

STATE OF FLORIDA



**2003
RIGID PAVEMENT
CONDITION SURVEY
FACTS & FIGURES**

**FL/DOT/SMO/03-461
April 2003**

STATE MATERIALS OFFICE

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Executive Summary

Since 1985, the Pavement Condition Unit of the Pavement Systems Evaluation Section has been collecting, processing and analyzing the information on the condition and performance of the State Roadway System on an annual basis. The information provided by the Pavement Condition Survey (PCS) program has been critical to the Department's effort to support informed highway planning, policy and decision making at State and local levels. This includes the apportionment and allocation of funding needs as well as the determination of appropriate cost-effective strategies to rehabilitate and preserve existing highway transportation infrastructure.

The PCS is traditionally performed on the pavement lane that has deteriorated the most in each direction. The beginning and ending of pavement sections to be rated are determined by construction limits and/or uniformity of conditions. All the sections rated are rated in terms of varying levels and amounts of specific distresses, namely, (1) ride quality, (2) surface deterioration, (3) spalling, (4) patching, (5) transverse cracking, (6) longitudinal cracking, (7) corner cracking, (8) shattered slabs, (9) faulting, (10) pumping, and (11) joint condition. Items 2 through 11 are combined to generate a Defect Rating.

The Survey data is collected, reviewed, processed, and analyzed by the Pavement Systems Evaluation Section of the State Materials Office. Once the data collection process is complete, the Central Pavement Management Office is responsible for processing, analysis and making the data available for use by the Department, consultants and others. Thereafter, the Central Program Development Office becomes responsible for reporting the condition of the State Highway System for Pavement Management purposes.

The present report provides essential information on the current condition of the Florida roadway system data collected as part of the PCS program. It also includes a twelve-year historical summary of condition ratings data by District and by system type.

SECTION I

Introduction

The Pavement Systems Evaluation Section of the State Materials Office is responsible for the Department's Annual PCS. The Survey is conducted on the entire State-maintained Highway System, on an annual basis.

The survey, which covers flexible and rigid pavements, is conducted by a highly trained and experienced staff. It requires each of the four area staff specialists about 25 weeks of travel each year to complete the survey. However, since rigid pavements represent only about 3% of the State-maintained Highway System, much less time is spent evaluating rigid pavement.

The annual PCS is used to accomplish the following main objectives:

- ☞ Determine the present condition of the State Roadway System
- ☞ Compare the present with past conditions
- ☞ Predict deterioration rates
- ☞ Predict rehabilitation funding needs
- ☞ Provide justification for annual rehabilitation budget
- ☞ Provide justification for project rehabilitation, and
- ☞ Provide justification for distribution of rehabilitation funds to Districts.

The PCS is conducted in terms of varying levels and amounts of specific distress criteria, namely, (1) defect rating, and (2) ride quality. For each distress type, the pavement sections are rated on a 0 to 10 scale, where a rating of 10 indicates a section in excellent condition. Currently, any section with a rating of 6 or less becomes eligible for rehabilitation.

Defect rating is measured using ten different individual distress types. These distresses are counted and/or estimated (depending on the distress type) and are classified according to severity. The rater collects this distress data by evaluating the pavement from the roadway shoulder.

Ride quality is measured using an automated vehicle-mounted instrument called a Profiler that measures the longitudinal profile of the roadway. The ride quality is quantified in terms of Ride Number (RN). Ride Number is a mathematical processing of longitudinal profile measurements to produce an estimate of ride quality or user perception in accordance with ASTM Standard E1489.

In order to ensure a maximum accuracy and repeatability of the data collected, the testing equipment must be well maintained and routinely calibrated. In addition, edit procedures are currently implemented to test both the data accuracy and compliance with other parameters of the Pavement Management System. Comparisons of annual survey data to that of earlier years are also performed to review trends and identify potential errors. The efforts made to upgrade the survey equipment and to improve the data analysis software resulted in increased speed of data collection and substantial improvement in accuracy of the survey results. These improvements now allow in-depth analysis of any segment of the highway system and timely completion of the PCS while maintaining a high level of accuracy.

