
11	4	New York	79	6.85	33	0.0%	5
11	5	Queens	297	6.69	44	0.0%	6
11	6	Richmond	107	7.15	12	0.0%	7
11			825	6.78	8	0.3%	1
State			37,897	6.90	---	5.0%	---

Table 6

State Highway System 2006 Percent Lane-Miles by Pavement Type and Rating Category											
Category	Poor		Fair		Good		Excellent		Total		Avg Cond
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
Rigid Overlay Flexible	301	11.8%	623	24.4%	1,246	48.9%	323	14.9%	2,483	6.6%	6.86
	982	4.6%	6,295	29.7%	11,622	54.7%	2,386	11.0%	21,291	56.2%	6.96
	600	4.3%	5,426	38.4%	6,829	48.4%	1,264	9.0%	14,124	37.2%	6.82
State	1,883	5.0%	12,344	32.6%	19,697	52.0%	3,973	10.5%	37,897	100.0%	6.90

Table 7

2006 New York State National Highway System*									
Region	Poor		Fair		Good		Excellent		Total Lane Miles
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
1	32	1.9%	417	25.0%	972	58.2%	249	14.9%	1,670
2	0	0.0%	91	9.3%	791	80.7%	98	10.0%	980
3	7	0.5%	251	17.1%	993	67.4%	222	15.1%	1,473
4	156	9.8%	233	14.7%	900	56.5%	302	19.0%	1,592
5	20	1.2%	405	23.8%	1,126	66.2%	150	8.8%	1,701
6	97	11.7%	379	45.5%	232	27.9%	124	14.9%	832
7	0	0.0%	405	38.9%	430	41.3%	206	19.8%	1,040
8	176	5.9%	485	16.2%	2,029	67.9%	297	10.0%	2,987
9	74	4.9%	144	9.5%	1,011	66.9%	283	18.7%	1,512
10	13	0.7%	232	11.5%	1,619	80.2%	156	7.7%	2,019
11	2	0.3%	233	30.7%	487	64.1%	37	4.9%	759
Total	576	3.5%	3,276	19.8%	10,591	63.9%	2,125	12.8%	16,568

\* This table contains NYS Thruway Authority mileage. The LHI mileage is not included in this table. FHWA now requires reporting of IRI only for the HPMS and therefore the LHI was not surveyed.

Table 8

2006 National Highway System: State Highways Only									
Region	Poor		Fair		Good		Excellent		Total Lane Miles
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
1	32	2.3%	417	30.7%	684	50.3%	228	16.8%	1,361
2	0	0.0%	83	14.9%	386	69.2%	89	16.0%	559
3	7	0.5%	233	18.5%	800	63.4%	222	17.6%	1,261
4	156	12.2%	231	18.1%	649	50.9%	241	18.9%	1,278
5	20	1.6%	281	23.1%	835	68.6%	83	6.8%	1,218
6	97	11.7%	379	45.5%	232	27.9%	124	14.9%	832
7	0	0.0%	405	38.9%	430	41.3%	206	19.8%	1,040
8	176	7.5%	421	18.0%	1,509	64.7%	228	9.8%	2,333
9	74	4.9%	144	9.5%	1,011	66.9%	283	18.7%	1,512
10	13	0.7%	232	11.5%	1,619	80.2%	156	7.7%	2,019
11	2	0.3%	233	31.5%	466	63.1%	37	5.1%	738
<b>Total</b>	<b>576</b>	<b>4.1%</b>	<b>3,060</b>	<b>21.6%</b>	<b>8,621</b>	<b>60.9%</b>	<b>1,897</b>	<b>13.4%</b>	<b>14,153</b>

Table 9

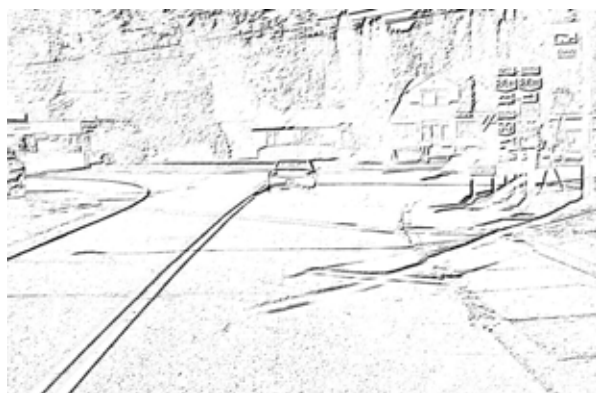
2006 National Highway System: NYS Thruway Authority									
Region	Poor		Fair		Good		Excellent		Total Lane Miles
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
1	0	0.0%	0	0.0%	288	93.1%	21	6.9%	309
2	0	0.0%	8	1.9%	405	96.1%	9	2.1%	421
3	0	0.0%	18	8.7%	194	91.3%	0	0.0%	212
4	0	0.0%	2	0.7%	251	79.8%	61	19.5%	314
5	0	0.0%	124	25.7%	292	60.4%	68	14.0%	484
6	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
7	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
8	0	0.0%	64	9.8%	521	79.6%	69	10.6%	654
9	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
10	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
11	0	0.0%	0	0.0%	21	100.0%	0	0.0%	21
<b>Total</b>	<b>0</b>	<b>0.0%</b>	<b>217</b>	<b>9.0%</b>	<b>1,970</b>	<b>81.6%</b>	<b>228</b>	<b>9.4%</b>	<b>2,415</b>

## Pavement Ride Quality

---

### Background

A pavement ride quality measurement known as the International Roughness Index (IRI) was originally developed by the World Bank during the 1970's to assess road conditions in developing countries for the purpose of allocating road improvement funding. Several more recent studies have shown that rough roads increase vehicle operating and maintenance costs, increase fuel consumption and actually increase the deterioration rate of the pavement.



Because of the importance of road smoothness to the traveling public and the economic impact of rough roads, IRI has been adopted by many countries, the FHWA and most states as a standard measure of the ride quality of a pavement. The units for IRI are inches per mile (or meters per kilometer); the higher the value, the greater the roughness. The IRI value is obtained by accurately measuring the profile of a road surface and calculating how a vehicle will respond to that profile at highway speeds. Certain types, or wavelengths, of

roughness are mathematically filtered out of the profile, just as the suspension of a car will dampen certain types of roughness as it travels over the road. The roughness reflected in the IRI value is basically the roughness a person would feel while riding in a typical car at 50 miles per hour.

