

Pavement Condition of New York's Highways



2005

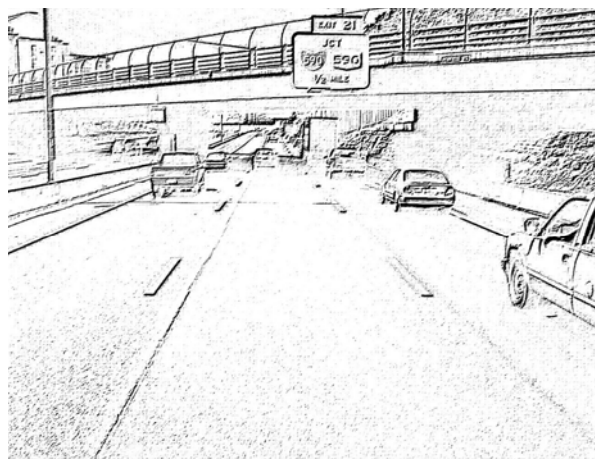


New York State Department of Transportation

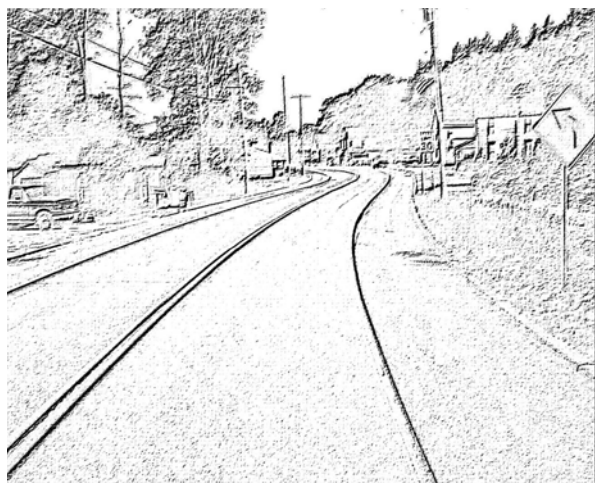
Preface

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

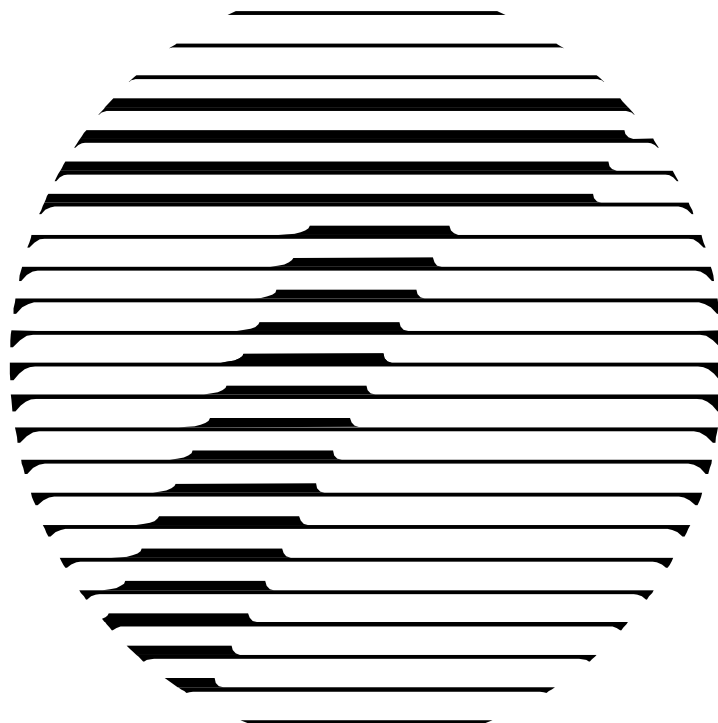


conducted in May and June and represents the condition of the system at that point in time. The impact of pavement improvement projects completed after the survey are therefore not reflected in the condition summaries.



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Executive Summary

State System Condition

The 2005 pavement condition survey results reaffirm that a trend of declining pavement conditions continues. The Average Condition Rating dropped again this year to 6.81, the third consecutive drop and down from a high of 7.05 five years ago. Fair pavements have been increasing steadily since 2000, up another 2% over last year to 33.8%. Most telling is Poor pavement increased this year (5.1%), ending eleven consecutive years of decline. Good and Excellent pavement declined for the fifth year in a row to 61.1%. These trends are indicative of blocks of pavements falling to lower condition levels before they can be addressed by the paving program.

Condition by Region

Average Pavement Conditions improved in only three regions and declined in seven regions; one region stayed the same. Regions 5 and 9 have the best overall condition again this year with average condition ratings of 7.14 and 7.13 respectively. Region 7 has improved but still has the lowest overall condition at 6.50 followed by Region 1 at 6.53. Region 4 had a large increase in Poor pavement, from 9.3% last year to 14.9% this year, and Region 10 had a large increase in Fair pavement, increasing by 18.5% to 31.4%.

E-Score and Data Quality Measures

E-Score was used statewide again this year to collect pavement score data. The Shadow Score results again showed that high quality data was produced: 97.9% of rater's scores were within +/-1 point of the benchmark rater, and the average scoring error was only -0.03. Both these measures are among the best values observed from any prior survey.

Ride Quality

Included in this report is ride quality data collected by Department resources in 2003 and 2004. Region 3 has the best ride quality (IRI) measure of 94 in/mi, and Region 11 has the roughest at 201 in/mi. Thirty-four counties are characterized as having smooth pavements, 24 counties are fair and 4 are rough. Overall, state highways have an average IRI of 121 in/mi, just at the Smooth/Fair boundary, with about 15% of the Touring Route having rough riding pavement (IRI>170 in/mi).

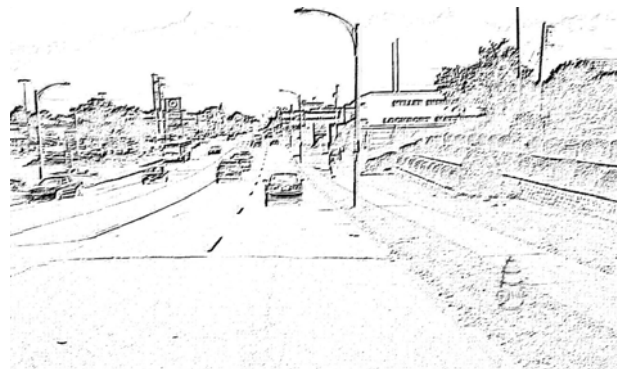
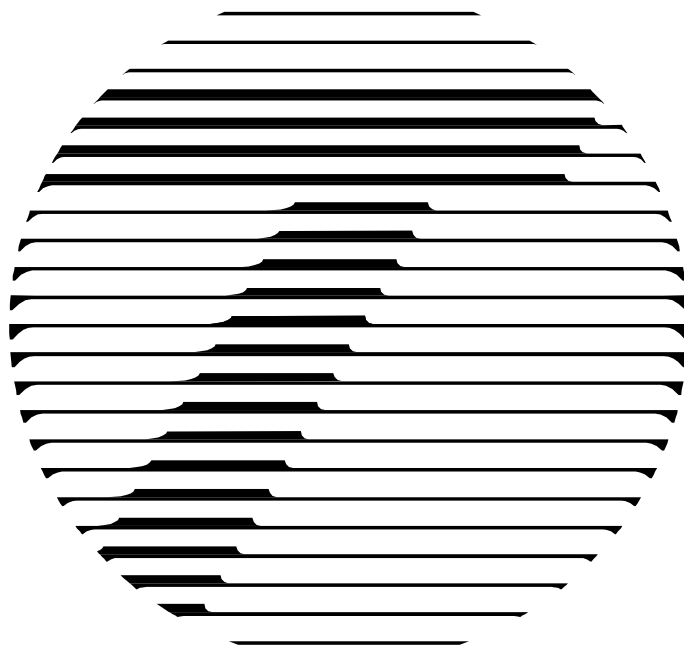


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An aerial photograph of a multi-lane highway, likely in New York, showing traffic moving along the road. The highway is flanked by dense trees and greenery. The image is in black and white, with a high-contrast, almost graphic quality. The text "Pavement Condition of New York's Highways" is overlaid in a large, bold, black font, and the year "2005" is centered below it in a similar bold font.

Pavement Condition of New York's Highways

2005

Pavement Condition of New York's Highways: 2005

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 2005 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:

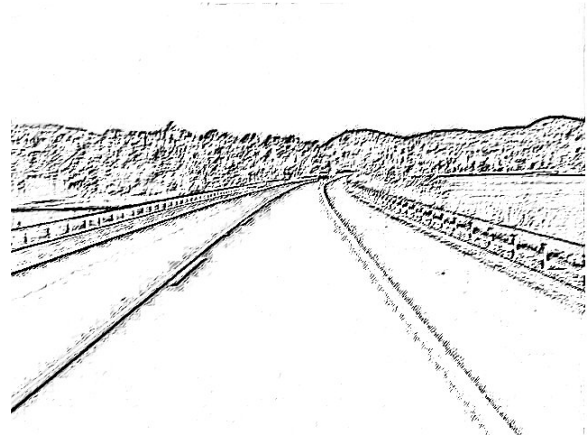
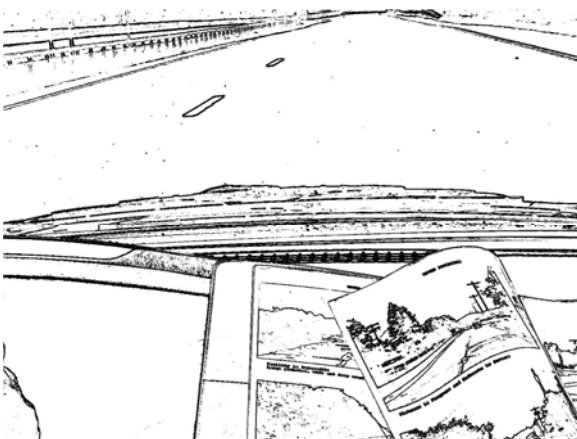
The Surface Condition Rating Scale

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 much 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.