For more detailed information about the Pavement Condition Surveys, please refer to the latest edition of the Rigid and Flexible Pavement Condition Survey Handbooks located online at:

<http://www.dot.state.fl.us/statematerialsoffice/PavementEvaluation/reports.htm>

The facts and figures contained in this report are for rigid pavements only unless otherwise noted.

Observations

The review and analysis of the 2003 PCS data have resulted into the following observations:

- Defect ratings have improved slightly during the past eleven years from an average rating of 6.67 in 1992 to 7.76 in 2003.
- Ride ratings have remained constant for the past twelve years with a mean rating of 7.29 (range of 7.00 to 7.55).
- 96.8% of the pavement sections rated this year were within one Defect point compared to previous year's ratings. (*)
- 99.9% of the pavement sections rated this year for Ride were within one point compared to the previous year's ratings. (*)
- Ultrasonic sensors were replaced with Laser sensors beginning with the 1999 survey, along with the use of Ride Number as the method of calculating Ride ratings. This may explain the increase in serviceability observed thereafter.
- * Note: Sections that had undergone notable changes such as new construction or total rehabilitation were excluded from the analysis.

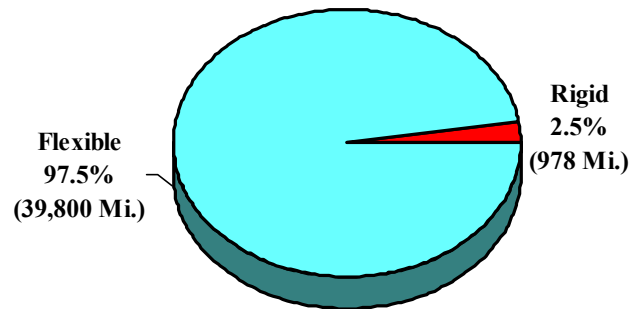
General Notes

- For multi-lane roadways: The worst lane in each direction is rated (normally the outermost traffic lane).
- For two-lane roadways: The worst lane is rated (normally the same lane tested the previous year).
- Rated sections are determined by construction limits and/or significant changes in visual condition of the pavement.
- Ride rating data is collected using four identical roadway profiler units.
- Defect Rating is based on manual and visual distress measurements collected by the rater from the shoulder of the roadway.

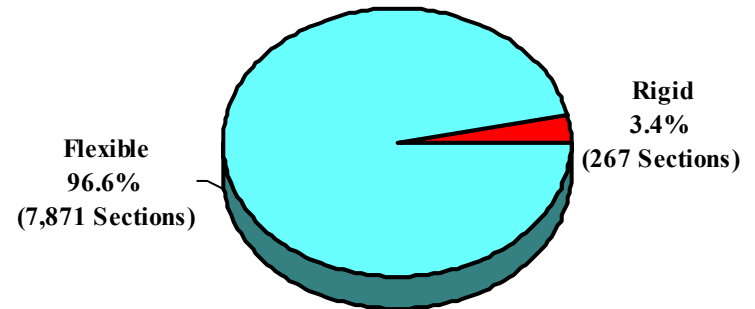
2003 Production Summary

Statewide

Total Lane Miles: 40,779 Mi.
(Flexible and Rigid Combined)