The application of IRI adds another dimension to assessing road condition. It is possible for roads with little distress, and therefore relatively good condition ratings, to have rough rides. It is equally possible to have roads with significant distress and depending on the type of distress, to have relatively smooth riding surfaces. These distinctions can be used to further prioritize the application of available funding to achieve the greatest combined positive impact on the highway system for the benefit of the traveling public.

The Department began collecting IRI data with in-house resources in 2003. The data reported in the following charts and tables was collected mostly in 2004 and 2005. Because of the timing of the roughness survey, data collected in 2006 is not yet available for inclusion in this report. The user is directed to the Visidata program to obtain the most recent IRI data. Also available is data for rutting, faulting, and road geometry (radius of curve, grade, crossfall) and high resolution digital images.

## Pavement Ride Quality

IRI values can be grouped into categories to summarize the level of ride quality:

IRI Range	Category
$\leq 60$ in/mi	Very Smooth
$60 < \text{IRI} \leq 120$	Smooth
$120 < \text{IRI} \leq 170$	Fair
$170 < \text{IRI} \leq 220$	Rough
$> 220$ in/mi	Very Rough

Figure 2 shows the Average Ride Quality (IRI) vs the Average Surface Score for the Touring Route by region. It is desirable on this chart to have a high Surface Score (narrow cross-hatched bar) and a low IRI (wide solid bar). This would indicate low surface distress and good ride quality.

Region 3 has the best ride quality at 85 in/mi and a relatively high Surface Score. The upstate regions all fall in the Smooth ride quality category. Regions 8 and 10 fall into the Fair ride quality at 122 in/mi and 139 in/mi. Region 11, even though reporting only 0.3% Poor pavement, is

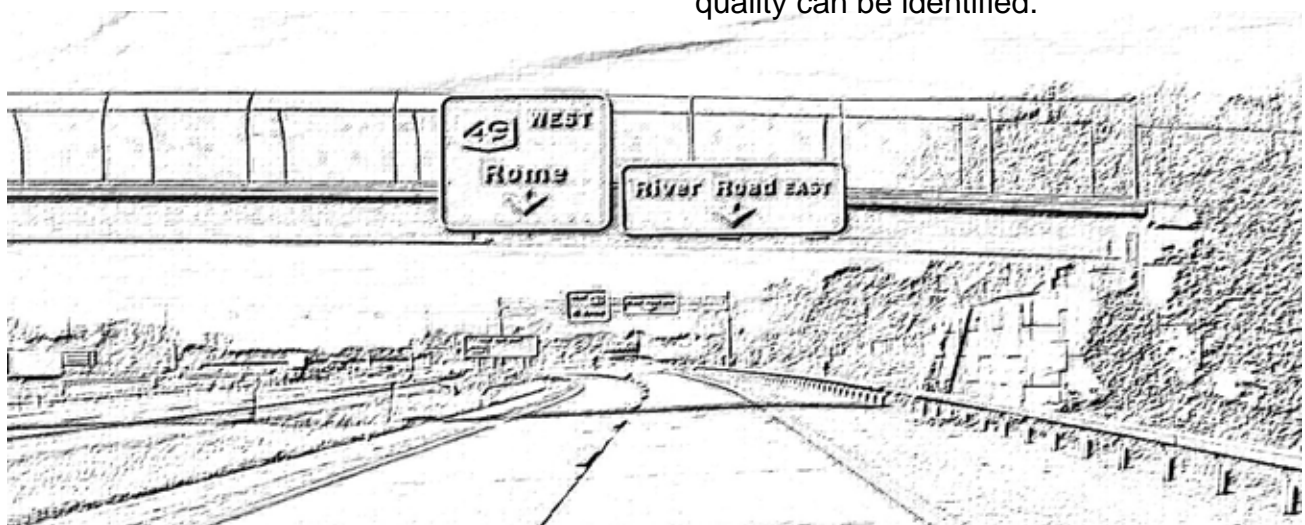
categorized as Rough ride quality (187 in/mi). Regions 6 and 7, despite having low Surface Scores, have reasonable ride quality (107 in/mi and 91 in/mi respectively).

Figure 3 compares the ride quality of the Interstates to the ride quality of the Touring Route by region. Most regions have about the same or better ride quality on the Interstates compared to the general Touring Route. One notable exception is Region 5, where Interstates have only a Fair ride quality.

Figures 4 and 5 present the distribution of ride quality for each region's Touring Route and Interstates.

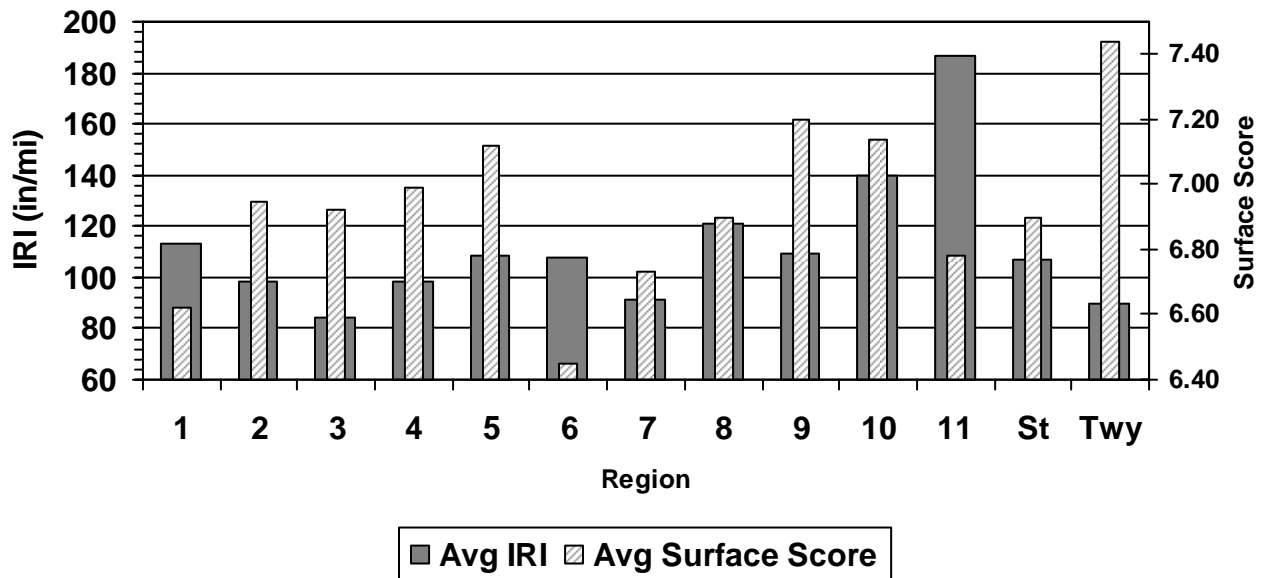
Tables 10 and 11 contain detailed ride quality data for each region and county. Overall, 50 counties have Smooth ride quality, 8 fall in the Fair category and 4 are Rough. Table 12 provides similar information for the Thruway.