It was suspected that 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. Such a bias would

be identified in the Shadow Scoring analysis as regional raters' results would more consistently vary from the central office benchmark rater. However, based on the Shadow Scoring results (described later in this report) from the first two years of using E-Score, this does not seem to be occurring.

The 2005 survey again produced quality assurance measures tighter than any prior survey assessed using the current set of statistical measures. The E-Score system allows the field survey to be conducted more quickly, has tremendous time savings in post processing and produces high quality data.

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). Other fields include 'Miles from Start' (2.551), 'GPS UTM X', and 'GPS UTM Y'. A 'TOTAL MILES' section shows '3.4' and '75%'. An 'EXIT' button is located in the top right corner.

The main section is divided into two columns. The left column, titled 'Roadway Characteristics (Inventory)', contains fields for 'Median Type' (3), 'Median Width' (0), 'Pavement Width' (72), 'Pavement Type' (OVL), 'Yr Last Work' (88), and 'Shoulder Width' (10). The right column, titled 'Pavement Condition', features a large 'Score' field (7) and a 'Dominant Distress' field (Ag). Below these are buttons for 'START', 'STOP', 'FILL', and 'CLEAR'. A grid of buttons for distress types (10, 9, 8, 7, 6, 5, 4, 3, U, Ai, Si, Ag, Sg, W, F) is also present.

At the bottom, there is a taskbar with icons for 'Start', 'E-Score PCS', 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. Usually about 10-20 lane miles are added to the Touring Route System each year. However, 46 lane miles were added in 2005, increasing the total to 41,218 lane miles.

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 2001 through 2005. 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 fifth year in a row, falling from a high of 69.8% in 2000 to

61.1% this year. Also of concern is Fair pavements have been steadily increasing since 2000, reaching 33.8% in 2005, rising another 2% over last year.

Pavements rated 7 fell for the second year in a row, to 44.8% as more pavement slipped into the Fair category. Pavements rated 6 or 7 make up 78.6% of all state highway pavements.

For the first time since 1993, Poor pavements increased, rising 0.4% to 5.1%. The overall average condition rating also declined for the third year in a row, slipping from 6.82 to 6.81.

Surface Condition by Region

Table 3 presents the distribution of surface condition ratings by region for 2005, as well as the percentage and number of lane-miles in each condition category. Region 7 made progress reducing Fair pavement but still has the most with 2,383 lane miles, or 68.4% of their system. Region 4 has the most Poor pavement with 14.9%. Region 9 has the highest percentage of Good and Excellent pavement at 77.6%. Region 10, who had a large accumulation of pavements rated 7 last year, had many of these fall to 6, with Fair pavement increasing by 18.5% from 12.9% last year to 31.4% this year.

Table 4 presents the average condition ratings and percent poor pavement by region for the years 2001-2005. Overall, only three regions improved, one stayed the same, and seven regions declined.

Region 7 made the largest improvement in average score, increasing by 0.24 points, and Region 4 had the sharpest decline of 0.23 points. Regions 5 and 9 have the highest average score of 7.14 and 7.13 respectively.

A few regions have well-defined declining condition trends. Region 8 has

declined continuously since 2000, Region 1 since 2001 and Region 2 since 2002. Only Regions 5 and 9 have higher average scores in 2005 than five years ago.

With respect to the percent of poor pavement, four regions showed modest improvement, five stayed about the same and two regions declined. Region 4 had the largest change with Poor pavement increasing 5.6% to 14.9%. Regions 11, 9 and 3 have the least Poor pavement, with 0.3% in Region 11 and Regions 9 and 3 both with 2.4%.

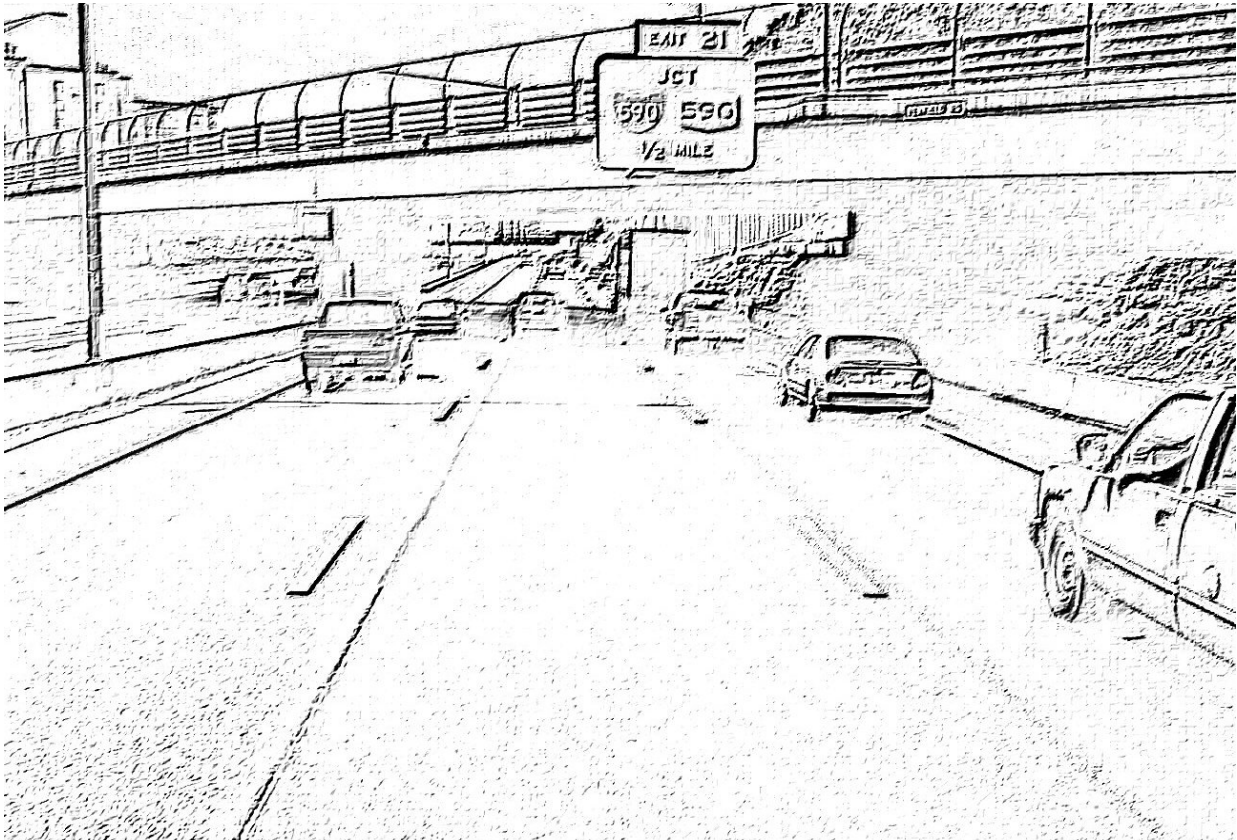


Table 1

Touring Route System 2005 Total Lane-Miles by Region and Jurisdiction						
Region	Rated			Under Construction		Touring Route System
	State 1	Non-State 2	Total	State	Non-State	
1	4768	219	4,987	37	4	5,028
2	2955	49	3,004	61	2	3,067
3	3514	168	3,682	75	6	3,763
4	3984	337	4,321	92	19	4,432
5	3740	466	4,206	37	7	4,250
6	2541	26	2,567	51	0	2,618
7	3483	114	3,597	32	4	3,633
8	5202	439	5,641	137	11	5,789
9	3827	145	3,972	71	2	4,045
10	2681	209	2,890	77	1	2,968
11	813	800	1,613	12	0	1,625
State	37,508	2,972	40,480	682	56	41,218
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, 2001 - 2005 State Highway System										
Condition Level	2001		2002		2003		2004		2005	
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%
Excellent 10	508	1.3	1,108	3.0	623	1.7	743	2.0	731	1.9
	9 3,030	8.1	2,940	7.9	1,513	4.0	1,402	3.7	1,894	5.0
Subtotal	3,538	9.4	4,048	10.9	2,136	5.7	2,145	5.7	2,625	7.0
Good 8	6,188	16.5	4,952	13.3	4,649	12.4	3,996	10.7	3,483	9.3
	7 15,747	42.0	16,174	43.6	17,998	47.9	17,606	47.0	16,795	44.8
Subtotal	21,935	58.5	21,126	56.9	22,647	60.2	21,602	57.7	20,278	54.1
Fair 6	9,711	25.9	9,888	26.6	10,927	29.1	11,948	31.9	12,688	33.8
Subtotal	9,711	25.9	9,888	26.6	10,927	29.1	11,948	31.9	12,688	33.8
Poor 5	2,220	5.9	1,990	5.4	1,793	4.8	1,675	4.5	1,786	4.8
	4 100	0.3	86	0.2	87	0.2	95	0.3	129	0.3
	3 1	0.0	0	0.0	1	0.0	1	0.0	2	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	2,321	6.2	2,076	5.6	1,881	5.0	1,771	4.7	1,917	5.1
Total	37,505	100.0	37,138	100.0	37,591	100.0	37,466	100.0	37,508	100.0
Avg Score	6.98		7.00		6.86		6.82		6.81	