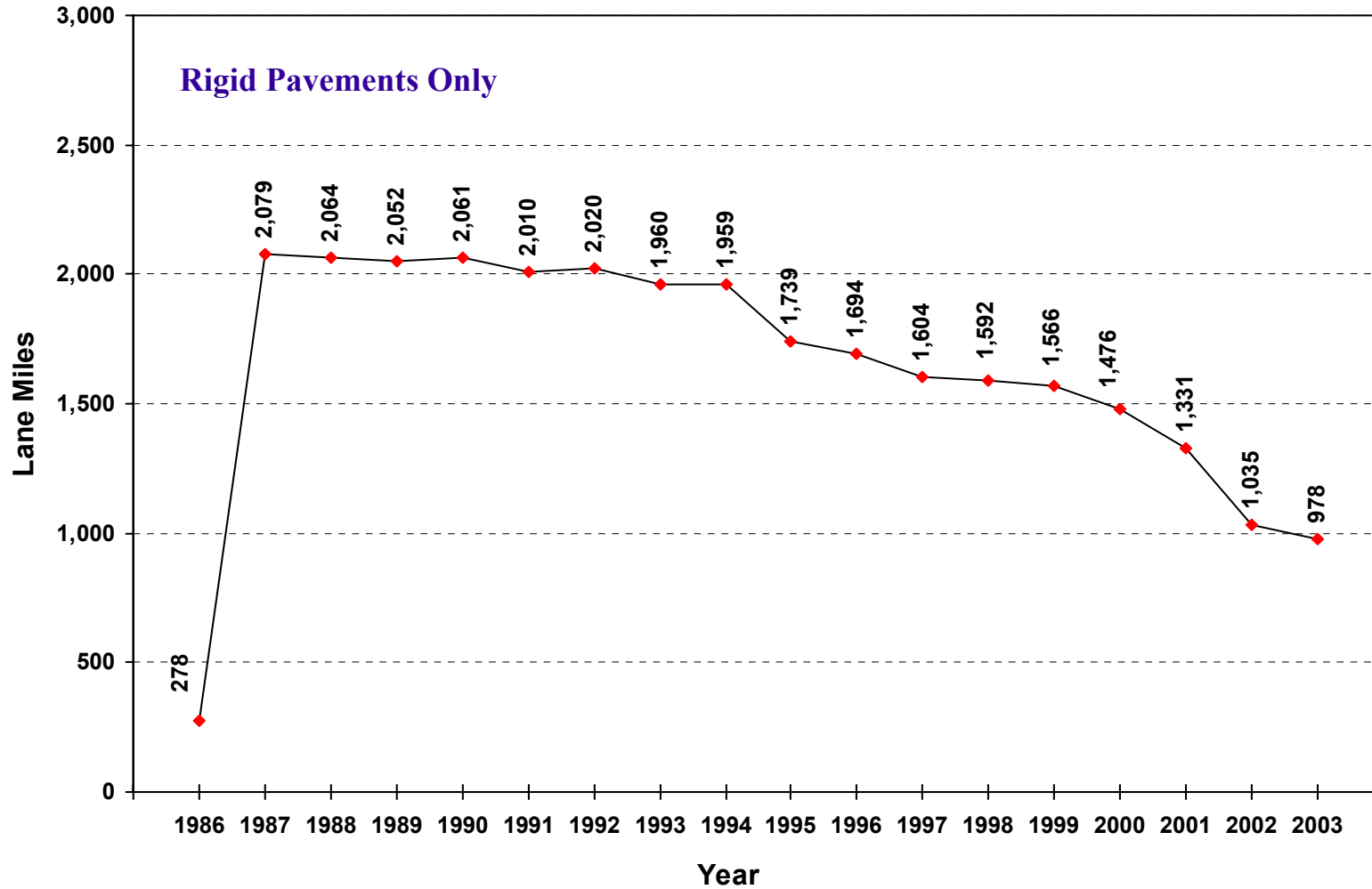


Total Rated Sections: 8,138
(Flexible and Rigid Combined)