A few more years of data are needed before any meaningful trends in ride quality can be identified.

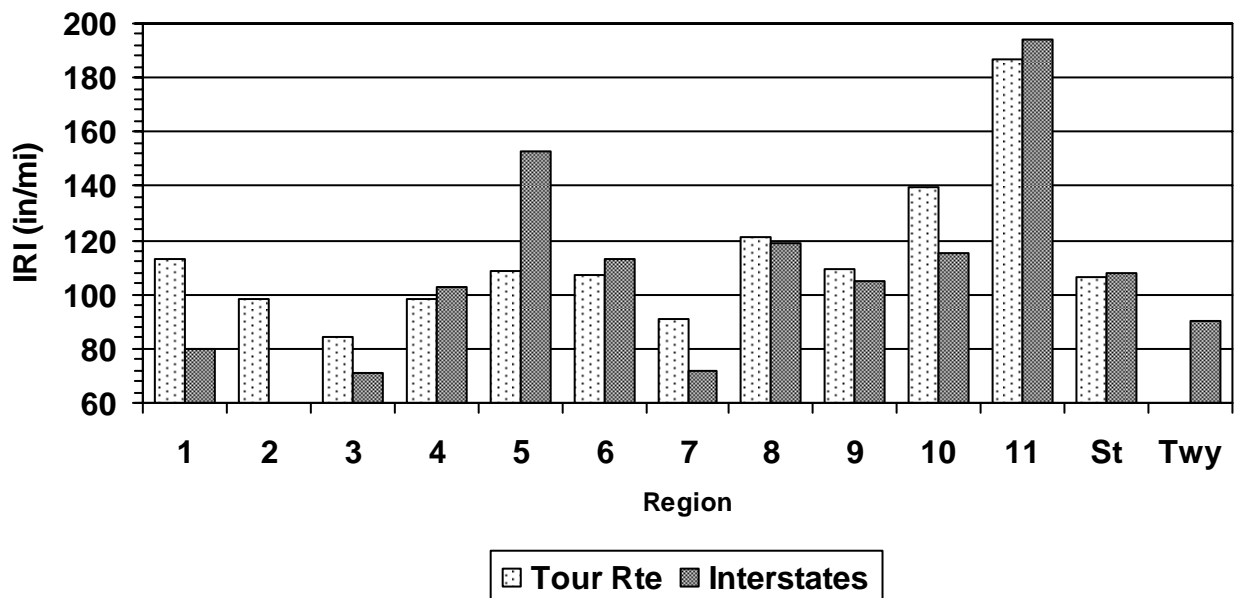




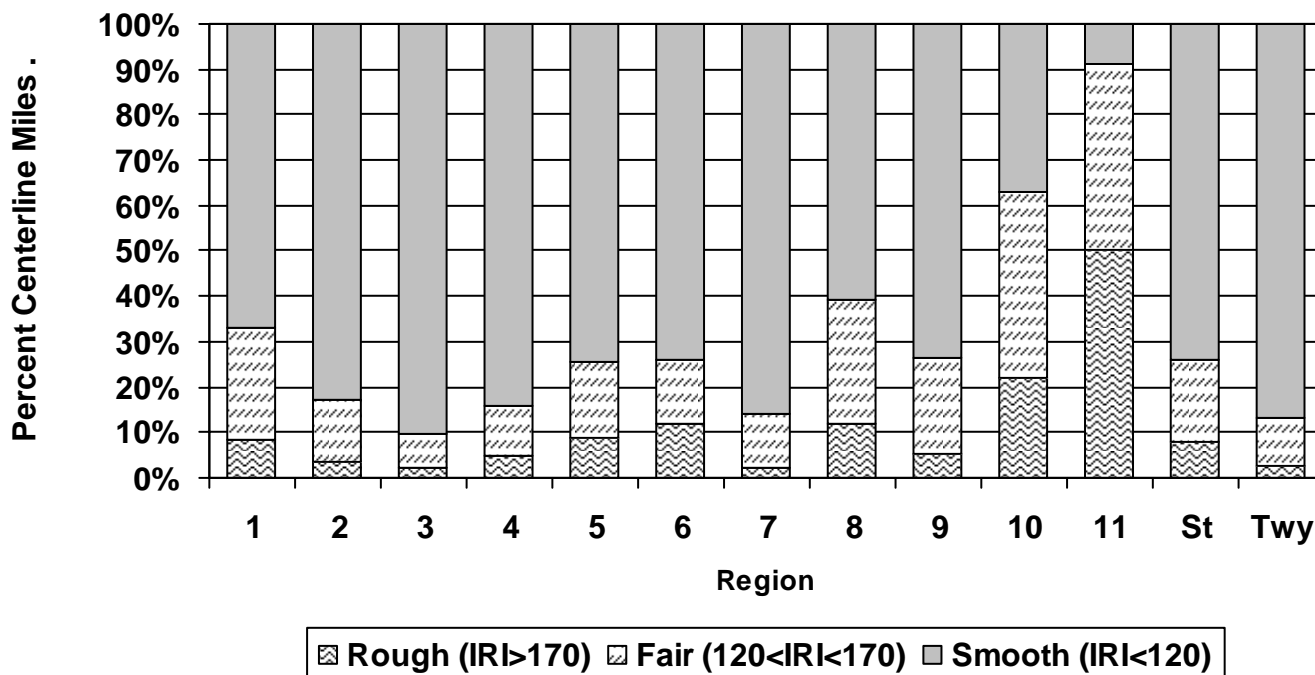
**Figure 2**  
**Average Ride Quality (IRI)**  
**vs Average Surface Score**  
 (Touring Route, 2004-05 data)