Figure 1
State Highway Condition Trends

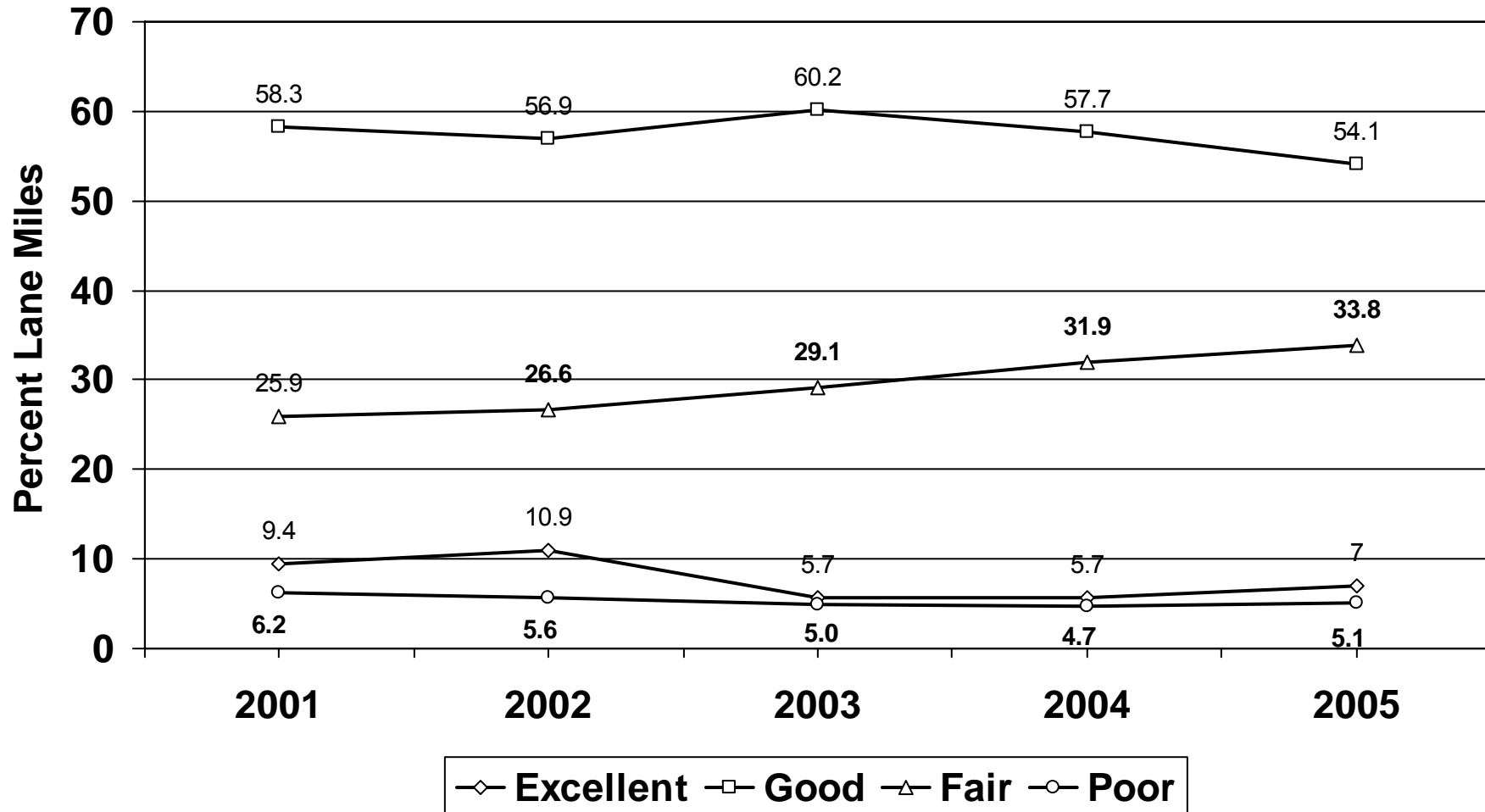


Table 3

State Highway System 2005 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	50	360	2,186	1,555	410	206	1	4,768
2	0	0	1	10	91	672	1,932	170	75	4	2,955
3	0	0	0	0	86	1,331	1,361	403	248	85	3,514
4	0	0	0	28	567	1,488	1,280	355	223	43	3,984
5	0	0	1	0	103	878	1,686	610	391	71	3,740
6	0	0	0	0	121	914	1,190	170	97	49	2,541
7	0	0	0	14	100	2,383	488	268	74	156	3,483
8	0	0	0	20	185	1,043	3,323	461	91	79	5,202
9	0	0	0	0	91	765	2,030	492	386	63	3,827
10	0	0	0	7	80	842	1,372	101	99	180	2,681
11	0	0	0	0	2	186	578	43	4	0	813
State	0	0	2	129	1,786	12,688	16,795	3,483	1,894	731	37,508
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	8.6%	45.9%	41.2%	4.3%	6.53	1	410	2,186	1,965	207	4,768
2	3.4%	22.8%	71.1%	2.7%	6.81	2	102	672	2,102	79	2,955
3	2.4%	37.9%	50.2%	9.5%	6.90	3	86	1,331	1,764	333	3,514
4	14.9%	37.4%	41.0%	6.7%	6.55	4	595	1,488	1,635	266	3,984
5	2.8%	23.5%	61.4%	12.3%	7.14	5	104	878	2,296	462	3,740
6	4.8%	36.0%	53.5%	5.7%	6.75	6	121	914	1,360	146	2,541
7	3.3%	68.4%	21.7%	6.6%	6.50	7	114	2,383	756	230	3,483
8	3.9%	20.1%	72.7%	3.3%	6.89	8	205	1,043	3,784	170	5,202
9	2.4%	20.0%	65.9%	11.7%	7.13	9	91	765	2,522	449	3,827
10	3.3%	31.4%	54.9%	10.4%	6.93	10	87	842	1,473	279	2,681
11	0.3%	22.9%	76.4%	0.4%	6.83	11	2	186	621	4	813
State	5.1%	33.8%	54.1%	7.0%	6.81	State	1,917	12,688	20,278	2,625	37,508

Table 4

State Highway System Regional Trends 2001-2005					
Average Condition Ratings					
Region	2001	2002	2003	2004	2005
1	6.95	6.94	6.81	6.58	6.53
2	6.95	6.98	6.89	6.87	6.81
3	7.02	7.03	6.74	6.81	6.90
4	6.84	6.91	6.75	6.78	6.55
5	7.10	7.24	7.01	7.14	7.14
6	6.94	6.84	6.67	6.76	6.75
7	6.63	6.70	6.45	6.26	6.50
8	7.20	7.13	7.10	6.95	6.89
9	6.83	7.06	6.97	7.08	7.13
10	7.33	7.12	7.14	7.01	6.93
11	7.08	7.03	6.86	6.89	6.83
Total	6.98	7.00	6.86	6.82	6.81
Percent Below 6, Poor Pavement					
Region	2001	2002	2003	2004	2005
1	9.2%	9.5%	7.8%	10.0%	8.6%
2	3.3%	3.1%	2.9%	3.1%	3.4%
3	5.1%	4.2%	3.4%	2.5%	2.4%
4	12.5%	9.7%	9.0%	9.3%	14.9%
5	4.9%	3.3%	5.3%	2.9%	2.8%
6	4.6%	4.7%	6.1%	5.5%	4.8%
7	7.2%	5.9%	4.4%	4.8%	3.3%
8	3.6%	4.0%	3.9%	4.0%	3.9%
9	7.2%	5.8%	4.4%	2.8%	2.4%
10	2.9%	4.3%	1.2%	0.6%	3.3%
11	2.8%	2.3%	2.8%	0.0%	0.3%
Total	6.2%	5.6%	5.0%	4.7%	5.1%

Surface Condition by County

Tables 5A and 5B rank the counties in the State by average surface condition and percent poor for 2005. Erie County again this year has the highest average condition rating (7.50), followed by Broome (7.34) and Schoharie (7.24). Four of the five boroughs in Region 11 plus Otsego and Clinton Counties report no poor pavement. There are 14 counties with 1% or less poor pavement compared to 8 counties with 10% or more. Orleans (20.8%), Ontario (19.3%) and Monroe (18.5%) have the highest percentage of poor pavement. Washington County has the lowest average surface condition at 6.23, with Essex at 6.33 and Ontario at 6.35.



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 6.8% rigid (PCC) pavements, 55.7% overlaid (composite) pavements, and 37.5% flexible (asphalt) pavements. Of the three, rigid pavements are in the

lowest condition with 12.4% poor and an average surface condition rating of 6.63, which is a slight decline from 2004.

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 73.7% of the entire NHS is in good to excellent condition, with only 3.4% 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 who miss just slightly, conditions on the NHS are higher than the conditions for all State Highways. Good and Excellent pavement on the NHS is 70.5% vs 61.1% for all state highways, and 3.9% Poor vs 5.1%. This demonstrates that priority is being given to the higher functional class highways.