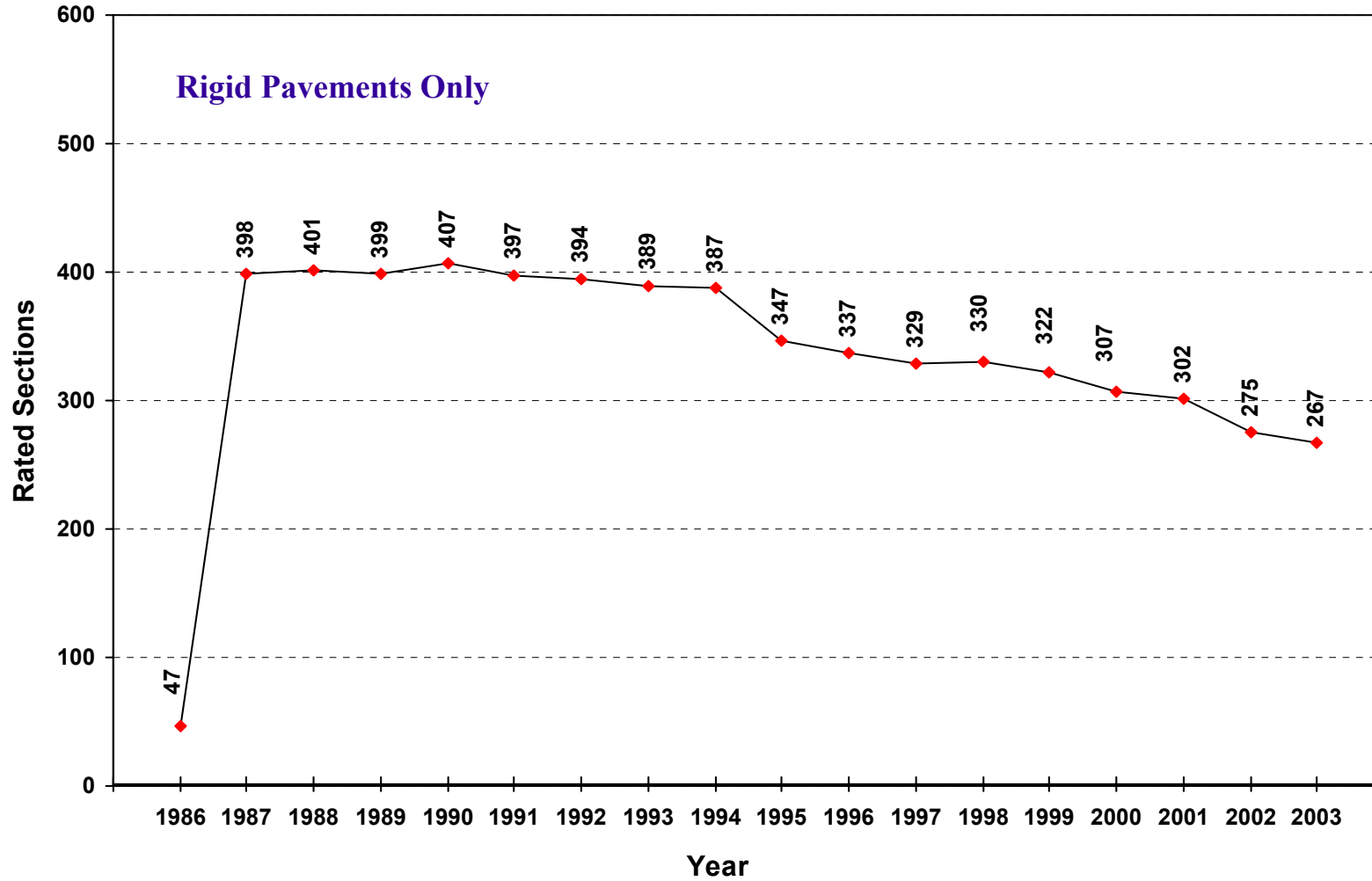
Production History

Lane Miles



Production History

Rated Sections



L

SECTION II

DEFECT RATING

BY

SYSTEM AND DISTRICT



SECTION II

Defect Rating by System and District

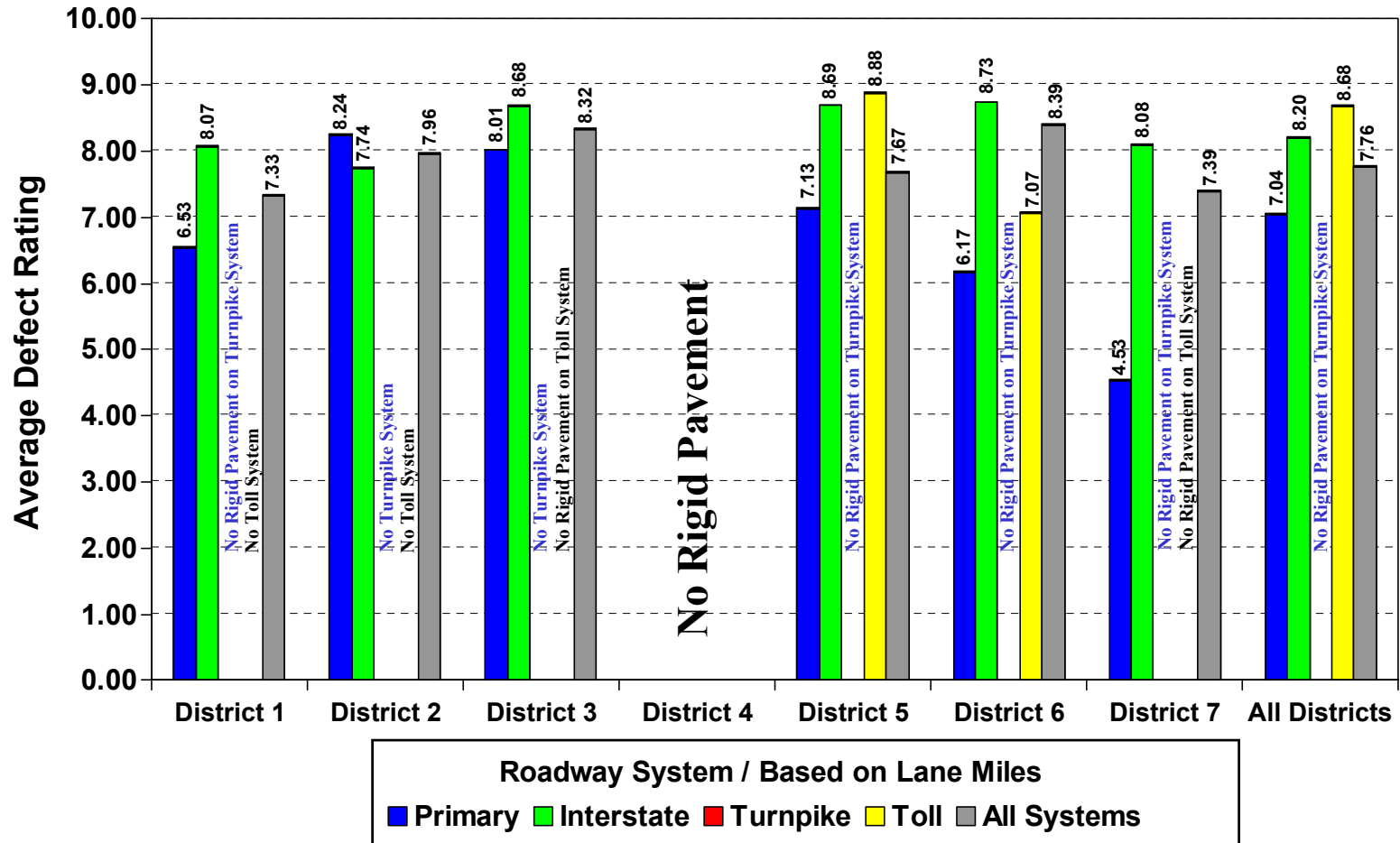
Defect Rating Criteria

- Ten different distresses are counted and/or estimated then classified by severity levels.
- Each distress has a numeric deduct value based on the severity level assigned by the rater.
- The Defect Rating is obtained by subtracting the deduct value associated with the various forms of distress from 100 and dividing by 10. A Defect Rating of 10 indicates a pavement without observable distress.

For more information on how Defect Rating is calculated see the 2003 Rigid Pavement Condition Survey Handbook.

