

Pavement Condition of New York's Highways



2004

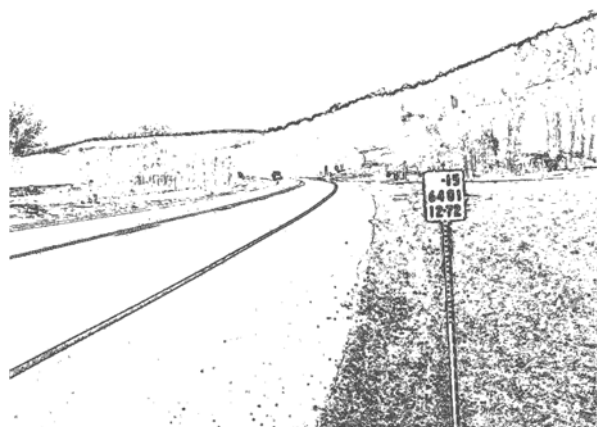


New York State Department of Transportation

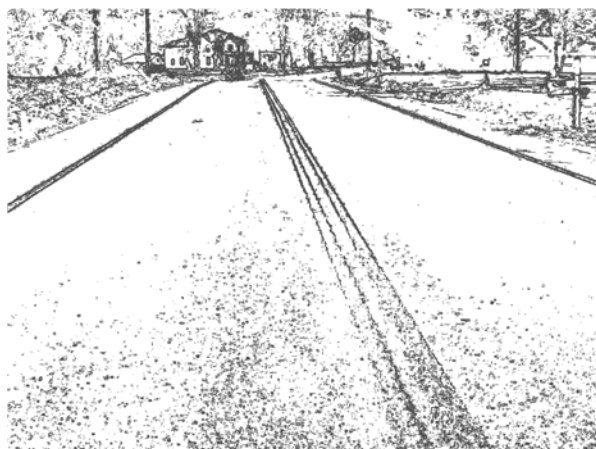
Preface

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

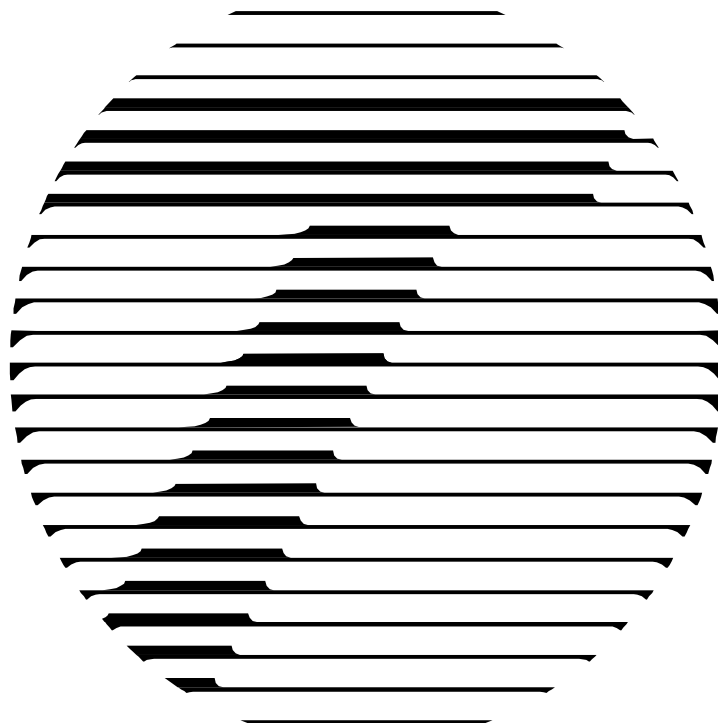


conducted in May and June and represents the condition of the system at that point in time. The impact of pavement improvement projects completed after the survey are therefore not reflected in the condition summaries.



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

Pavement Management Services
New York State Dept. of Transportation
50 Wolf Road – POD 32
Albany, New York 12232
(518) 457-1965

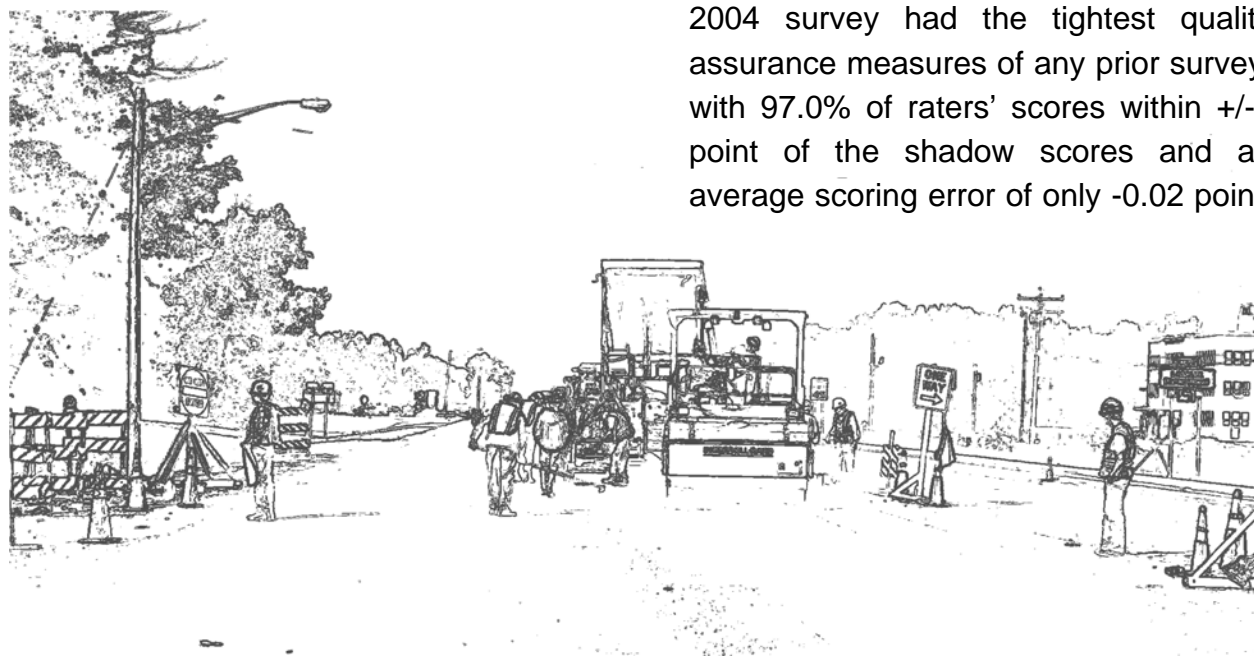


Executive Summary

State System Condition

The results of the 2004 pavement condition survey confirm that a trend of declining pavement conditions has developed. The Average Condition Rating dropped again this year to 6.82, down from a high of 7.05 four years ago and 7.00 two years ago. Fair pavements have been increasing steadily since 2000, up almost 3% over last year to 31.9%. Pavements rated 6 (fair) or 7 (low good) now make up 78.9% of all state highway pavements, the highest percentage since scoring began in 1981.