Table 5A

State Highway System 2005 County Rankings by Average Condition and Percent Poor							
Region	County	Name	Lane Miles	Average Condition	State Rank	% Poor (< 6)	State Rank
1	1	Albany	791	6.69	39	9.2%	51
1	2	Essex	785	6.33	61	9.9%	54
1	3	Greene	412	6.46	53	8.5%	50
1	4	Rensselaer	619	6.36	58	15.6%	59
1	5	Saratoga	729	7.01	14	3.4%	30
1	6	Schenectady	404	6.65	44	3.4%	31
1	7	Warren	563	6.43	55	4.2%	35
1	8	Washington	466	6.23	62	14.1%	58
1			4,768	6.53	10	8.6%	10
2	1	Fulton	284	6.66	43	0.7%	11
2	2	Hamilton	360	6.62	47	4.5%	38
2	3	Herkimer	501	6.58	48	10.0%	55
2	4	Madison	380	6.72	37	2.5%	23
2	5	Montgomery	377	6.94	18	3.6%	33
2	6	Oneida	1052	7.01	14	1.0%	14
2			2,955	6.81	7	3.4%	7
3	1	Cayuga	567	6.78	30	4.5%	37
3	2	Cortland	466	6.93	20	2.5%	22
3	3	Onondaga	1146	6.88	22	3.3%	29
3	4	Oswego	668	7.10	8	0.8%	12
3	5	Seneca	318	6.88	24	1.1%	17
3	6	Tompkins	349	6.77	32	0.3%	8
3			3,514	6.90	4	2.4%	3
4	1	Genesee	424	6.85	25	7.0%	47
4	2	Livingston	611	6.45	54	12.0%	56
4	3	Monroe	1358	6.54	50	18.5%	60
4	4	Ontario	500	6.35	60	19.3%	61
4	5	Orleans	314	6.77	31	20.8%	62
4	6	Wyoming	402	6.73	35	6.5%	46
4	7	Wayne	376	6.38	57	13.8%	57
4			3,984	6.56	9	14.9%	11
5	1	Cattaraugus	784	6.69	39	9.5%	52
5	2	Chautauqua	812	6.89	21	1.8%	20
5	3	Erie	1535	7.50	1	0.6%	9
5	4	Niagara	609	7.13	7	1.1%	15
5			3,740	7.14	1	2.8%	4

Table 5B

State Highway System 2005 County Rankings by Average Condition and Percent Poor							
Region	County	Name	Lane Miles	Average Condition	State Rank	Poor (< 6)	State Rank
6	1	Allegany	513	6.73	34	8.1%	49
6	2	Chemung	318	6.95	17	6.3%	44
6	3	Schuyler	217	6.84	26	2.7%	25
6	4	Steuben	905	6.72	36	2.7%	26
6	5	Tioga	370	6.71	38	4.8%	39
6	6	Yates	218	6.56	49	4.9%	40
6			2,541	6.75	8	4.8%	9
7	1	Clinton	651	6.63	46	0.0%	6
7	2	Franklin	532	6.66	42	6.3%	45
7	3	Jefferson	941	6.52	52	0.6%	10
7	4	Lewis	314	6.40	56	5.1%	42
7	5	St. Lawrence	1045	6.36	59	5.7%	43
7			3,483	6.50	11	3.3%	6
8	1	Columbia	606	6.67	41	7.4%	48
8	2	Dutchess	934	6.78	29	5.0%	41
8	3	Orange	1008	6.88	23	3.2%	28
8	4	Putnam	348	6.53	51	9.5%	53
8	5	Rockland	256	7.23	4	0.3%	7
8	6	Ulster	615	6.98	16	0.9%	13
8	7	Westchester	1433	7.05	11	2.9%	27
8			5,202	6.89	5	3.9%	8
9	1	Broome	884	7.34	2	1.8%	18
9	2	Chenango	545	7.13	5	3.5%	32
9	3	Delaware	788	7.02	12	4.3%	36
9	4	Otsego	630	7.06	10	0.0%	1
9	5	Schoharie	461	7.24	3	2.7%	24
9	6	Sullivan	518	6.94	19	2.0%	21
9			3,827	7.13	2	2.4%	2
10	3	Nassau	1050	7.13	6	1.8%	19
10	7	Suffolk	1631	6.80	28	4.2%	34
10			2,681	6.93	3	3.3%	5
11	1	Bronx	203	7.09	9	1.1%	16
11	2	Kings	138	6.75	33	0.0%	4
11	4	New York	67	6.99	15	0.0%	2
11	5	Queens	297	6.64	45	0.0%	5
11	6	Richmond	107	6.83	27	0.0%	3
11			813	6.83	6	0.3%	1
State			37,466	6.82	---	6.81	---

Table 6

State Highway System 2005 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	315	12.4%	754	29.6%	1339	52.5%	144	5.6%	2,552	6.8%	6.63
	1026	4.9%	6508	31.1%	11696	56.0%	1670	8.0%	20,900	55.7%	6.86
	576	4.1%	5425	38.6%	7243	51.5%	812	5.8%	14,056	37.5%	6.76
State	1,917	5.1%	12,688	33.8%	20,278	54.1%	2,625	7.0%	37,508	100.0%	6.81

Table 7

2005 New York State National Highway System*									
Region	Poor		Fair		Good		Excellent		Total Lane Miles
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
1	19	1.1%	466	28.5%	962	58.8%	189	11.6%	1,636
2	4	0.4%	149	15.3%	779	79.7%	45	4.6%	977
3	11	0.7%	244	16.7%	1,004	68.8%	201	13.8%	1,460
4	227	15.0%	282	18.6%	871	57.3%	138	9.1%	1,518
5	41	2.3%	424	23.4%	1,150	63.6%	194	10.7%	1,809
6	55	7.0%	189	23.9%	465	58.7%	82	10.4%	791
7	27	2.5%	547	52.0%	371	35.3%	108	10.2%	1,053
8	139	4.8%	444	15.2%	2,204	75.6%	130	4.4%	2,917
9	10	0.7%	187	12.7%	1,058	72.0%	214	14.6%	1,469
10	22	1.1%	648	32.0%	1,165	57.6%	188	9.3%	2,023
11	2	0.3%	181	21.8%	639	77.1%	7	0.8%	829
Total	557	3.4%	3,761	22.8%	10,668	64.7%	1,496	9.0%	16,482

* 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

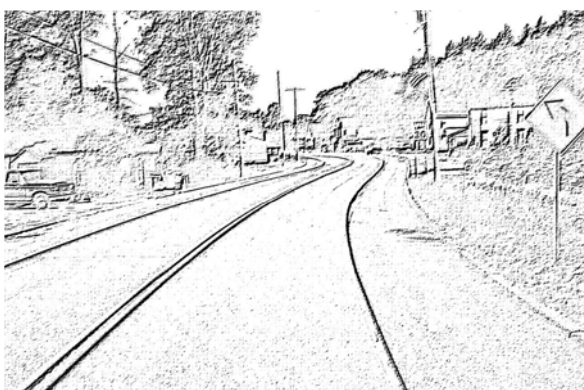
2005 National Highway System: State Highways Only									
Region	Poor		Fair		Good		Excellent		Total Lane Miles
	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	
1	19	1.4%	466	35.0%	728	54.7%	118	8.9%	1,331
2	4	0.7%	137	24.7%	370	66.5%	45	8.1%	556
3	11	0.9%	223	17.8%	813	65.2%	201	16.1%	1,248
4	227	18.1%	282	22.4%	622	49.5%	126	10.0%	1,257
5	41	3.1%	323	24.3%	795	60.0%	167	12.6%	1,326
6	55	7.0%	189	23.9%	465	58.7%	82	10.4%	791
7	27	2.5%	547	52.0%	371	35.3%	108	10.2%	1,053
8	139	6.2%	422	18.6%	1641	72.5%	61	2.7%	2,263
9	10	0.7%	187	12.7%	1058	72.0%	214	14.6%	1,469
10	22	1.1%	648	32.0%	1165	57.6%	188	9.3%	2,023
11	2	0.3%	181	22.4%	621	76.9%	4	0.4%	808
Total	557	3.9%	3,605	25.5%	8,649	61.2%	1,314	9.3%	14,125

Table 9

2005 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%	234	76.8%	71	23.2%	305
2	0	0.0%	12	2.8%	409	97.2%	0	0.0%	421
3	0	0.0%	21	9.9%	191	90.1%	0	0.0%	212
4	0	0.0%	0	0.0%	249	95.3%	12	4.7%	261
5	0	0.0%	101	21.0%	355	73.4%	27	5.6%	483
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%	22	3.3%	563	86.1%	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%	18	85.9%	3	14.1%	21
Total	0	0.0%	156	6.6%	2,019	85.7%	182	7.7%	2,357

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, 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. A summary of this data is in the following figures and tables. Because of the timing of the roughness survey, data collected in 2005 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
≤ 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 94 in/mi and a relatively high Surface Score. Region 5 (124 in/mi) and Region 9 (123 in/mi) have high Surface Scores, but the

ride quality falls just outside the Smooth category. Region 11, even though reporting only 0.3% Poor pavement, is categorized as Rough ride quality (201 in/mi). Regions 4 and 7 have low Surface Scores, but reasonable ride quality (107 in/mi and 112 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 smoother Interstates than the general Touring Route. Exceptions are Regions 4, 5 and 6.

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, 34 counties have Smooth ride quality, 24 fall in the Fair category and 4 are Rough. Table 12 provides similar information for the Thruway.