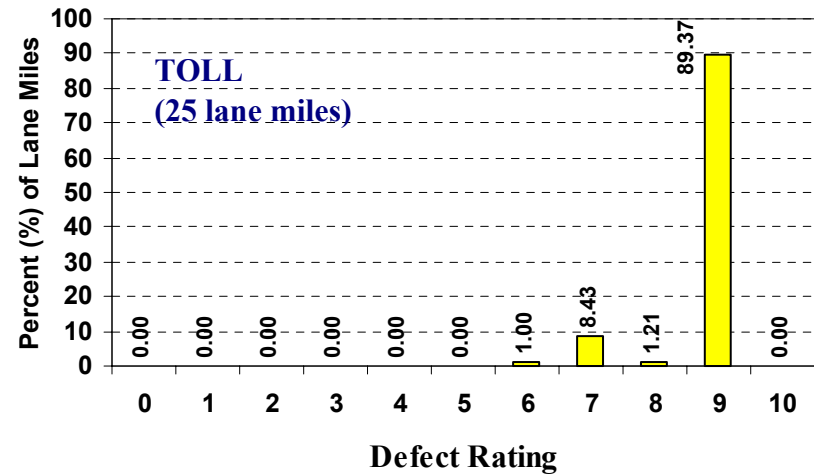
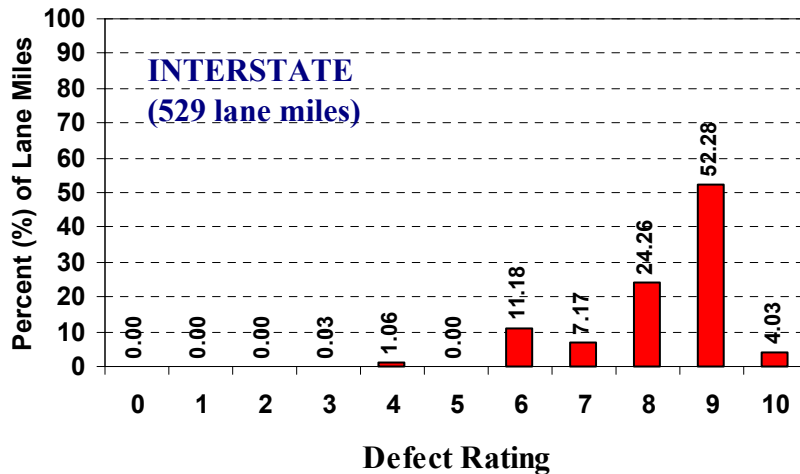
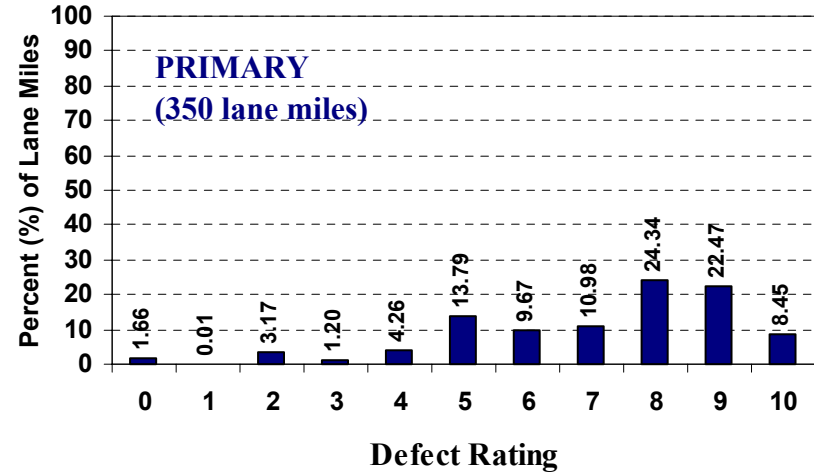
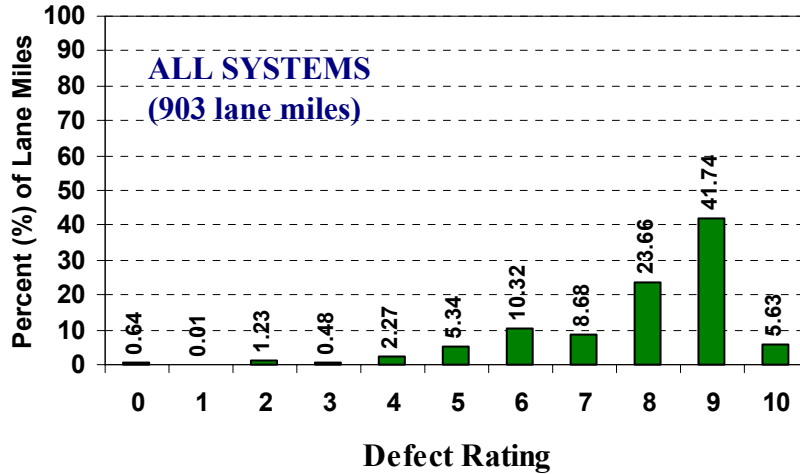
Defect Rating by System and District