**Figure 3**  
**Average Ride Quality (IRI)**  
**Touring Route vs Interstates**  
 (2004-05 data)



**Figure 4**  
**Ride Quality (IRI) - Touring Route**  
 (2004-05 data)



**Figure 5**  
**Ride Quality (IRI) - Interstates**  
 (2004-05 data)

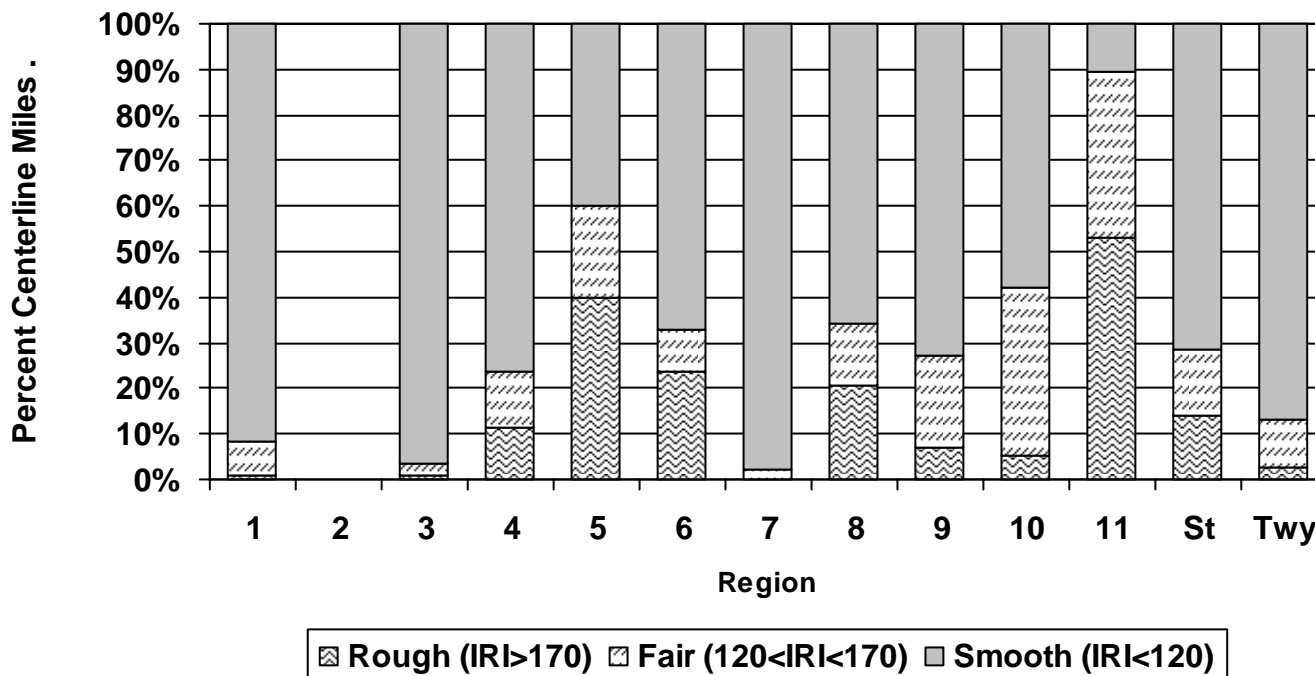


Table 10A

2005 IRI by Category and County - Touring Route							
County	Percent Collected	V. Smooth IRI<60	Percent Based on CLM			V. Rough IRI>220	AVG IRI (in/mi)
			Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220		
Region 1							
ALB	83.6%	7.4%	50.8%	27.3%	10.7%	3.8%	122
ESX	99.6%	1.2%	60.8%	29.7%	4.2%	4.0%	118
GRN	61.4%	0.0%	53.8%	35.3%	6.2%	4.8%	127
REN	95.6%	6.8%	49.1%	31.1%	10.8%	2.2%	117
SAR	94.5%	17.3%	63.7%	12.1%	1.8%	5.1%	99
SCH	92.3%	2.5%	74.1%	17.9%	4.1%	1.4%	105
WAR	99.7%	4.8%	58.8%	32.2%	4.2%	0.1%	110
WSH	99.8%	6.8%	67.6%	15.5%	4.9%	5.2%	109
Total	93.1%	6.1%	60.8%	24.6%	5.1%	3.3%	113
Region 2							
FUL	61.7%	8.3%	80.5%	9.2%	1.8%	0.1%	92
HAM	70.4%	0.1%	78.5%	17.8%	3.2%	0.5%	104
HRK	69.1%	1.1%	77.9%	13.6%	5.4%	2.0%	106
MAD	78.0%	23.3%	64.6%	11.1%	0.9%	0.1%	85
MTG	23.0%	0.0%	81.8%	15.2%	2.5%	0.6%	97
OND	87.5%	5.7%	76.5%	14.5%	2.8%	0.5%	100
Total	69.3%	6.6%	75.9%	13.8%	2.9%	0.7%	98
Region 3							
CAY	63.8%	16.4%	81.3%	2.0%	0.0%	0.3%	79
COR	95.7%	28.9%	60.5%	9.5%	0.5%	0.5%	79
ONO	99.1%	6.8%	74.4%	14.6%	2.9%	1.3%	98
OSW	99.8%	22.7%	72.2%	3.5%	1.1%	0.5%	76
SEN	100.0%	4.1%	92.1%	3.7%	0.0%	0.0%	80
TOM	65.8%	20.6%	73.6%	3.3%	1.4%	1.1%	81
Total	88.7%	15.5%	74.9%	7.6%	1.3%	0.7%	85
Region 4							
GEN	92.4%	0.0%	81.9%	12.3%	3.3%	2.4%	101
LIV	91.5%	0.4%	87.9%	7.0%	4.1%	0.6%	97
MNR	93.3%	1.6%	71.2%	17.6%	6.1%	3.5%	112
ONT	83.5%	3.0%	81.9%	11.6%	2.3%	1.1%	97
ORL	98.9%	5.6%	88.5%	4.0%	1.2%	0.8%	89
WYN	90.4%	7.2%	84.1%	7.3%	1.3%	0.0%	83
WYO	91.6%	4.8%	86.7%	7.6%	0.5%	0.4%	89
Total	91.6%	2.7%	81.2%	11.0%	3.4%	1.6%	99
Region 5							
CAT	75.9%	2.1%	66.3%	19.0%	5.5%	7.0%	117
CHA	89.1%	0.1%	75.1%	17.5%	7.0%	0.5%	108
ERI	98.3%	4.6%	69.8%	17.3%	6.5%	1.8%	107
NIA	99.9%	8.9%	70.0%	12.1%	5.3%	3.6%	105
Total	91.2%	3.8%	70.5%	16.7%	6.2%	2.8%	109