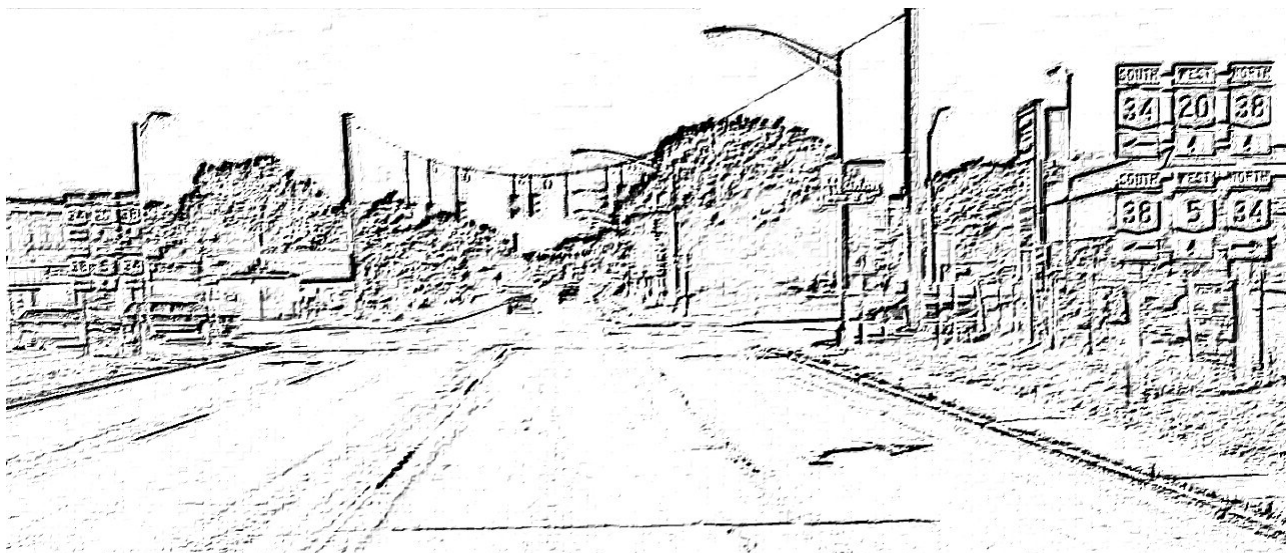


Figure 2
Average Ride Quality (IRI)
vs Average Surface Score
 (Touring Route, 2003-04 data)

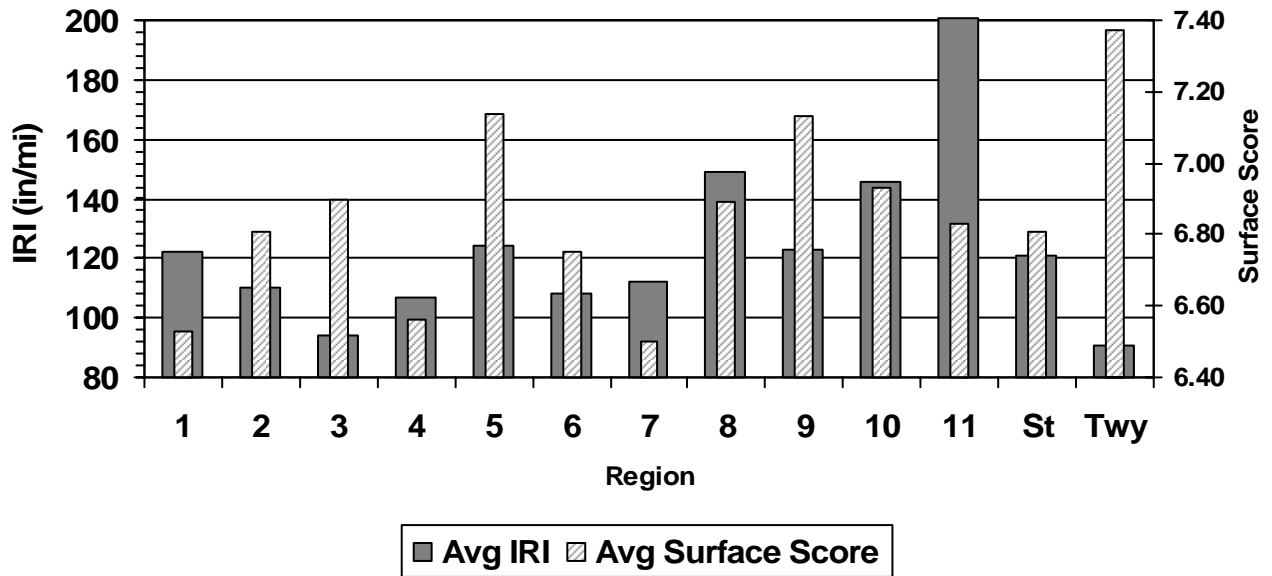


Figure 3
Average Ride Quality (IRI)
Touring Route vs Interstates
 (2003-04 data)

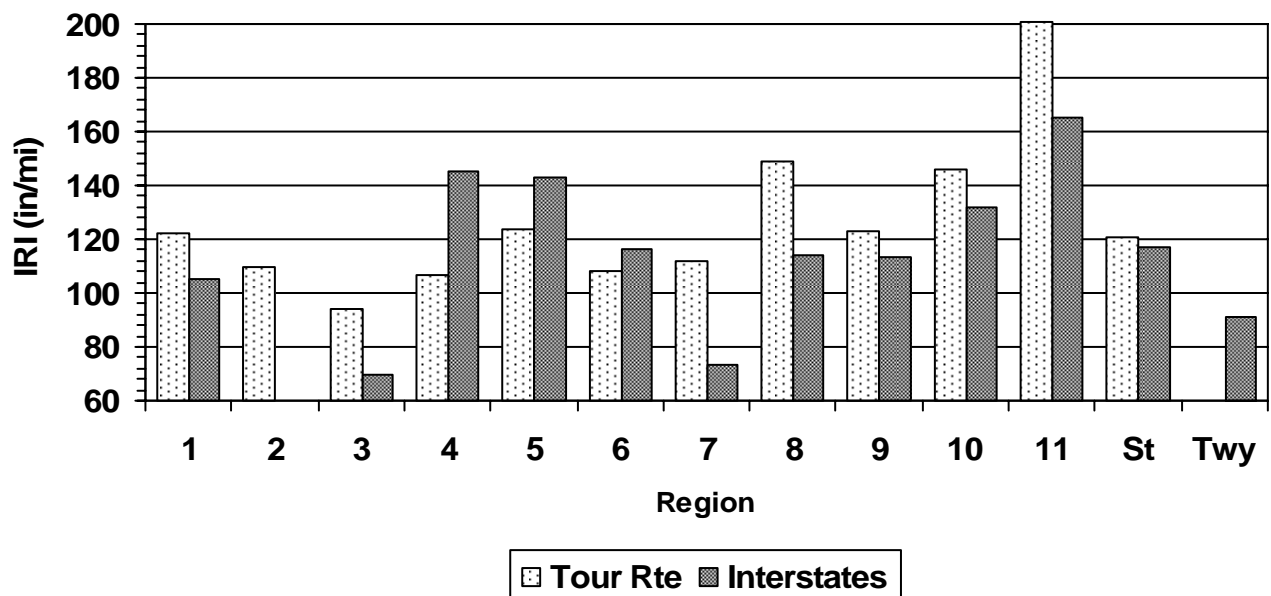


Figure 4
Ride Quality (IRI) - Touring Route
 (2003-04 data)

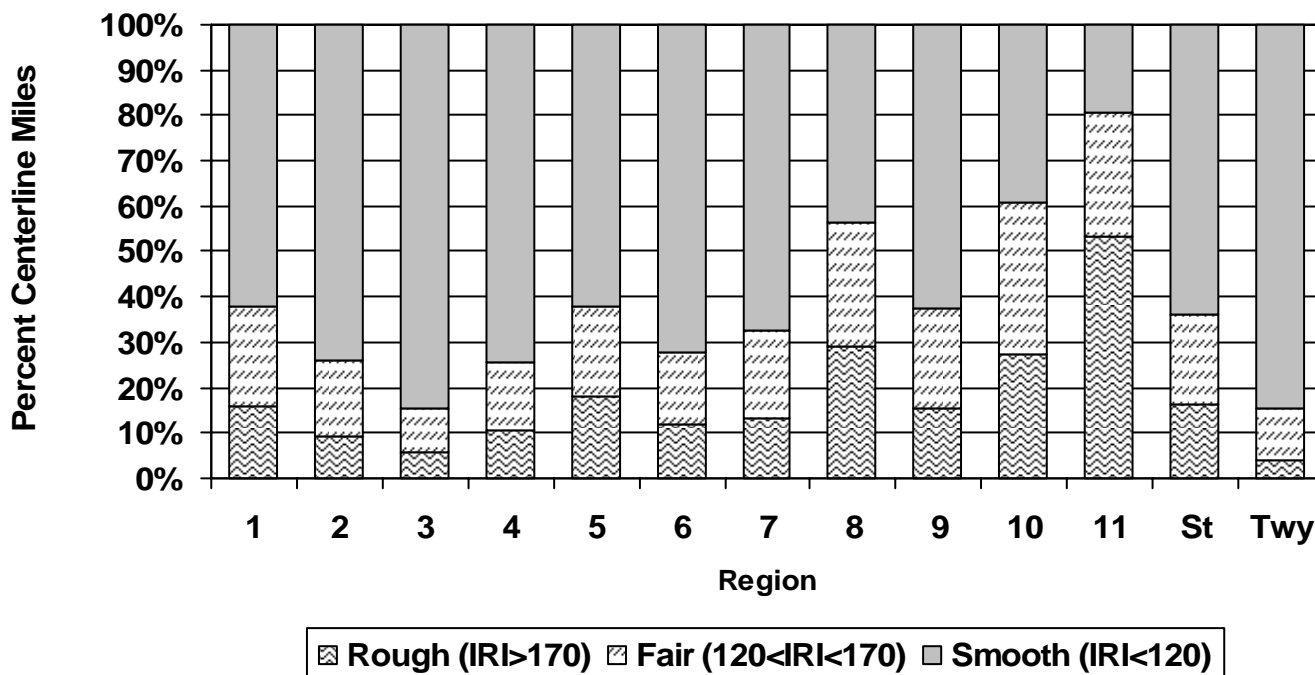


Figure 5
Ride Quality (IRI) - Interstates
 (2003-04 data)