In the other categories, good and excellent pavement declined for the fourth year in a row to 63.4%, and poor pavement decreased slightly to 4.7%, continuing its long term decline.



Condition by Region

Average Pavement Conditions improved slightly in four regions, declined sharply in four regions and stayed about the same in three. Regions 5, 9 and 10 have the best overall condition with average condition ratings of 7.14, 7.08 and 7.01 respectively. Region 7 has the lowest overall condition at 6.26 followed by Region 1 at 6.58, and Region 6 at 6.76.

Implementation of E-Score

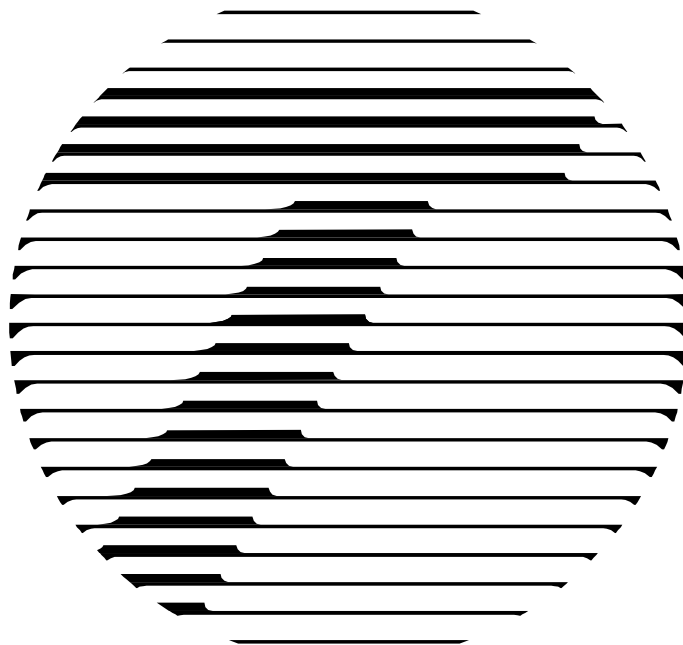
E-Score, an electronic system to document pavement scores in the field, was used statewide this year for the first time. Intuitively, the use of *E-Score* may have had a stabilizing influence on scores. However, a review of the Shadow Scoring data shows that the 2004 survey had the tightest quality assurance measures of any prior survey, with 97.0% of raters' scores within +/-1 point of the shadow scores and an average scoring error of only -0.02 point.

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
Implementation of E-Score	4
Pavement Condition Survey Results	6
Extent of System	6
State Highway System	6
Surface Condition by Region	6
Surface Condition by County	13
Surface Condition by Pavement Type	13
National Highway System	13
Pavement Roughness	18
Network-Level Pavement Needs	19
Treatment Categories	19
Pavement Needs	20
Survey Quality Assurance Procedures	22
Annual Training Session	22
Shadow Scoring Activity	22
Statistical Measures & Analysis	22
Percent of Ratings Within +/- 1 Scale Point	23
Average Rating Error	23
Absolute Rating Difference	23

List of Tables and Figures

	Page
Table 1: Touring Route System 2004	8
Table 2: Surface Condition, 2000 - 2004, State Highway System	9
Figure 1: State Highway Condition Trends	10
Table 3: State Highway System - 2004 Surface Condition by Region	11
Table 4: State Highway System - Regional Trends 2000 - 2004, Average Condition Ratings and Percent Below 6, Poor Pavement	12
Table 5: State Highway System - 2004 County Rankings	14
Table 6: State Highway System - 2004 Percent Lane-Miles by Pavement Type and Rating Category	16
Table 7: 2004 New York State National Highway System	16
Table 8: 2004 National Highway System: State Highways Only	17
Table 9: 2004 National Highway System: NYS Thruway Authority	17
Table 10: Algorithm for Estimating Network-Level Pavement Needs	20
Table 11: State Highway System - 2004 Lane-Miles by Treatment Category	21
Table 12: 2004 Shadow Scoring Results	25
Figure 2: 2004 Shadow Scoring Results - Average Scoring Error	25



An aerial photograph of a multi-lane highway, likely in New York, showing traffic including cars and trucks. The highway is flanked by dense trees and foliage. The image is in black and white, with a high-contrast, almost graphic quality.

Pavement Condition of New York's Highways

2004

Pavement Condition of New York's Highways: 2004

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 2004 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.

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:

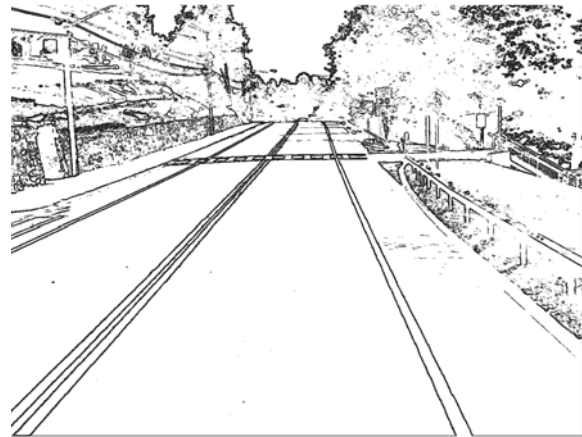
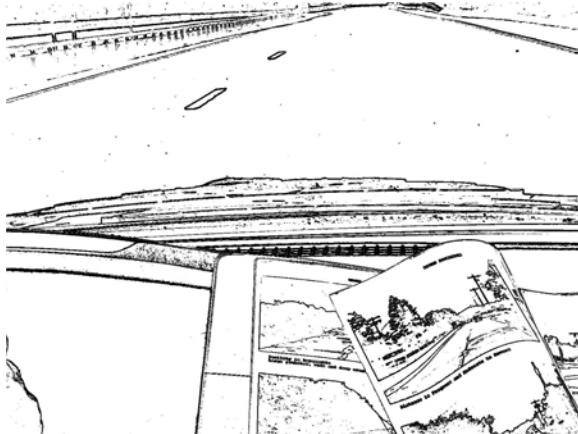
The Surface Condition Rating Scale

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.

Implementation of E-Score

During the traditional pavement survey, ratings and changes to the highway inventory were hand written by the field raters on large paper computer printouts.

The information from the paper sheets would then be transposed by hand to coding sheets, keypunched, then uploaded to a mainframe computer. This paper process was time consuming, prone to errors and required a lot of edit checking.