Table 10B

2005 IRI by Category and County - Touring Route							
County	Percent Collected	V. Smooth IRI<60	Percent Based on CLM			V. Rough IRI>220	AVG IRI (in/mi)
			Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220		
Region 6							
ALG	86.7%	3.9%	68.4%	15.3%	8.0%	4.5%	111
CMG	88.8%	9.1%	73.2%	8.4%	4.8%	4.4%	100
SHY	85.9%	2.7%	78.5%	5.2%	11.6%	1.9%	105
STU	82.5%	4.9%	64.9%	18.9%	9.0%	2.3%	109
TIO	79.4%	9.7%	55.9%	16.8%	12.8%	4.8%	112
YAT	62.8%	0.0%	87.9%	10.3%	1.2%	0.6%	100
Total	82.0%	5.3%	68.6%	14.5%	8.5%	3.2%	107
Region 7							
CLN	100.0%	13.7%	74.9%	10.2%	0.7%	0.5%	88
FRK	97.4%	5.7%	78.3%	13.1%	1.7%	1.3%	95
JEF	95.3%	7.3%	84.2%	6.8%	1.4%	0.3%	84
LEW	100.0%	4.9%	74.1%	19.3%	1.3%	0.4%	94
STL	98.5%	8.8%	74.3%	13.8%	1.8%	1.3%	96
Total	98.0%	8.4%	77.5%	11.9%	1.4%	0.8%	91
Region 8							
COL	84.2%	16.2%	63.8%	10.7%	5.4%	3.9%	101
DUT	67.2%	0.0%	66.1%	29.5%	3.4%	1.0%	114
ORG	57.2%	0.4%	71.0%	21.4%	3.5%	3.8%	115
PUT	78.3%	0.0%	48.9%	43.3%	6.2%	1.6%	126
ROC	83.7%	0.2%	45.1%	39.6%	9.8%	5.1%	134
ULS	66.5%	0.0%	70.6%	21.3%	6.7%	1.5%	117
WST	86.7%	2.7%	39.1%	35.8%	12.7%	9.7%	139
Total	73.3%	3.3%	57.5%	27.5%	7.2%	4.5%	121
Region 9							
BRM	93.4%	4.6%	67.2%	17.2%	5.0%	6.0%	115
CHN	89.9%	5.1%	67.8%	23.1%	1.9%	2.2%	105
DEL	76.9%	0.1%	66.0%	27.7%	4.9%	1.4%	112
OTS	93.7%	0.0%	77.4%	20.1%	1.1%	1.4%	107
SCO	70.5%	0.0%	87.3%	10.6%	1.5%	0.6%	103
SUL	65.5%	0.0%	73.7%	25.1%	0.5%	0.7%	109
Total	83.0%	1.9%	71.9%	21.1%	2.8%	2.3%	109
Region 10							
NAS	96.8%	0.5%	36.0%	40.8%	17.7%	5.0%	140
SUF	98.1%	0.0%	37.4%	40.7%	17.3%	4.6%	139
Total	97.7%	0.2%	37.0%	40.7%	17.4%	4.7%	139
Region 11							
BNX	87.5%	0.0%	12.9%	46.0%	23.6%	17.5%	171
KGS	95.3%	0.0%	3.9%	29.3%	10.1%	56.6%	228
QNS	100.0%	0.0%	8.8%	42.6%	24.3%	24.3%	182
RCH	96.0%	0.0%	14.0%	54.8%	17.2%	14.0%	166
NY	100.0%	0.0%	0.0%	20.1%	37.5%	42.3%	214
Total	96.0%	0.0%	8.8%	40.9%	22.7%	27.5%	187
State	86.1%	5.6%	68.3%	18.4%	5.1%	2.7%	107

Table 11A

2005 IRI by Category and County – Interstates							
County	Percent Collected	V. Smooth IRI<60	Percent Based on CLM			V. Rough IRI>220	AVG IRI (in/mi)
			Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220		
Region 1							
ALB	96.9%	26.4%	56.9%	11.1%	5.6%	0.0%	81
ESX	99.5%	5.5%	87.1%	7.5%	0.0%	0.0%	82
GRN	-	-	-	-	-	-	-
REN	100.0%	1.5%	61.4%	33.6%	3.4%	0.0%	97
SAR	100.0%	35.9%	64.1%	0.0%	0.0%	0.0%	70
SCH	99.7%	1.6%	79.5%	13.8%	3.1%	1.9%	92
WAR	100.0%	26.4%	73.6%	0.0%	0.0%	0.0%	73
WSH	-	-	-	-	-	-	-
Total	99.8%	15.8%	76.0%	7.2%	0.7%	0.3%	80
Region 2							
FUL	-	-	-	-	-	-	-
HAM	-	-	-	-	-	-	-
HRK	-	-	-	-	-	-	-
MAD	-	-	-	-	-	-	-
MTG	-	-	-	-	-	-	-
OND	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
Region 3							
CAY	-	-	-	-	-	-	-
COR	92.5%	54.3%	45.7%	0.0%	0.0%	0.0%	60
ONO	100.0%	12.2%	81.1%	5.3%	1.4%	0.0%	80
OSW	99.8%	56.1%	43.9%	0.0%	0.0%	0.0%	61
SEN	-	-	-	-	-	-	-
TOM	-	-	-	-	-	-	-
Total	98.2%	32.8%	63.7%	2.8%	0.7%	0.0%	71
Region 4							
GEN	68.8%	0.0%	100.0%	0.0%	0.0%	0.0%	64
LIV	99.5%	2.1%	67.0%	7.9%	23.0%	0.0%	119
MNR	99.2%	6.5%	73.1%	15.7%	3.1%	1.6%	94
ONT	78.1%	0.0%	100.0%	0.0%	0.0%	0.0%	75
ORL	-	-	-	-	-	-	-
WYN	-	-	-	-	-	-	-
WYO	-	-	-	-	-	-	-
Total	98.5%	7.2%	69.0%	12.4%	10.4%	0.9%	103
Region 5							
CAT	100.0%	0.0%	20.1%	28.9%	20.4%	30.6%	181
CHA	100.0%	0.0%	45.2%	15.0%	38.7%	1.1%	140
ERI	100.0%	2.6%	73.5%	6.4%	17.5%	0.0%	109
NIA	93.0%	0.0%	77.2%	19.2%	3.6%	0.0%	112
Total	99.6%	0.4%	39.6%	20.4%	25.2%	14.5%	153