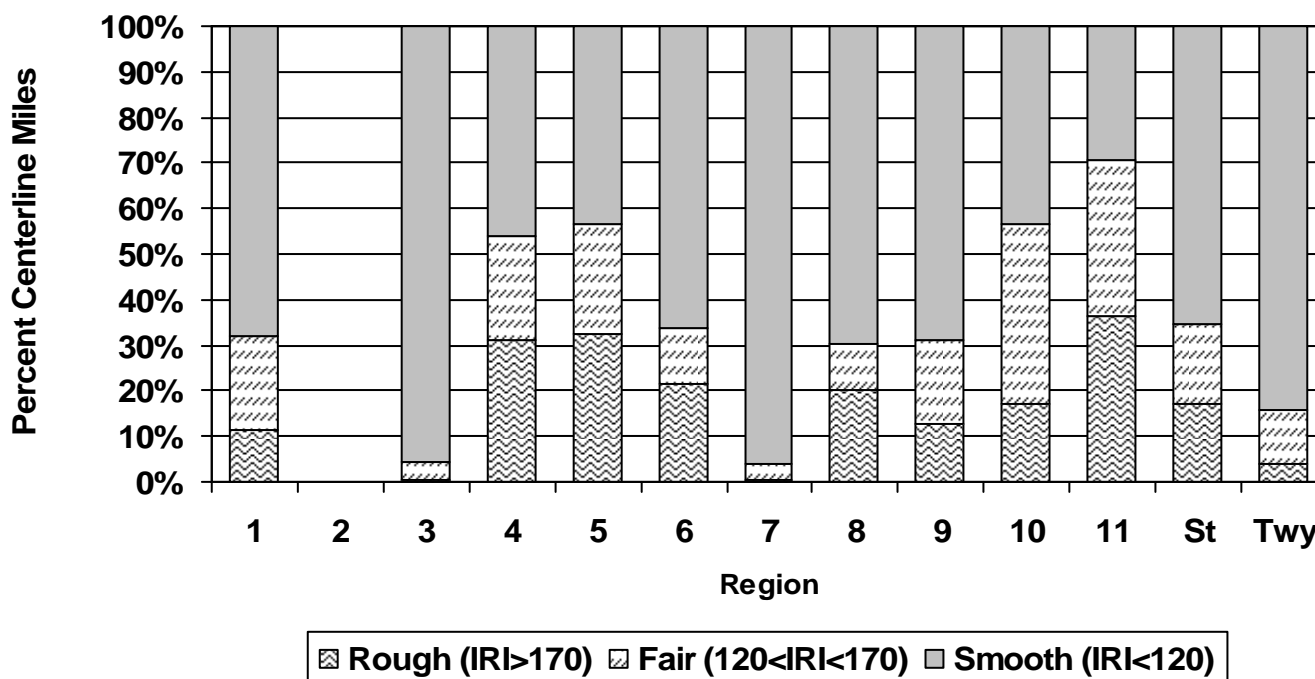


Table 10A

2003-04 IRI by Category and County - Touring Route							
County	Percent Based on CLM						AVG IRI (in/mi)
	*IRI Not Avail	V. Smooth IRI<60	Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220	V. Rough IRI>220	
Region 1							
ALB	8.3%	2.9%	44.0%	19.8%	13.3%	11.7%	141
ESX	2.3%	1.4%	48.8%	30.2%	9.8%	7.6%	132
GRN	3.8%	1.1%	47.8%	29.3%	11.2%	6.7%	133
REN	6.5%	3.1%	49.4%	23.1%	10.6%	7.3%	128
SAR	5.3%	9.9%	63.5%	12.7%	4.5%	4.1%	105
SCH	12.5%	5.5%	58.7%	15.8%	5.4%	2.1%	107
WAR	3.1%	13.4%	62.7%	13.6%	4.3%	2.9%	100
WSH	2.0%	2.8%	64.8%	19.1%	7.5%	3.7%	114
Total	5.4%	4.7%	54.2%	20.7%	8.7%	6.3%%	122
Region 2							
FUL	2.4%	5.0%	75.7%	9.1%	4.6%	3.2%	100
HAM	0.8%	0.6%	51.8%	33.5%	10.2%	3.1%	124
HRK	3.4%	5.2%	52.1%	21.9%	10.0%	7.4%	123
MAD	0.8%	4.0%	81.4%	9.1%	2.8%	1.8%	96
MTG	2.6%	5.3%	72.5%	12.0%	2.3%	5.3%	110
OND	3.9%	6.0%	68.4%	14.9%	4.6%	2.2%	104
Total	3.0%	5.1%	66.7%	16.2%	5.5%	3.6%	110
Region 3							
CAY	2.4%	15.3%	74.0%	5.7%	1.5%	1.0%	85
COR	18.3%	19.7%	51.6%	7.4%	2.0%	1.0%	84
ONO	7.6%	9.6%	60.3%	12.3%	4.4%	5.7%	111
OSW	2.7%	21.9%	66.1%	6.9%	1.7%	0.7%	83
SEN	5.1%	11.7%	65.9%	11.7%	3.8%	1.8%	93
TOM	4.1%	17.2%	65.5%	7.2%	3.2%	2.9%	91
Total	6.5%	15.2%	63.9%	8.9%	2.9%	2.6%	94
Region 4							
GEN	6.8%	7.2%	65.2%	12.1%	5.2%	3.6%	103
LIV	8.1%	4.3%	54.3%	18.4%	6.9%	8.1%	120
MNR	9.7%	4.3%	55.7%	16.2%	7.8%	6.4%	118
ONT	3.6%	6.5%	76.2%	9.7%	2.7%	1.3%	95
ORL	3.8%	4.5%	62.9%	17.2%	7.8%	3.9%	113
WYN	2.8%	12.6%	77.2%	5.1%	1.8%	0.6%	84
WYO	1.9%	4.5%	73.8%	14.3%	3.9%	1.7%	99
Total	6.2%	5.8%	64.1%	13.9%	5.7%	4.3%	107
Region 5							
CAT	7.6%	4.8%	51.7%	19.0%	10.1%	6.8%	121
CHA	5.0%	3.2%	67.0%	17.0%	5.9%	2.0%	106
ERI	9.5%	2.4%	46.9%	20.1%	9.3%	11.9%	138
NIA	5.4%	3.7%	54.9%	16.9%	9.1%	10.0%	128
Total	7.2%	3.3%	54.3%	18.5%	8.6%	8.1%	124

Table 10B

2003-04 IRI by Category and County - Touring Route							
County	*IRI Not Avail	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	6.8%	5.4%	52.1%	18.5%	10.7%	6.5%	120
CMG	4.9%	11.2%	64.7%	10.1%	5.6%	3.4%	100
SHY	5.3%	3.1%	68.2%	15.2%	4.2%	4.0%	106
STU	4.7%	13.9%	54.2%	15.3%	6.2%	5.8%	109
TIO	3.9%	13.4%	56.1%	16.0%	7.0%	3.6%	104
YAT	2.1%	5.1%	78.1%	10.5%	2.7%	1.5%	99
Total	4.9%	9.9%	58.7%	15.0%	6.7%	4.8%	108
Region 7							
CLN	2.7%	18.8%	66.3%	8.0%	2.3%	1.9%	90
FRK	2.4%	4.3%	37.5%	31.9%	14.2%	9.8%	140
JEF	4.1%	12.2%	44.7%	24.6%	8.6%	5.8%	119
LEW	2.0%	12.3%	64.7%	10.7%	6.2%	4.2%	102
STL	3.0%	9.9%	58.4%	17.4%	6.4%	4.8%	110
Total	3.1%	11.4%	53.7%	19.2%	7.4%	5.2%	112
Region 8							
COL	3.8%	0.5%	44.0%	23.4%	16.3%	11.8%	143
DUT	5.1%	0.7%	34.4%	27.4%	17.6%	14.8%	156
ORG	6.9%	1.0%	52.9%	19.5%	8.8%	10.9%	137
PUT	4.6%	0.3%	31.3%	29.8%	18.8%	15.2%	159
ROC	9.4%	0.3%	41.7%	27.1%	14.0%	7.5%	138
ULS	5.7%	0.3%	42.6%	25.0%	15.2%	11.1%	145
WST	11.8%	1.4%	31.9%	26.8%	13.4%	14.8%	159
Total	7.3%	0.8%	39.6%	25.2%	14.3%	12.7%	149
Region 9							
BRM	7.6%	8.6%	49.8%	17.5%	8.1%	8.4%	124
CHN	3.3%	3.6%	50.2%	24.5%	10.3%	8.1%	133
DEL	2.3%	2.9%	67.6%	18.9%	5.7%	2.7%	109
OTS	3.7%	1.0%	48.9%	26.8%	11.7%	7.9%	135
SCO	3.5%	1.4%	57.3%	22.0%	10.6%	5.2%	125
SUL	2.6%	2.0%	81.1%	10.6%	2.0%	1.8%	100
Total	4.0%	3.6%	56.5%	21.1%	8.6%	6.2%	123
Region 10							
NAS	9.1%	0.4%	32.1%	31.1%	16.7%	10.7%	150
SUF	7.5%	1.1%	37.5%	30.4%	14.1%	9.3%	143
Total	8.2%	0.8%	35.3%%	30.7%	15.2%	9.9%	146
Region 11							
BNX	27.3%	0.0%	24.6%	23.4%	9.3%	15.3%	173
KGS	33.1%	0.0%	8.3%	22.1%	16.4%	20.1%	201
QNS	25.2%	0.0%	10.4%	15.4%	18.3%	30.7%	220
RCH	25.6%	0.0%	28.2%	19.8%	13.0%	13.3%	160
NY	36.8%	0.0%	6.8%	20.8%	14.2%	21.5%	213
Total	29.3%	0.0%	13.6%	19.4%	15.0%	22.7%	201
State	6.1%	6.2%	53.8%	18.6%	8.4%	6.8%	121

* IRI Not Available occurs when valid IRI data could not be obtained, such as bridges, construction and slow moving traffic.