The E-Score (Electronic Documentation of Pavement Scores) project was designed to capture 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 was used statewide for the first time in 2004.

By design, the E-Score interface provides the raters with last year's score. This is to help reduce the waffling of scores when a pavement condition approaches the boundary between ratings, thereby improving the data quality and its usefulness for trend analysis. Intuitively, knowing the prior year score may cause a stabilizing effect on the current year ratings because the rater must make an intentional decision to change the score.

Nevertheless, the Shadow Scoring results (described later in this report) show that the 2004 survey had the tightest quality assurance measures of any prior survey assessed using the current set of statistical measures. The E-Score system is determined to be successful as it allowed the field survey to be conducted more quickly, had tremendous time savings in post processing and produced high quality data. Improvements under way to the system will further enhance the benefits in future surveys.

Typical E-Score display

The screenshot displays the E-Score PCS software interface. At the top, it shows the title 'E-Score PCS' and 'NYSDOT E-Score Pavement Condition Survey'. Below this, there are fields for 'Region' (1), 'County' (Albany), and 'Route' (87I 11077). A 'Miles from Start' field shows 2.551. There are also fields for 'GPS UTM X' and 'GPS UTM Y'. A 'TOTAL MILES' field shows 3.4 and a '75%' progress indicator. An 'EXIT' button is present. Below these fields, there are 'Previous Landmark' and 'Next Landmark' fields with dropdown menus. The 'Previous Landmark' is 'VILLAGE COLONIE SAND CREEK ROAD UNDER (1.54 mi) 87I11082016' and the 'Next Landmark' is 'EXIT 4 ALBANY SHAKER ROAD UNDER (2.73 mi) 87I11082028'. The main interface is divided into two sections: 'Roadway Characteristics (Inventory)' and 'Pavement Condition'. The 'Roadway Characteristics' section includes fields for 'Median Type' (3), 'Median Width' (0), 'Pavement Width' (72), 'Shoulder Width' (10), 'Pavement Type' (OVL), 'Shoulder Type' (4), 'Yr Last Work' (88), and 'Work Type'. The 'Pavement Condition' section includes a 'Score' field (7), 'Dominant Distress 1' (Ag), and 'Dominant Distress 2' (Ag). There is a grid of buttons for selecting distress types: 10, 9, 8, 7, 6, 5, 4, 3, U, Ai, Si, Ag, Sg, W, F. At the bottom, there are 'START', 'STOP', 'FILL', and 'CLEAR' buttons. The interface also includes a taskbar at the bottom with a 'Start' button and a system clock showing 10:24 AM.

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. About 10-20 lane miles are added to the Touring Route System each year, reaching 41,172 lane miles in 2004. It should be noted that mileage under construction at the time of the survey, which can be several hundred miles, are *not* included in any of the condition summaries presented in this report.

State Highway System

Condition Trends - Statewide

Table 2 and *Figure 1* illustrate the statewide trends in pavement surface condition for State-owned highways from 2000 through 2004. Pavement conditions generally improved from 1994 through about 2002 as a result of a robust paving program. However, competing priorities have diverted resources from the pavement program over the last few years and a trend of declining conditions has developed.

Pavements rated Good and Excellent have declined for the fourth year in a row, falling from a high of 69.8% in 2000 to 63.4% this year. More telling is Fair pavements have been steadily increasing since 2000, reaching 31.9%

in 2004, an increase of 1,021 lane miles, or 2.8%, over last year.

Pavements rated 7 fell to 47.0% this year from the all-time high of 47.9% last year, the first decrease since 1992 as more pavement slipped into the Fair category. Pavements rated 6 or 7 now make up 78.9% of all state highway pavements, the highest percentage since scoring began in 1981.

Poor pavements continued to decline, falling slightly from 5.0% in 2003 to 4.7% this year, a reduction of 110 lane miles. However, the overall average condition rating also declined for the second year in a row, slipping from 6.86 to 6.82.

Surface Condition by Region

Table 3 presents the distribution of surface condition ratings by region for 2004, as well as the percentage and number of lane-miles in each condition category. Region 7 has the most lane miles of Fair pavement at 2,550, which is 74.2% of their system. Region 1 has the most lane miles of Poor pavement at 475, comprising 10.0% of their lane miles. Region 10 has the highest percentage of Good and Excellent pavement at 86.5%, but they also have the highest percent of lane miles of pavement rated 7 at 76.7%.

Table 4 presents the average condition ratings and percent poor pavement by region for the years 2000-2004. Overall, four regions improved slightly, three stayed about the same, and four regions declined sharply.

Region 5 made the largest improvement in average score and has the highest average condition rating at 7.14. Region 9 has the second highest average score of 7.08 and also made the second largest improvement in score.

Regions 1, 7 and 8 had declines in average condition rating, continuing

downward trends over the last few years. Region 1 fell 0.23 points to 6.58, Region 7 fell 0.19 points to 6.26, and Region 8 fell 0.15 points to 6.95.

With respect to the percent of poor pavement, five regions showed improvement and six regions declined. Regions 11 and 5 showed the greatest reductions in poor pavement, with Region 11 reporting no poor pavement and Region 5 showing 2.9%. Region 10 also reduced their poor pavement to only 0.6%. Region 1 has the most poor pavement with 10.0%, followed by Region 4 with 9.3%.