Table 11B

2005 IRI by Category and County – Interstates							
County	Percent Collected	Percent Based on CLM					AVG IRI (in/mi)
		V. Smooth IRI<60	Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220	V. Rough IRI>220	
Region 6							
ALG	99.3%	18.6%	47.8%	2.4%	13.5%	17.7%	120
CMG	75.1%	6.8%	52.7%	2.5%	21.3%	16.7%	129
SHY	-	-	-	-	-	-	-
STU	98.9%	0.6%	56.2%	17.7%	21.2%	4.3%	121
TIO	100.0%	22.8%	76.4%	0.7%	0.1%	0.0%	71
YAT	-	-	-	-	-	-	-
Total	95.2%	9.4%	57.6%	9.3%	15.7%	8.1%	113
Region 7							
CLN	100.0%	37.7%	60.9%	1.4%	0.0%	0.0%	67
FRK	-	-	-	-	-	-	-
JEF	100.0%	11.1%	86.0%	2.9%	0.0%	0.0%	75
LEW	-	-	-	-	-	-	-
STL	-	-	-	-	-	-	-
Total	100.0%	22.3%	75.5%	2.3%	0.0%	0.0%	72
Region 8							
COL	-	-	-	-	-	-	-
DUT	-	-	-	-	-	-	-
ORG	48.8%	3.1%	84.8%	8.2%	2.3%	1.6%	97
PUT	31.3%	0.0%	0.0%	47.1%	31.0%	21.9%	191
ROC	100.0%	2.5%	45.6%	32.9%	13.9%	5.1%	129
ULS	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	200
WST	68.7%	0.4%	65.1%	6.2%	10.5%	17.8%	123
Total	49.3%	1.7%	64.1%	13.4%	11.0%	9.8%	119
Region 9							
BRM	95.4%	6.1%	75.9%	12.6%	2.4%	2.9%	95
CHN	100.0%	7.9%	77.7%	14.4%	0.0%	0.0%	83
DEL	100.0%	0.2%	69.1%	14.8%	12.8%	3.2%	111
OTS	100.0%	0.0%	22.1%	73.9%	1.1%	3.0%	144
SCO	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	89
SUL	100.0%	0.0%	95.6%	4.4%	0.0%	0.0%	97
Total	98.4%	2.6%	72.3%	19.6%	3.5%	2.1%	105
Region 10							
NAS	100.0%	0.0%	92.6%	7.4%	0.0%	0.0%	96
SUF	100.0%	0.0%	44.4%	48.2%	7.4%	0.0%	122
Total	100.0%	0.0%	57.9%	36.8%	5.3%	0.0%	115
Region 11							
BNX	99.3%	0.0%	15.1%	38.1%	26.1%	20.6%	175
KGS	98.4%	0.0%	6.1%	6.0%	3.9%	84.0%	261
QNS	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	410
RCH	97.8%	0.0%	10.8%	40.8%	23.4%	25.1%	183
NY	98.1%	0.0%	0.0%	69.0%	20.6%	10.4%	173
Total	98.4%	0.0%	10.4%	36.5%	20.6%	32.5%	194
State	83.2%	10.8%	56.3%	16.4%	10.2%	6.4%	110

Interstates include the divided portion of Route 17. Thruway owned/maintained Interstates are not included.

Table 12

2005 IRI by Category and Division – Thruway							
Division	Percent Collected	V.Smooth IRI<60	Percent Based on CLM			V.Rough IRI>220	AVG IRI (in/mi)
			Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220		
Mainline							
NY I-87	92.8%	0.8%	74.4%	21.4%	2.7%	0.6%	106
ALB I-87	95.1%	21.6%	74.0%	4.4%	0.0%	0.0%	76
ALB I-90	94.4%	13.5%	85.2%	1.3%	0.0%	0.0%	80
SYR I-90	98.8%	16.8%	76.1%	5.3%	1.6%	0.1%	82
BUF I-90	95.4%	15.9%	72.3%	10.2%	1.1%	0.4%	88
All Mainline	96.0%	14.8%	75.4%	8.4%	1.2%	0.3%	86
MIDD I-84	92.3%	0.5%	85.2%	10.4%	2.3%	1.6%	101
EF I-84	95.8%	0.0%	54.8%	36.4%	5.4%	3.4%	119
All I-84	93.8%	0.3%	72.0%	21.6%	3.7%	2.4%	109
BRKS	86.1%	32.4%	62.9%	2.9%	1.0%	1.0%	78
CWE I-287	79.2%	0.0%	47.6%	47.6%	2.4%	2.4%	125
NIAG I-190	71.0%	14.3%	71.4%	11.0%	3.2%	0.0%	89
NE I-95	74.0%	43.9%	10.5%	12.3%	21.1%	12.3%	120
GSP	92.0%	0.0%	91.3%	4.3%	4.3%	0.0%	98
All Twy	93.7%	14.0%	72.9%	10.4%	1.9%	0.8%	90

## Network-Level Pavement Needs

---

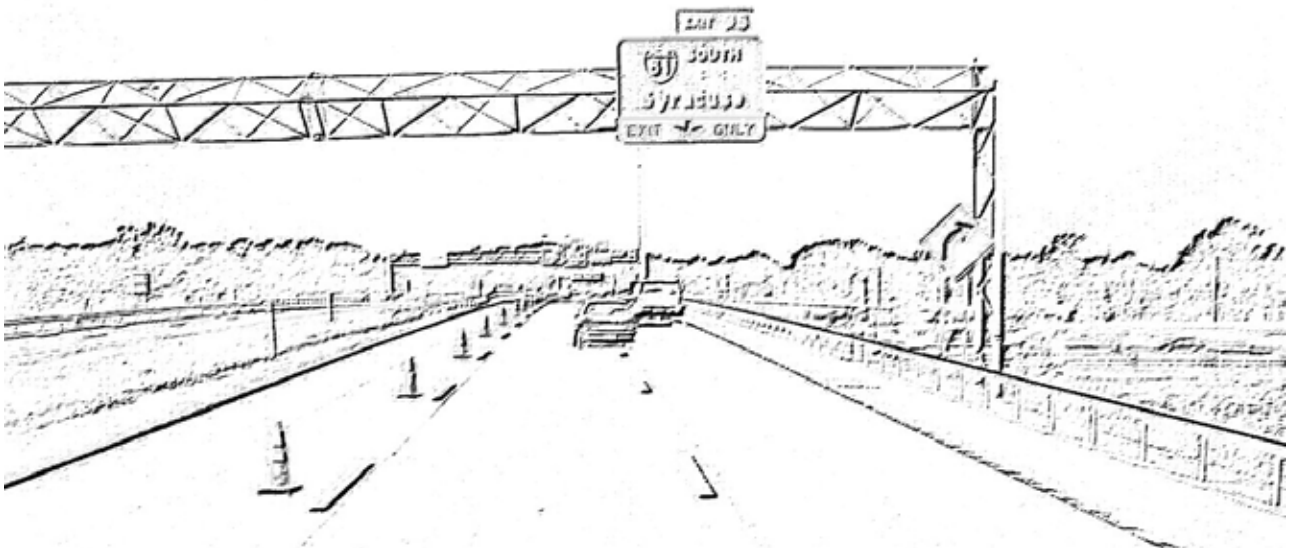
### Treatment Categories

Pavement treatment strategies currently available can be classified into six general categories:

1. *Do Nothing*
2. *Preventive Maintenance Non-paving* - joint and crack sealing and filling, minor spall repair.
3. *Preventive Maintenance Overlays* - single-course (1-½") overlays, microsurfacing, surface treatments and other thin overlays intended to seal the pavement surface.
4. *Corrective Maintenance* - applies to HMA and PCC pavements and includes for PCC: resealing joints, spall repair, grinding and isolated full-depth segment replacement; and for HMA: mill and fill, cold or hot in-place recycling with single course overlay.
5. *Rehabilitation* - multi-course overlays with or without milling or recycling, crack and seat, rubblizing, joint replacement, and isolated full depth segment replacement.
6. *Reconstruction* - full depth asphalt or concrete replacement.

A simple algorithm is used to assign pavements with specific combinations of surface score and dominant distress to one of the six treatment categories described above. This analysis is used to provide a network level estimate of pavement needs. It should be noted that specific project level decisions may assign another treatment based on additional detailed information.

The algorithm used to estimate network level pavement needs is summarized in Table 13.





**Table 13: Algorithm for Estimating Network Level Pavement Needs**

Score	PCC				Asphalt			Overlay				
	Fault	Spall Genl	Spall Iso	None	Allig Genl	Allig Iso	None	Allig Genl	Allig Iso	Allig Iso & Wide Drop	Wide Drop	None
1-4	6				6			6				
5	5				5			5				
6					4	4	3	4	4	4	4	3
7	4	4	2	2	3	3	3	3	3	3	2	2
8	N/A			2	N/A		2	N/A				2
9-10	N/A			1	N/A		1	N/A				1

1 - Do Nothing

2 - Preventive Maintenance Non-Paving

3 - Preventive Maintenance Overlays

4 - Corrective Maintenance

5 - Rehabilitation

6 - Reconstruction

## Pavement Needs

As shown in Table 14, it is estimated that 10.5% of the State Highway system falls in the Do Nothing category. This indicates that almost 90% of the State Highway System is in need of some type of maintenance or rehabilitation action.

About 21% of pavements are candidates for crack sealing, 33.6% are in need of preventive maintenance paving, 28.6% need corrective maintenance, 6.3% need rehabilitation, and only about 0.4%, representing 129 lane miles, need to be reconstructed.

Table 14

State Highway System 2006 Lane-Miles by Treatment Category													
Region	Total Lane Miles	Do Nothing		Preventive Maintenance (Non-Paving)		Preventive Maintenance (Paving)		Corrective Maintenance		Rehabilitation		Reconstruction	
		Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%
1	4,798	371	7.7%	757	15.8%	1,220	25.4%	1,975	41.2%	406	8.5%	69	1.5%
2	2,973	269	9.0%	503	16.9%	1,416	47.6%	687	23.1%	84	2.8%	15	0.5%
3	3,590	423	11.8%	697	19.4%	1,113	31.0%	1,276	35.5%	81	2.3%	0	0.0%
4	4,065	663	16.3%	574	14.1%	1,252	30.8%	1,186	29.2%	379	9.3%	12	0.3%
5	3,664	340	9.3%	979	26.7%	1,472	40.2%	655	17.9%	218	5.9%	0	0.0%
6	2,574	191	7.4%	147	5.7%	532	20.7%	1,337	51.9%	367	14.3%	0	0.0%
7	3,472	409	11.8%	478	13.8%	822	23.7%	1,662	47.9%	88	2.5%	13	0.4%
8	5,331	393	7.4%	1,499	28.1%	2,118	39.7%	971	18.2%	336	6.3%	15	0.3%
9	3,877	582	15.0%	1,013	26.1%	1,480	38.2%	556	14.3%	241	6.2%	5	0.1%
10	2,727	296	10.9%	696	25.5%	1,138	41.7%	522	19.2%	76	2.8%	0	0.0%
11	825	37	4.5%	518	62.8%	176	21.3%	0	0.0%	94	11.4%	0	0.0%
State	37,896	3,974	10.5%	7,861	20.7%	12,739	33.6%	10,827	28.6%	2,370	6.3%	129	0.4%

## Survey Quality Assurance Procedures

---

### Annual Training Session

The success of the pavement management program depends on the ability to collect accurate, consistent, and reliable data on pavement condition. The core of the Pavement Condition Rating Quality Assurance effort is the Annual Highway Condition Survey Training Session conducted each spring at the NYSDOT Main Office in Albany. Through classroom and field exercises, the regional rating teams learn to distinguish the surface conditions and dominant distress features.

The purpose of the classroom practice rating is to develop a consensus among the regional raters in their use of the condition rating scales to determine appropriate surface condition ratings, and to help the raters gain confidence in their pavement condition rating abilities. Following the in-house practice rating,



the regional teams are taken on a field trip to rate several miles of pavements. The field rating exercise is specifically designed to test the raters' ability to use the condition rating manual and develop appropriate rating practices to ensure pavements are evaluated in a consistent and accurate manner.

### Shadow Scoring Activity

To assess and monitor the quality of ratings in the condition survey, a sample of pavements statewide are re-scored by an expert rating team from the main office. The ratings from the main office shadow scoring team are compared to the ratings assigned by each regional team, and various statistical measurements are applied to evaluate the consistency and accuracy in rating provided by the regional teams. Approximately 2,550 sections totaling 5,478 lane miles were shadow scored in 2006 by the main office team (usually only about 3,000 lane miles are shadow scored).