Table 11A

2003-04 IRI by Category and County – Interstates							
County	*IRI Not Avail	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	4.9%	13.9%	37.8%	15.1%	16.6%	11.6%	131
ESX	1.2%	0	33.0%	47.0%	13.3%	5.4%	142
GRN	0	0	0	0	0	0	-
REN	4.6%	34.0%	45.1%	11.8%	3.7%	0.7%	89
SAR	1.7%	26.2%	64.0%	7.8%	0.3%	0	82
SCH	29.3%	21.3%	30.7%	8.9%	7.7%	2.1%	95
WAR	2.3%	41.6%	55.0%	0.8%	0.3%	0	100
WSH	0	0	0	0	0	0	-
Total	5.6%	19.9%	44.3%	19.5%	7.4%	3.4%	105
Region 2							
FUL	0	0	0	0	0	0	-
HAM	0	0	0	0	0	0	-
HRK	0	0	0	0	0	0	-
MAD	0	0	0	0	0	0	-
MTG	0	0	0	0	0	0	-
OND	0	0	0	0	0	0	-
Total	0	0	0	0	0	0	-
Region 3							
CAY	0	0	0	0	0	0	-
COR	3.7%	40.7%	54.6%	0.3%	0.7%	0	65
ONO	9.9%	25.3%	58.1%	5.7%	1.0%	0	76
OSW	1.0%	58.8%	38.3%	1.9%	0	0	62
SEN	0	0	0	0	0	0	-
TOM	0	0	0	0	0	0	-
Total	6.2%	37.4%	52.3%	3.5%	0.6%	0.0%	70
Region 4							
GEN	7.3%	43.8%	48.9%	0	0	0	65
LIV	3.9%	0	7.0%	32.6%	18.7%	37.9%	211
MNR	6.9%	16.3%	44.9%	16.8%	10.3%	4.8%	110
ONT	2.7%	8.1%	86.7%	2.4%	0	0	77
ORL	0	0	0	0	0	0	-
WYN	0	0	0	0	0	0	-
WYO	0	0	0	0	0	0	-
Total	5.7%	10.5%	32.8%	21.7%	12.8%	16.5%	145
Region 5							
CAT	6.6%	0.2%	25.1%	18.7%	25.2%	24.3%	174
CHA	5.7%	1.2%	46.0%	26.6%	15.8%	4.6%	127
ERI	5.0%	0	50.7%	21.7%	17.0%	5.6%	133
NIA	12.2%	6.1%	60.8%	9.1%	10.3%	1.5%	103
Total	6.2%	0.9%	39.9%	22.6%	18.9%	11.4%	143

Table 11B

2003-04 IRI by Category and County – Interstates							
County	Percent Based on CLM						AVG IRI (in/mi)
	*IRI Not Avail	V. Smooth IRI<60	Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220	V. Rough IRI>220	
Region 6							
ALG	14.7%	10.1%	44.1%	9.8%	12.6%	8.7%	117
CMG	4.4%	16.0%	49.7%	6.0%	15.2%	8.7%	115
SHY	0	0	0	0	0	0	-
STU	6.0%	15.7%	40.6%	15.3%	8.8%	13.5%	128
TIO	3.5%	38.7%	53.9%	3.2%	0.7%	0	69
YAT	0	0	0	0	0	0	-
Total	7.6%	17.1%	44.1%	11.5%	9.5%	10.2%	116
Region 7							
CLN	4.9%	38.6%	53.8%	2.1%	0.5%	0	70
FRK	0	0	0	0	0	0	-
JEF	6.3%	26.3%	63.3%	3.5%	0.4%	0.2%	75
LEW	0	0	0	0	0	0	-
STL	0	0	0	0	0	0	-
Total	5.7%	31.4%	59.4%	3.0%	0.4%	0.1%	73
Region 8							
COL	0	0	0	0	0	0	-
DUT	0	0	0	0	0	0	-
ORG	3.6%	4.7%	76.6%	10.2%	3.2%	1.7%	99
PUT	8.1%	0	8.4%	10.8%	48.5%	24.3%	190
ROC	0	0.3%	55.0%	27.5%	12.0%	5.2%	121
ULS	8.6%	0	0	0	74.1%	17.2%	199
WST	4.0%	23.0%	37.9%	5.6%	15.7%	13.7%	120
Total	3.8%	10.4%	56.7%	9.9%	11.7%	7.5%	114
Region 9							
BRM	8.3%	18.7%	52.6%	7.7%	5.8%	6.9%	105
CHN	1.5%	0	71.5%	9.9%	6.1%	11.0%	127
DEL	5.3%	9.7%	58.8%	11.5%	8.6%	6.2%	108
OTS	5.4%	0	33.1%	48.6%	11.4%	1.5%	136
SCO	3.5%	0	27.4%	48.9%	16.0%	4.3%	144
SUL	1.7%	0.2%	88.0%	8.3%	1.5%	0.2%	96
Total	5.5%	8.7%	56.2%	17.6%	7.1%	4.8%	113
Region 10							
NAS	8.9%	0	31.4%	31.1%	15.9%	12.7%	153
SUF	3.0%	3.2%	41.9%	40.1%	9.6%	2.2%	124
Total	4.6%	2.3%	39.0%	37.6%	11.4%	5.1%	132
Region 11							
BNX	35.0%	0	24.1%	23.9%	8.8%	8.3%	154
KGS	77.0%	0	7.0%	4.7%	6.2%	5.1%	170
QNS	36.8%	0	21.7%	17.3%	10.1%	14.2%	168
RCH	44.8%	0	22.5%	18.0%	6.8%	7.9%	155
NY	34.6%	0	9.9%	26.6%	15.6%	13.4%	176
Total	41.9%	0.0%	17.1%	19.9%	10.4%	10.6%	165
State	8.4%	14.3%	45.5%	16.0%	8.9%	6.9%	117

* IRI Not Available occurs when valid IRI data could not be obtained, such as bridges, construction and slow moving traffic.

Table 12

2004 IRI by Category and Division – Thruway							
Division	Percent Based on CLM						
	*IRI Not Avail	V.Smooth IRI<60	Smooth 60<IRI<120	Fair 120<IRI<170	Rough 170<IRI<220	V.Rough IRI>220	AVG IRI (in/mi)
Mainline							
NY I-87	6.9%	0.9%	71.7%	17.3%	2.7%	0.6%	104
ALB I-87	2.4%	21.1%	68.5%	6.8%	1.0%	0.3%	81
ALB I-90	1.2%	19.4%	75.4%	3.5%	0.4%	0	78
SYR I-90	1.9%	17.5%	73.2%	6.2%	1.0%	0.3%	83
BUF I-90	5.0%	11.1%	68.8%	12.0%	2.6%	0.5%	92
All Mainline	3.5%	14.1%	71.1%	9.2%	1.6%	0.3%	88
Other Divisions							
MIDD I-84	7.2%	0	82.4%	5.8%	2.6%	1.9%	99
EF I-84	7.0%	0	44.5%	36.8%	7.4%	4.3%	128
All I-84	7.1%	0.0%	66.5%	18.8%	4.6%	2.9%	112
BRKS	6.6%	12.5%	57.9%	18.9%	2.5%	1.6%	99
CWE I-287	23.1%	0.0%	34.2%	31.2%	8.0%	3.4%	134
NIAG I-190	20.9%	15.7%	45.6%	12.4%	4.5%	1.0%	94
NE I-95	9.2%	35.4%	9.3%	11.3%	18.0%	16.7%	76
GSP	8.1%	0.0%	83.8%	4.0%	4.0%	0.0%	98
All Twy							
All Twy	5.1%	12.8%	67.3%	11.1%	2.6%	1.1%	91

* IRI Not Available occurs when valid IRI data could not be obtained, such as bridges, construction and slow moving traffic.

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.