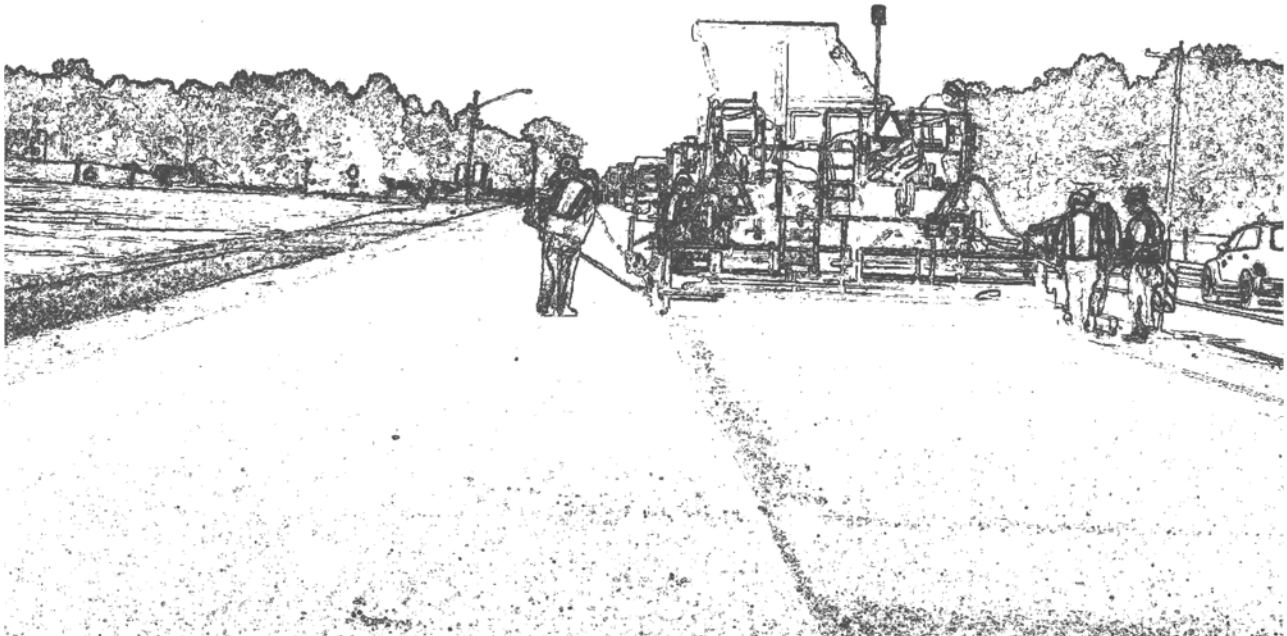


Table 1

Touring Route System 2004 Total Lane-Miles by Region and Jurisdiction						
Region	Rated			Under Construction		Touring Route System
	State 1	Non-State 2	Total	State	Non-State	
1	4,765	253	5,018	38	4	5,060
2	2,992	50	3,042	16	2	3,060
3	3,520	175	3,695	61	1	3,757
4	3,981	352	4,333	95	5	4,433
5	3,709	458	4,167	58	10	4,235
6	2,541	26	2,567	51	0	2,618
7	3,434	115	3,549	81	2	3,632
8	5,222	450	5,672	116	0	5,788
9	3,859	148	4,007	33	0	4,040
10	2,622	207	2,829	93	2	2,924
11	821	784	1,605	16	4	1,625
State	37,466	3,018	40,484	658	30	41,172
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, 2000 - 2004											
State Highway System											
Condition Level	2000		2001		2002		2003		2004		
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
Excellent 10	846	2.2	508	1.3	1,108	3.0	623	1.7	743	2.0	
	3,834	10.3	3,030	8.1	2,940	7.9	1,513	4.0	1,402	3.7	
9											
Subtotal	4,680	12.5	3,538	9.4	4,048	10.9	2,136	5.7	2,145	5.7	
Good 8	5,755	15.4	6,188	16.5	4,952	13.3	4,649	12.4	3,996	10.7	
	15,640	41.9	15,747	42.0	16,174	43.6	17,998	47.9	17,606	47.0	
7											
Subtotal	21,395	57.3	21,935	58.5	21,126	56.9	22,647	60.2	21,602	57.7	
Fair 6	8,720	23.3	9,711	25.9	9,888	26.6	10,927	29.1	11,948	31.9	
Subtotal	8,720	23.3	9,711	25.9	9,888	26.6	10,927	29.1	11,948	31.9	
Poor 5	2,424	6.5	2,220	5.9	1,990	5.4	1,793	4.8	1,675	4.5	
	143	0.4	100	0.3	86	0.2	87	0.2	95	0.3	
4											
3	2	0.0	1	0.0	0	0.0	1	0.0	1	0.0	
2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Subtotal	2,569	6.9	2,321	6.2	2,076	5.6	1,881	5.0	1,771	4.7	
Total	37,364	100.0	37,505	100.0	37,138	100.0	37,591	100.0	37,466	100.0	
Avg Score	7.05		6.98		7.00		6.86		6.82		