### Statistical Measures & Analysis

Several statistical measures are employed to analyze the accuracy and consistency of the condition survey ratings. These are:

- The Percent of Ratings Within +/- 1 Scale Point
- The Average Scoring Error
- The Absolute Scoring Difference

### ***The Percent of Ratings Within +/- 1 Scale Point***

One of the measures used to assess the accuracy of the condition ratings is the percent of sections rated within 1 point by the two rating teams. Results from the shadow scoring efforts for the past five years show that about 95% of all shadow ratings were within 1 scale point of the region's ratings. These results show the ratings have been conducted in a manner sufficiently consistent and accurate to support network-level analyses and summaries.

### ***The Average Scoring Error***

The average scoring error is computed using the formula shown below. To compute the average scoring error the differences in ratings provided by the region and shadow teams are summed for all sections surveyed and divided by the total number of sections rated. These figures provide an average estimate of the degree to which a region "over" or "under" rates relative to the main office shadow team. The average scoring error statistic provides a measure of the direction of rating bias.

Average Scoring Error =

$$\frac{1}{n_j} \sum_{i=1}^{n_j} (r_i - s_i)$$

$r_i$  = region ratings

$s_i$  = shadow ratings

$n_j$  = number of sections evaluated in Region J

### ***The Absolute Scoring Difference***

The absolute rating difference statistic identifies where rating differences exist and the magnitude of rating error. It is computed by summing the absolute value of the rating difference between region and shadow ratings and dividing this value by the total number of sections surveyed. This is useful in providing a reference to evaluate network-level condition estimates. In other words, the average scoring error per section provides the direction of rating bias, while the absolute scoring difference provides the magnitude of the scoring error.



Table 15 presents the results of the 2006 shadow scoring effort. Overall, the results show continued rating consistency with 97.3% of the rating judgments by the shadow rating team within one point of the region's condition ratings. Over the last five years, this value has ranged from a low of 96.8% to a high of 97.9%, and averaged 97.2%. Differences of greater than one point have remained relatively consistent over the past few years, and are generally indicative of repair work undertaken between rating trips by regional and main office teams. The absolute scoring error statewide of 0.33 is consistent with previous year's results.

Figure 6 presents the average scoring error by region and statewide. The average scoring error per section statewide is -0.13, which indicates that on average the region ratings are slightly lower than the shadow scores.

This year's results show striking consistency of the region scores between each other, with most Average Scoring Errors between -0.15 and -0.23. These errors are actually quite small, as errors of 0.4 to 0.6 have been observed in prior years. Regions 6, 9 and 10 have very small scoring errors.

The shadow scoring results show that the 2006 rating process has produced reliable, accurate and consistent pavement condition ratings. These findings demonstrate the benefits of carefully designed quality assurance procedures utilizing intensive training and monitoring of rating procedures, and show the 2006 NYSDOT pavement condition ratings are sufficiently accurate for network-level summaries and analysis.

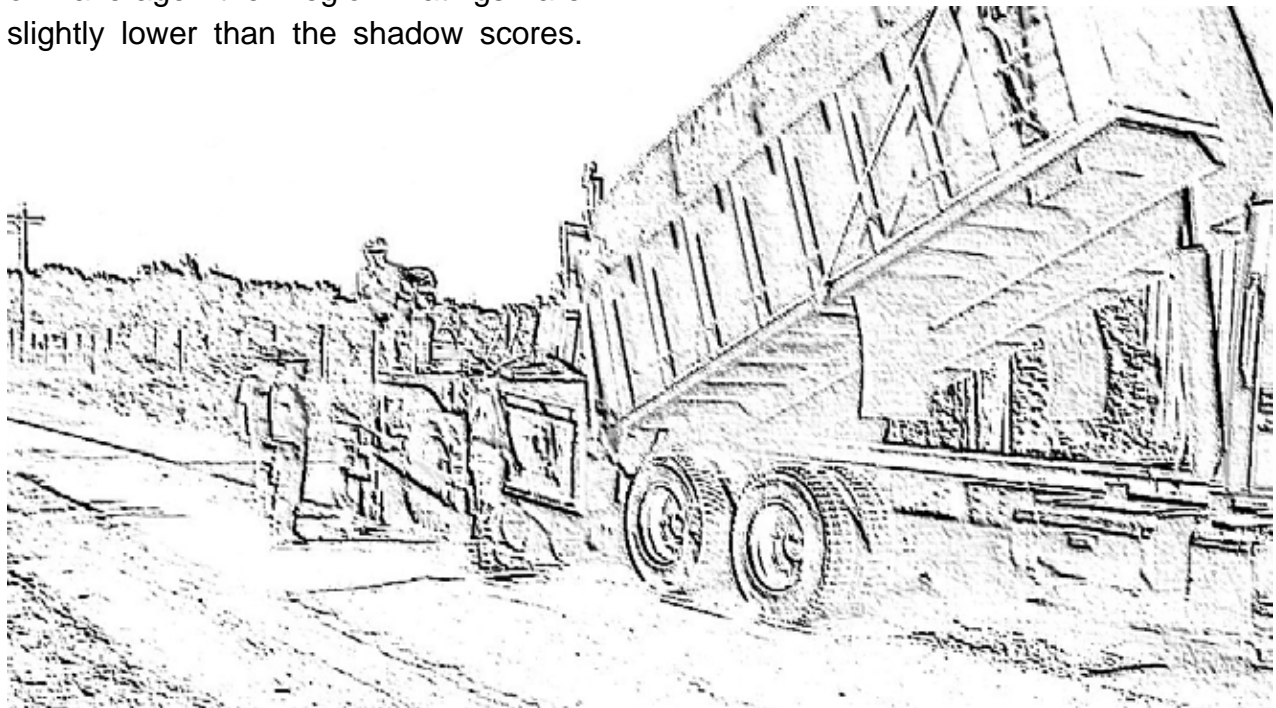


Table 15

2006 Shadow Scoring Results			
Region	Percent +/- 1 Point	Average Scoring Error	Absolute Scoring Error
1	98.8%	-0.15	0.28
2	98.9%	-0.15	0.28
3	95.9%	-0.17	0.32
4	99.1%	-0.23	0.33
5	98.0%	-0.17	0.30
6	99.3%	-0.03	0.28
7	97.6%	-0.18	0.45
8	93.3%	-0.13	0.36
9	96.7%	0.03	0.42
10	97.9%	-0.02	0.28
11	94.5%	-0.10	0.26
State	97.3%	-0.13	0.33

Figure 6

### 2006 Shadow Scoring Results Average Scoring Error by Region