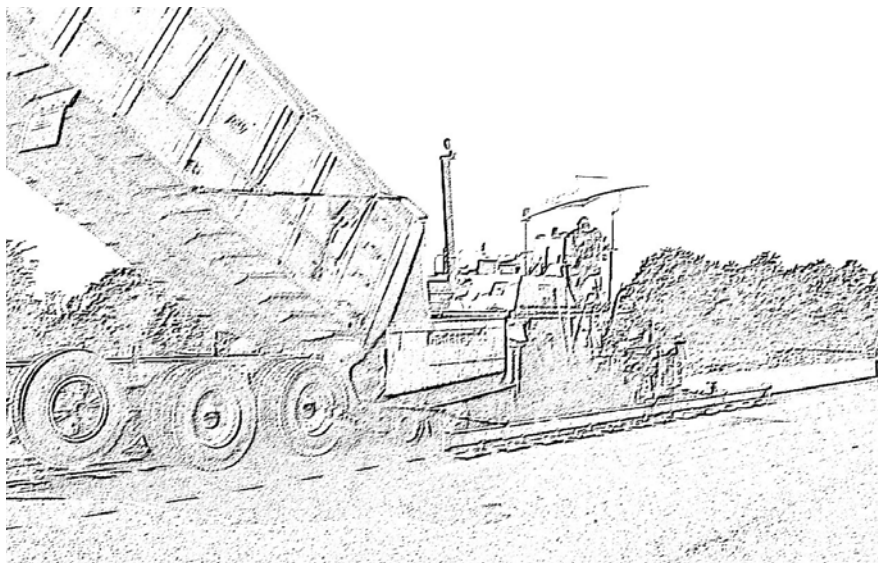


Table 13: Algorithm for Estimating Network Level Pavement Needs

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	1				1			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 7% of the State Highway system falls in the Do Nothing category. This indicates that 93% of the State Highway System is in need of some type of maintenance or rehabilitation action. About 22% of

pavements are candidates for crack sealing, 34.5% are in need of preventive maintenance paving, almost 30% need corrective maintenance, close to 7% need rehabilitation, and only about 0.4%, representing 132 lane miles, need to be reconstructed.

Table 14

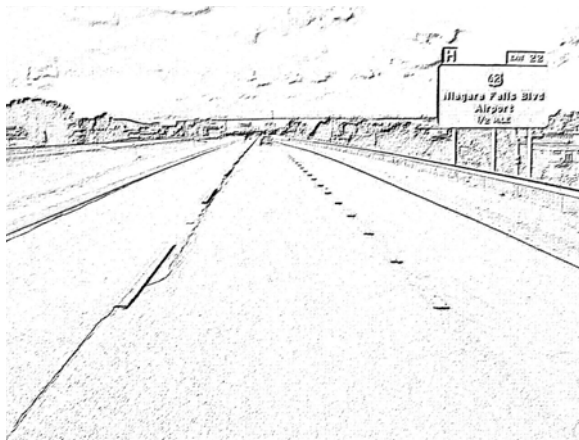
State Highway System 2005 Lane-Miles by Treatment Category													
Region	Total Lane Miles	Do Nothing		Preventive Maintenance (Non-Paving)		Preventive Maintenance (Paving)		Corrective Maintenance		Rehabilitation		Reconstruction	
		Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%	Lane Miles	%
1	4768	207	4.3%	742	15.6%	1311	27.5%	2036	42.7%	422	8.8%	50	1.1%
2	2955	79	2.7%	545	18.4%	1567	53.0%	650	22.0%	103	3.5%	11	0.4%
3	3514	334	9.5%	813	23.1%	1118	31.8%	1163	33.1%	86	2.5%	0	0.0%
4	3984	267	6.7%	593	14.9%	1081	27.1%	1442	36.2%	573	14.4%	28	0.7%
5	3740	462	12.4%	1032	27.6%	1254	33.5%	675	18.0%	315	8.4%	2	0.0%
6	2541	145	5.7%	226	8.9%	1112	43.8%	862	33.9%	196	7.7%	0	0.0%
7	3483	230	6.6%	341	9.8%	825	23.7%	1973	56.6%	101	2.9%	13	0.4%
8	5202	170	3.3%	1484	28.5%	2335	44.9%	938	18.0%	255	4.9%	20	0.4%
9	3827	448	11.7%	1183	30.9%	1394	36.4%	545	14.3%	257	6.7%	0	0.0%
10	2681	279	10.4%	573	21.4%	835	31.1%	820	30.6%	166	6.2%	8	0.3%
11	813	4	0.4%	621	76.4%	121	14.9%	0	0.0%	67	8.3%	0	0.0%
State	37,508	2,625	7.0%	8,153	21.7%	12,953	34.5%	11,104	29.6%	2,541	6.8%	132	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 1,360 sections totaling about 3,500 lane miles were shadow scored in 2005 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.

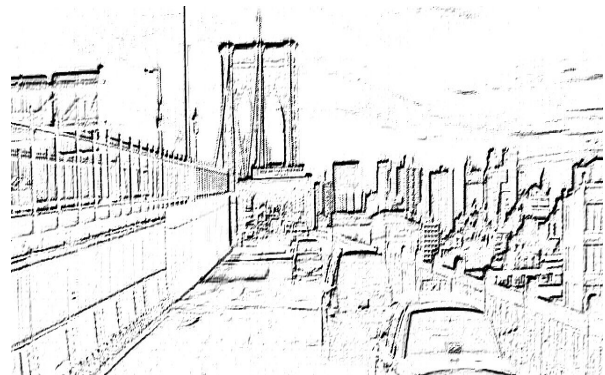


Table 15 presents the results of the 2005 shadow scoring effort. Overall, the results show continued rating consistency with 97.9% of the rating judgments by the shadow rating team within one point of the region's condition ratings. Over the last several years, this value has ranged from a low of 93.6% to a high this year of 97.9%, and averaged 96.0%. 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 0.25 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 -0.03, which indicates that

on average the shadow scores agree very closely with regional ratings. On a regional basis, Region 4 showed the greatest variation with -0.19 average scoring error, with Region 10 next having -0.13 average error in the shadow scored sections. These errors are actually quite small, as errors of 0.4 to 0.6 have been observed in prior years.

The shadow scoring results show that the 2005 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 2005 NYSDOT pavement condition ratings are sufficiently accurate for network-level summaries and analysis.

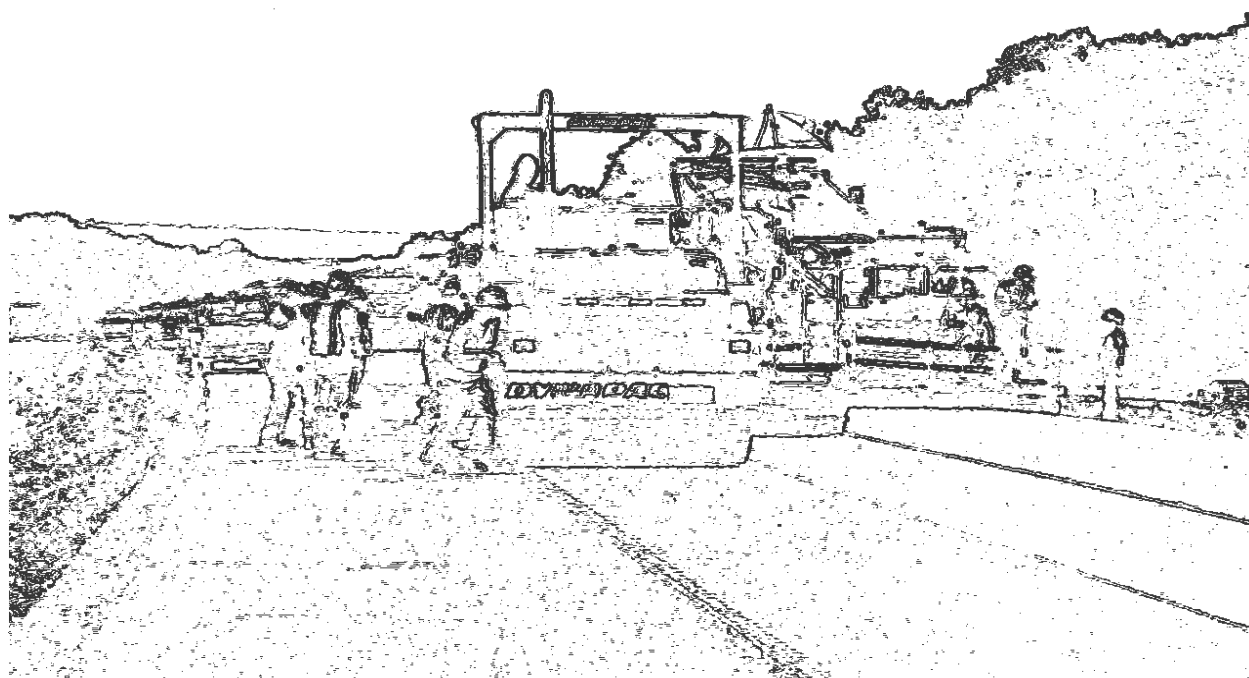


Table 15

2005 Shadow Scoring Results			
Region	Percent +/- 1 Point	Average Scoring Error	Absolute Scoring Error
1	95.0%	-0.11	0.30
2	99.5%	0.02	0.22
3	99.1%	0.00	0.21
4	98.2%	-0.19	0.38
5	95.9%	0.10	0.25
6	99.2%	0.12	0.23
7	99.0%	-0.11	0.18
8	95.8%	-0.08	0.20
9	98.4%	0.02	0.23
10	93.5%	-0.13	0.26
11	95.8%	0.02	0.21
State	97.9%	-0.03	0.25

Figure 6

2005 Shadow Scoring Results Average Scoring Error by Region