Figure 1
State Highway Condition Trends

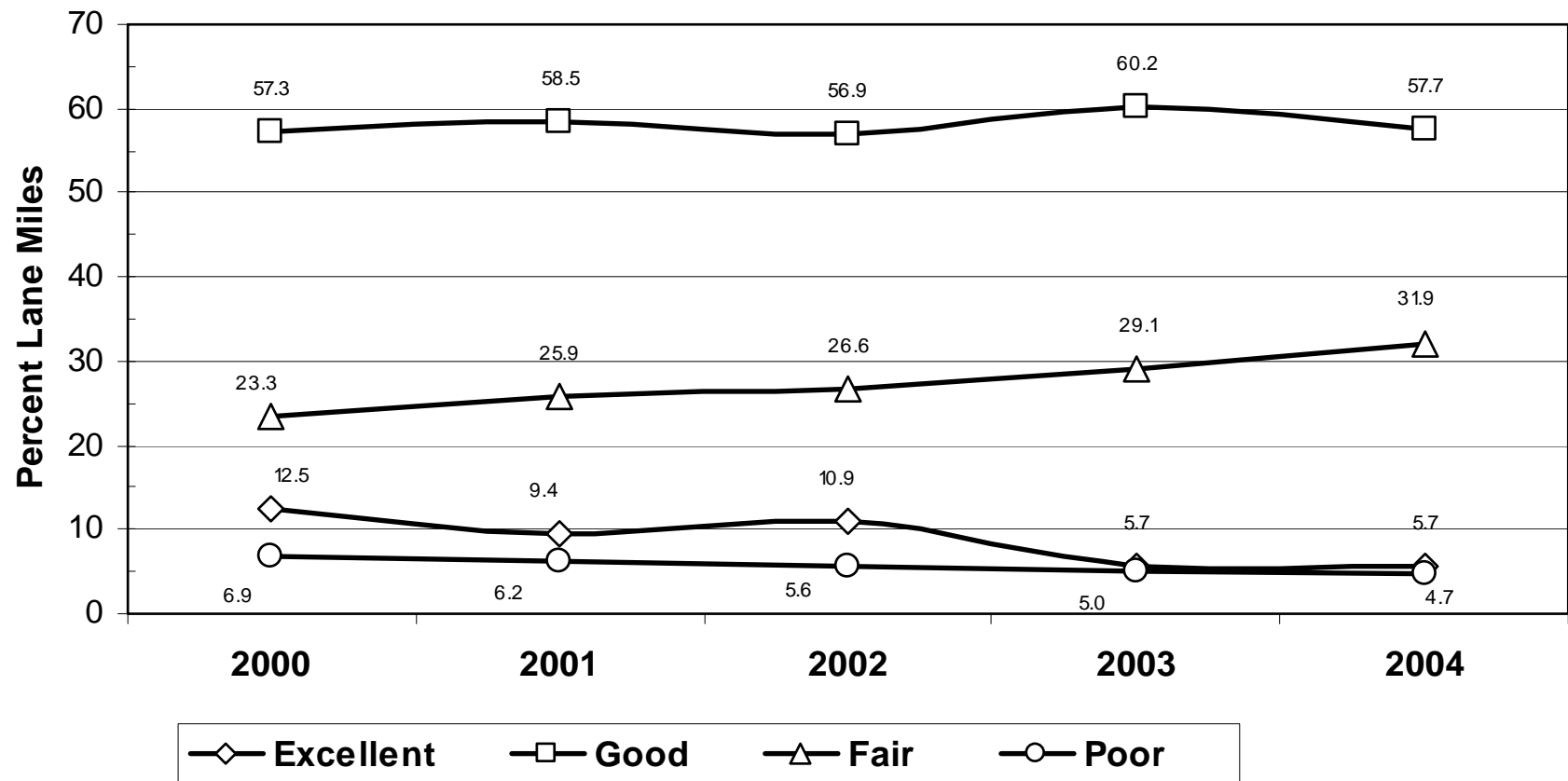


Table 3

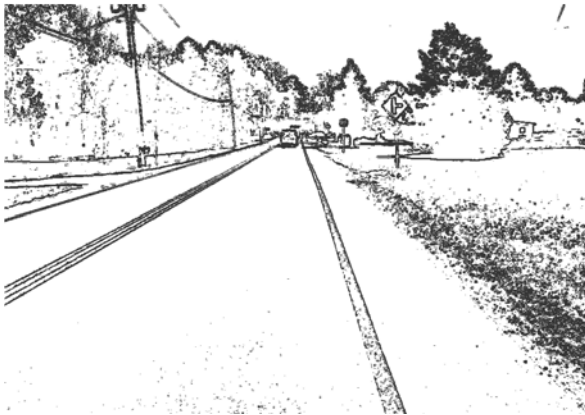
State Highway System 2004 Surface Condition by Region in Lane-Miles											
Region	Surface Condition Ratings										Total
	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	42	433	1,836	1,854	422	118	60	4,765
2	0	0	0	11	81	656	1,917	235	47	45	2,992
3	0	0	0	0	88	1,426	1,363	417	156	70	3,520
4	0	0	0	22	347	1,367	1,423	480	272	70	3,981
5	0	0	1	2	105	912	1,586	718	209	176	3,709
6	0	0	0	0	140	816	1,225	252	99	9	2,541
7	0	0	0	17	148	2,550	523	110	5	81	3,434
8	0	0	0	1	209	994	3,218	566	120	114	5,222
9	0	0	0	0	109	843	1,970	572	281	84	3,859
10	0	0	0	0	15	338	2,011	157	68	33	2,622
11	0	0	0	0	0	210	517	67	27	0	821
State	0	0	1	95	1,675	11,948	17,606	3,996	1,402	743	37,466
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
1	10.0%	38.5%	47.8%	3.7%	6.58	1	475	1,836	2,276	178	4,765
2	3.1%	21.9%	71.9%	3.1%	6.87	2	92	656	2,152	92	2,992
3	2.5%	40.5%	50.6%	6.4%	6.81	3	88	1,426	1,780	226	3,520
4	9.3%	34.3%	47.8%	8.6%	6.78	4	369	1,367	1,903	342	3,981
5	2.9%	24.6%	62.1%	10.4%	7.14	5	108	912	2,304	385	3,709
6	5.5%	32.1%	58.1%	4.3%	6.76	6	140	816	1,477	108	2,541
7	4.8%	74.2%	18.5%	2.5%	6.26	7	165	2,550	633	86	3,434
8	4.0%	19.0%	72.5%	4.5%	6.95	8	210	994	3,784	234	5,222
9	2.8%	21.9%	65.8%	9.5%	7.08	9	109	843	2,542	365	3,859
10	0.6%	12.9%	82.7%	3.8%	7.01	10	15	338	2,168	101	2,622
11	0.0%	25.5%	71.2%	3.3%	6.89	11	0	210	584	27	821
State	4.7%	31.9%	57.7%	5.7%	6.82	State	1,771	11,948	21,602	2,145	37,466

Table 4

State Highway System Regional Trends 2000-2004					
Average Condition Ratings					
Region	2000	2001	2002	2003	2004
1	6.87	6.95	6.94	6.81	6.58
2	7.08	6.95	6.98	6.89	6.87
3	7.27	7.02	7.03	6.74	6.81
4	6.95	6.84	6.91	6.75	6.78
5	7.16	7.10	7.24	7.01	7.14
6	6.91	6.94	6.84	6.67	6.76
7	6.78	6.63	6.70	6.45	6.26
8	7.43	7.20	7.13	7.10	6.95
9	6.81	6.83	7.06	6.97	7.08
10	7.22	7.33	7.12	7.14	7.01
11	6.79	7.08	7.03	6.86	6.89
Total	7.05	6.98	7.00	6.86	6.82
Percent Below 6, Poor Pavement					
Region	2000	2001	2002	2003	2004
1	11.1%	9.2%	9.5%	7.8%	10.0%
2	4.2%	3.3%	3.1%	2.9%	3.1%
3	1.4%	5.1%	4.2%	3.4%	2.5%
4	11.6%	12.5%	9.7%	9.0%	9.3%
5	7.3%	4.9%	3.3%	5.3%	2.9%
6	7.2%	4.6%	4.7%	6.1%	5.5%
7	9.4%	7.2%	5.9%	4.4%	4.8%
8	2.8%	3.6%	4.0%	3.9%	4.0%
9	7.9%	7.2%	5.8%	4.4%	2.8%
10	5.6%	2.9%	4.3%	1.2%	0.6%
11	4.8%	2.8%	2.3%	2.8%	0.0%
Total	6.9%	6.2%	5.6%	5.0%	4.7%

Surface Condition by County

Tables 5A and 5B rank the counties in the State by average surface condition and percent poor for 2004. Erie County has the highest average condition rating (7.33), followed by Broome (7.25) and Chautauqua (7.21). All five boroughs in Region 11 plus Otsego County report no poor pavement. There are 15 counties with less than 1% poor pavement compared to 9 counties with more than 10%. Rensselaer (17.6%), Washington (15.1%) and Allegany (14.6%) have the highest percentage of poor pavement. Lewis County has the lowest average surface condition at 6.17, with St. Lawrence at 6.21 and Jefferson at 6.23.



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 7.3% rigid (PCC) pavements, 55.3% overlaid (composite) pavements, and 37.4% flexible (asphalt) pavements. Of the three, rigid pavements are in the lowest condition with 11.4% poor and an average surface condition rating of 6.67, which is an

improvement from the 2003 Condition Survey of 13.3% and 6.58, respectively.

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 75.5% of the entire NHS is in good to excellent condition, with only 3.3% 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 and 8, conditions on the NHS are higher than the conditions for all State Highways. Good and Excellent pavement on the NHS is 72.2% vs 63.4% for all state highways, and 3.8% Poor vs 4.7%. This is in compliance with the strategy of the 21st Century Goal for Pavements which states the NHS be given priority over other pavements.

Table 5A

State Highway System 2004 County Rankings by Average Condition and Percent Poor							
Region	County	Name	Lane Miles	Average Condition	State Rank	% Poor (< 6)	State Rank
1	1	Albany	804	6.64	48	10.4%	55
1	2	Essex	786	6.43	54	12.4%	58
1	3	Greene	414	6.42	56	10.6%	56
1	4	Rensselaer	616	6.38	57	17.6%	62
1	5	Saratoga	713	7.08	10	1.2%	18
1	6	Schenectady	404	6.77	35	3.1%	32
1	7	Warren	562	6.55	51	9.1%	52
1	8	Washington	466	6.27	59	15.1%	61
1			4,765	6.58		10.0%	
2	1	Fulton	287	6.73	40	1.6%	19
2	2	Hamilton	360	6.78	34	2.6%	24
2	3	Herkimer	521	6.68	46	6.8%	45
2	4	Madison	383	6.75	37	2.8%	28
2	5	Montgomery	382	7.04	12	3.9%	36
2	6	Oneida	1060	7.02	17	1.6%	20
2			2,992	6.87		3.1%	
3	1	Cayuga	572	6.94	22	2.7%	26
3	2	Cortland	466	6.53	52	2.8%	27
3	3	Onondaga	1162	6.75	38	3.4%	35
3	4	Oswego	642	6.92	24	2.3%	23
3	5	Seneca	329	7.01	18	1.1%	16
3	6	Tompkins	349	6.81	32	0.8%	13
3			3,520	6.81		2.5%	
4	1	Genesee	406	6.71	44	8.1%	50
4	2	Livingston	617	6.71	43	7.0%	46
4	3	Monroe	1387	6.73	41	12.9%	59
4	4	Ontario	488	6.57	50	11.6%	57
4	5	Orleans	295	7.12	7	6.4%	44
4	6	Wyoming	412	7.04	13	4.3%	38
4	7	Wayne	376	6.82	31	5.6%	42
4			3,981	6.78		9.3%	
5	1	Cattaraugus	782	6.68	47	9.2%	53
5	2	Chautauqua	804	7.21	3	0.5%	10
5	3	Erie	1516	7.33	1	1.8%	21
5	4	Niagara	607	7.20	6	0.5%	11
5			3,709	7.14		2.9%	

Table 5B

State Highway System 2004 County Rankings by Average Condition and Percent Poor							
Region	County	Name	Lane Miles	Average Condition	State Rank	Poor (< 6)	State Rank
6	1	Allegany	501	6.60	49	14.6%	60
6	2	Chemung	322	6.92	26	7.3%	47
6	3	Schuyler	217	6.91	28	0.6%	12
6	4	Steuben	913	6.75	36	2.7%	25
6	5	Tioga	370	6.92	25	2.9%	29
6	6	Yates	218	6.48	53	3.2%	33
6			2,541	6.76		5.5%	
7	1	Clinton	600	6.31	58	0.1%	7
7	2	Franklin	530	6.42	55	8.2%	51
7	3	Jefferson	926	6.23	60	0.8%	14
7	4	Lewis	314	6.17	62	10.4%	54
7	5	St. Lawrence	1063	6.21	61	7.5%	48
7			3,434	6.26		4.8%	
8	1	Columbia	603	6.70	45	5.8%	43
8	2	Dutchess	951	6.89	29	4.7%	41
8	3	Orange	995	7.07	11	3.4%	34
8	4	Putnam	347	6.74	39	8.0%	49
8	5	Rockland	271	7.09	9	0.2%	8
8	6	Ulster	616	6.96	20	1.2%	17
8	7	Westchester	1439	7.03	16	4.2%	37
8			5,222	6.95		4.0%	
9	1	Broome	876	7.25	2	3.0%	30
9	2	Chenango	551	7.04	14	4.7%	40
9	3	Delaware	769	7.10	8	4.3%	39
9	4	Otsego	680	6.91	27	0.0%	3
9	5	Schoharie	465	7.21	4	3.1%	31
9	6	Sullivan	518	6.95	21	2.0%	22
9			3,859	7.08		2.8%	
10	3	Nassau	963	6.96	19	0.9%	15
10	7	Suffolk	1659	7.03	15	0.4%	9
10			2,622	7.01		0.6%	
11	1	Bronx	200	7.20	5	0.0%	1
11	2	Kings	138	6.71	42	0.0%	6
11	4	New York	79	6.84	30	0.0%	4
11	5	Queens	297	6.78	33	0.0%	5
11	6	Richmond	107	6.92	23	0.0%	2
11			821	6.89		0.0%	
State			37,466	6.82		5.7%	

Table 6

State Highway System 2004 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	310	11.4%	792	29.0%	1,458	53.4%	170	6.2%	2,730	7.3%	6.67
Overlay	869	4.2%	6,007	29.0%	12,473	60.2%	1,364	6.6%	20,713	55.3%	6.89
Flexible	592	4.2%	5,149	36.7%	7,671	54.7%	611	4.4%	14,023	37.4%	6.76
State	1,771	4.7%	11,948	31.9%	21,602	57.7%	2,145	5.7%	37,466	100.0%	6.82

Table 7

2004 New York State National Highway System*									
Region	Poor		Fair		Good		Excellent		Total Lane Miles
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
1	41	2.5%	358	21.9%	1,059	64.7%	178	10.9%	1,636
2	4	0.5%	185	18.9%	686	70.1%	103	10.5%	978
3	11	0.8%	368	25.3%	925	63.7%	148	10.2%	1,452
4	136	8.7%	336	21.6%	884	56.8%	201	12.9%	1,557
5	54	3.0%	400	22.2%	1,135	63.0%	213	11.8%	1,802
6	74	9.3%	151	18.8%	553	68.9%	24	3.0%	802
7	50	4.9%	606	59.6%	343	33.7%	18	1.8%	1,017
8	152	5.2%	475	16.2%	2,136	72.8%	172	5.8%	2,935
9	9	0.6%	247	16.3%	1,049	69.3%	208	13.8%	1,513
10	8	0.4%	179	8.9%	1,738	86.6%	81	4.0%	2,006
11	0	0.0%	205	24.4%	590	70.5%	42	5.0%	837
Total	539	3.3%	3,510	21.2%	11,098	67.1%	1,388	8.4%	16,535

* 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

2004 National Highway System: State Highways Only									
Region	Poor		Fair		Good		Excellent		Total Lane Miles
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
1	41	3.1%	335	25.2%	867	65.1%	88	6.6%	1,331
2	4	0.8%	126	22.6%	379	68.0%	48	8.6%	557
3	11	1.0%	366	29.5%	774	62.4%	89	7.1%	1,240
4	136	10.9%	323	25.9%	674	54.0%	117	9.3%	1,250
5	50	3.7%	391	29.7%	739	56.1%	138	10.5%	1,318
6	74	9.3%	151	18.8%	553	68.9%	24	3.0%	802
7	50	4.9%	606	59.6%	343	33.7%	18	1.8%	1,017
8	152	6.6%	458	20.1%	1,580	69.3%	91	4.0%	2,281
9	9	0.6%	247	16.3%	1,049	69.3%	208	13.8%	1,513
10	8	0.4%	179	8.9%	1,738	86.6%	81	4.0%	2,006
11	0	0.0%	205	25.1%	584	71.6%	27	3.3%	816
Total	535	3.8%	3,387	24.0%	9,280	65.7%	929	6.5%	14,131

Table 9

2004 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%	23	7.6%	192	62.9%	90	29.5%	305
2	0	0.0%	59	13.9%	307	73.0%	55	13.1%	421
3	0	0.0%	2	0.9%	151	71.0%	59	28.1%	212
4	0	0.0%	13	4.2%	210	68.5%	84	27.3%	307
5	4	0.8%	9	1.8%	396	81.9%	75	15.5%	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%	17	2.6%	556	85.0%	81	12.4%	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%	6	30.1%	15	69.9%	21
Total	4	0.2%	123	5.1%	1,818	75.6%	459	19.1%	2,404

The Local Highway portion of the NHS was not surveyed this year because reporting of the surface conditions of the Local Highways for HPMS is no longer required by FHWA. Instead of reporting surface condition, HPMS requires only the reporting of IRI (International Roughness Index) on the NHS.

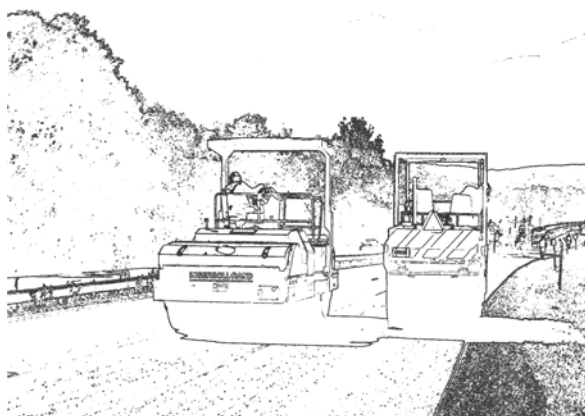
Pavement Roughness

A road roughness 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, 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 and completed the first statewide collection cycle in late 2004. Because of the timing of the survey, the data was not yet available for inclusion in this report. The

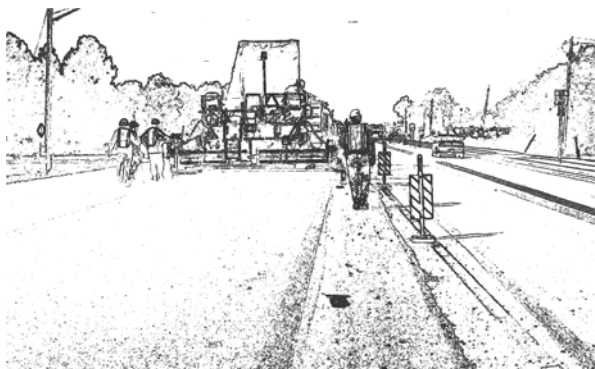
user is directed to the Visidata program to obtain the most recent IRI data. Also available is data for rutting, faulting, and road geometry (radius of curve, grade, crossfall) and high resolution digital images.

Network-Level Pavement Needs

Last year it was identified that it would be necessary to update the algorithm used to estimate network-level pavement needs to better reflect current pavement preventive maintenance and rehabilitation strategies. In particular, the algorithm was under-reporting the amount of preventive maintenance work needed. A task force of regional and main office pavement experts was assembled to update the algorithm for 2004.

Treatment Categories

The Task Force classified current treatment strategies into the following 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.

The revised algorithm assigns pavements with specific combinations of surface score and dominant distress to one of the

six treatment categories described above. The analysis is used to estimate pavement needs on a network level only. Specific project level decisions may assign another treatment based on additional detailed information.

The Task Force also considered the effect of high vs low traffic volume on treatment selection. However, it was decided that the differences due to traffic volume in a network level analysis were not sufficient to warrant further adjustment to the algorithm. The algorithm used for the 2004 Pavement Needs estimate is summarized in Table 10.

Pavement Needs

As shown in Table 11, it is estimated that about 6% of the State Highway system falls in the Do Nothing category. This indicates that almost 94% of the State Highway System is in need of some type of maintenance or rehabilitation action. About 25% of pavements are candidates for crack sealing, almost 34% are in need of preventive maintenance paving, about 28% need corrective maintenance, close to 7% need rehabilitation, and only about 0.3%, representing 96 lane miles, need to be reconstructed.

Table 10: 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	1				1			1				

1 - Do Nothing

2 - Preventive Maintenance Non-Paving

3 - Preventive Maintenance Overlays

4 - Corrective Maintenance

5 - Rehabilitation

6 - Reconstruction

Table 11

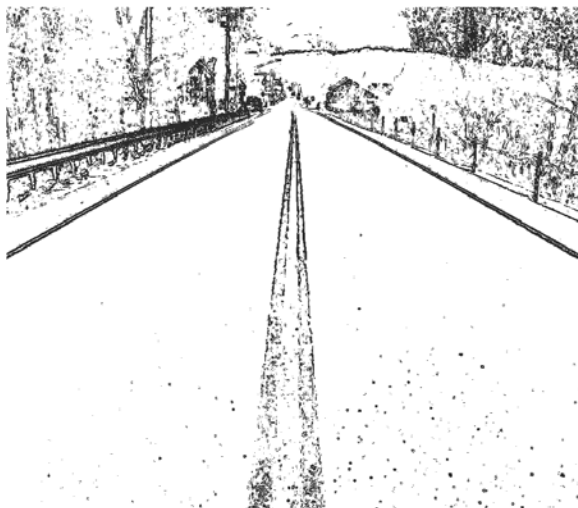
State Highway System 2004 Lane-Miles by Treatment Category													
Region	Total Lane Miles	Do Nothing		Preventive Maintenance (Non-Paving)		Preventive Maintenance (Paving)		Corrective Maintenance		Rehabilitation		Reconstruction	
		Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%
1	4,765	177	3.7%	865	18.2%	1422	29.8%	1755	36.8%	503	10.6%	43	0.9%
2	2,992	92	3.1%	731	24.4%	1455	48.6%	609	20.4%	94	3.1%	11	0.4%
3	3,520	226	6.4%	863	24.5%	1057	30.1%	1285	36.5%	89	2.5%	0	0.0%
4	3,981	342	8.6%	650	16.3%	1265	31.9%	1325	33.3%	377	9.5%	22	0.5%
5	3,709	386	10.4%	1106	29.8%	1146	30.9%	747	20.1%	321	8.7%	3	0.1%
6	2,541	109	4.3%	377	14.8%	1125	44.3%	715	28.1%	215	8.5%	0	0.0%
7	3,434	86	2.5%	181	5.3%	904	26.3%	2098	61.1%	149	4.3%	16	0.5%
8	5,222	233	4.4%	1860	35.6%	2041	39.1%	791	15.1%	296	5.7%	1	0.1%
9	3,859	365	9.5%	1417	36.7%	1203	31.2%	547	14.3%	327	8.5%	0	0.0%
10	2,622	100	3.8%	857	32.7%	952	36.3%	681	26.0%	32	1.2%	0	0.0%
11	821	27	3.3%	585	71.2%	144	17.6%	0	0.0%	65	7.9%	0	0.0%
State	37,466	2143	5.7%	9492	25.3%	12,714	33.9%	10,553	28.2%	2,468	6.6%	96	0.3%

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 1,300 sections totaling about 3,000 lane miles were shadow scored in 2004 by the main office team.

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.

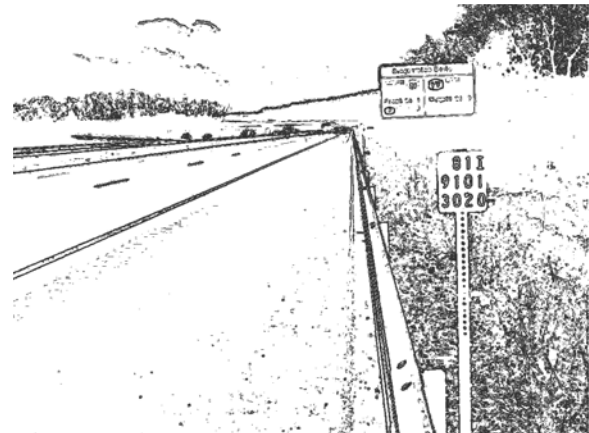


Table 12 presents the results of the 2004 shadow scoring effort. Overall, the results show continued rating consistency with 97.0% of the rating judgments by the shadow rating team within one point of the region's condition ratings. Over the last five years, this value has ranged from a low of 93.6% to a high of 97.0%, and averaged 95.7%. 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 rating difference statewide of 0.27 is consistent with previous year's results as well.

Figure 2 presents the average scoring error by region and statewide. The average scoring error per section statewide is -0.02, which indicates that

on average the shadow scores agree very closely with regional ratings. On a regional basis, Region 7 showed the greatest variation with +0.64 average scoring error, with Region 1 next having -0.30 average error in the shadow scored sections.

The shadow scoring results shows that the 2004 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 2004 NYSDOT pavement condition ratings are sufficiently accurate for network-level summaries and analysis.

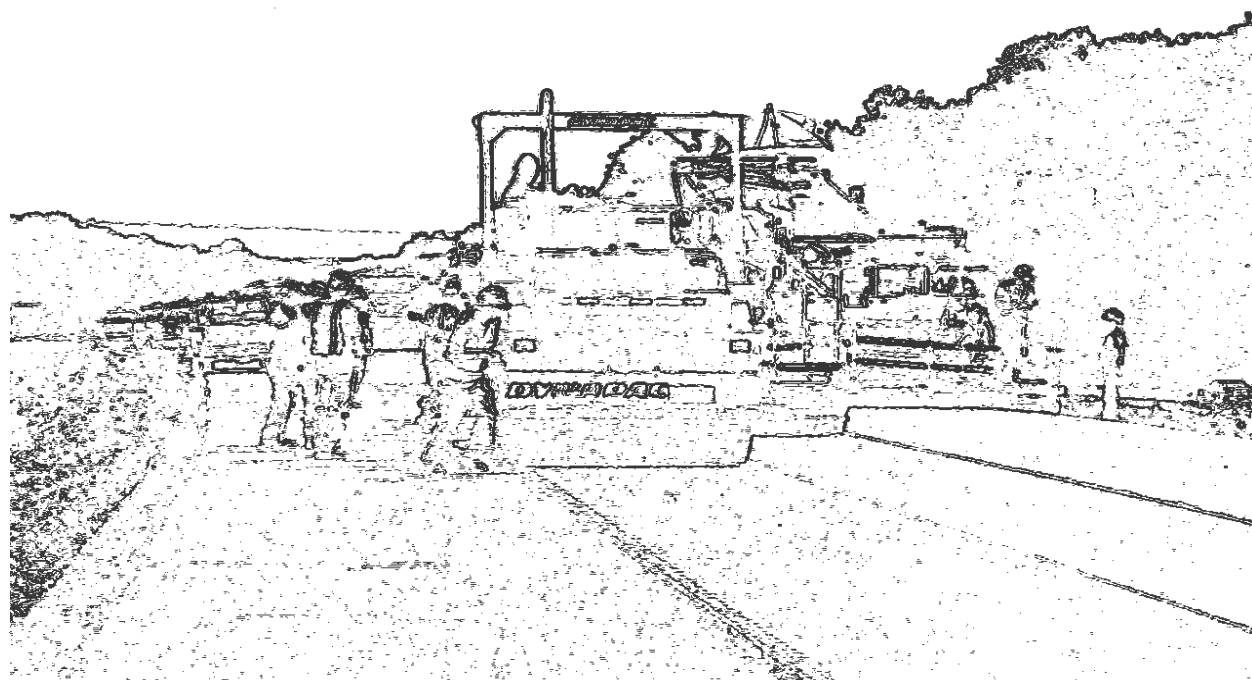


Table 12

2004 Shadow Scoring Results			
Region	Percent +/- 1 Point	Average Scoring Error	Absolute Scoring Error
1	95.3%	-0.30	0.44
2	99.5%	0.00	0.18
3	98.9%	-0.10	0.31
4	91.3%	-0.11	0.43
5	94.9%	0.05	0.19
6	98.1%	0.18	0.31
7	100.0%	0.64	0.64
8	97.5%	-0.05	0.21
9	98.3%	-0.27	0.27
10	93.5%	-0.01	0.21
11	95.8%	-0.17	0.33
State	97.0%	-0.02	0.27