01



2003 Defect Distribution by System Statewide

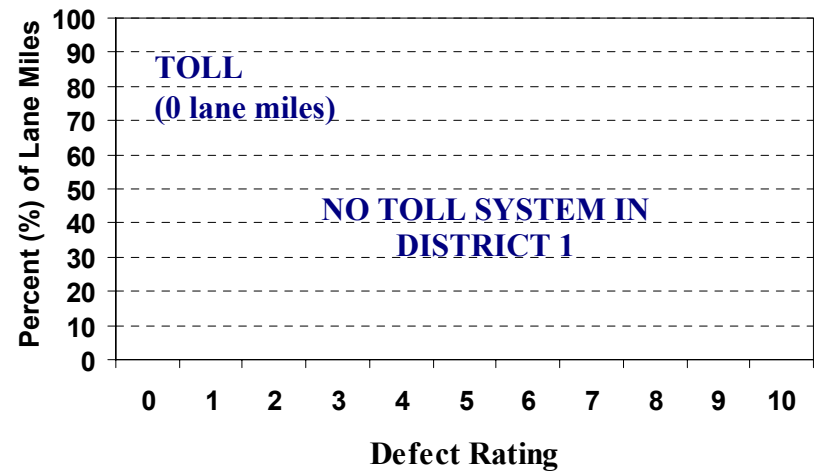
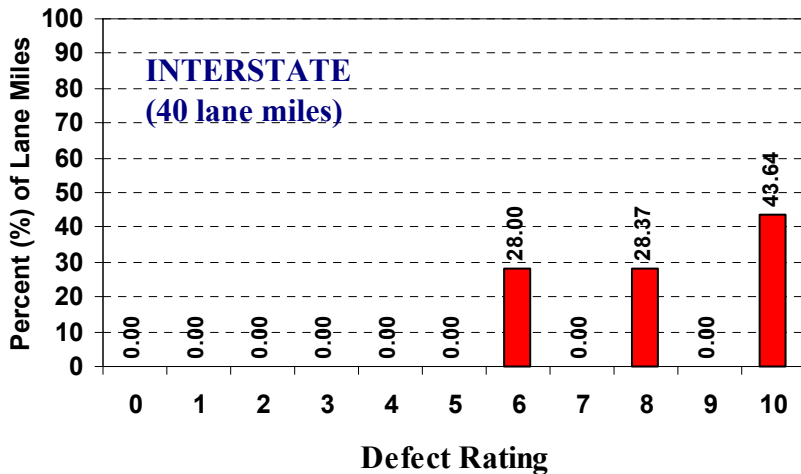
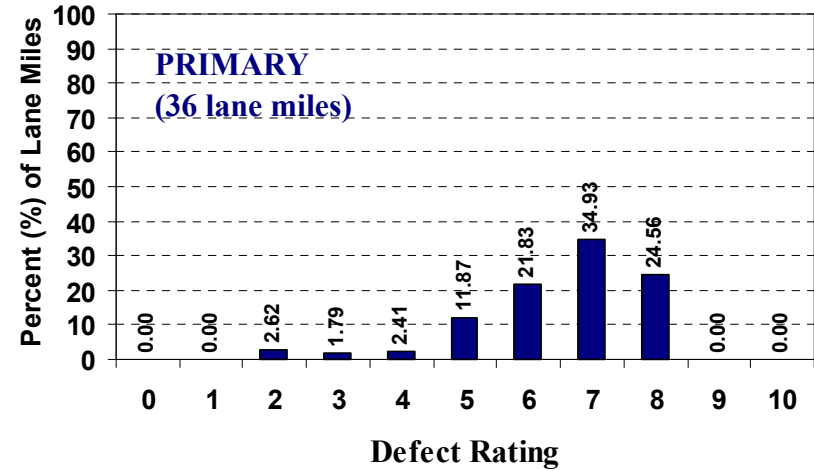
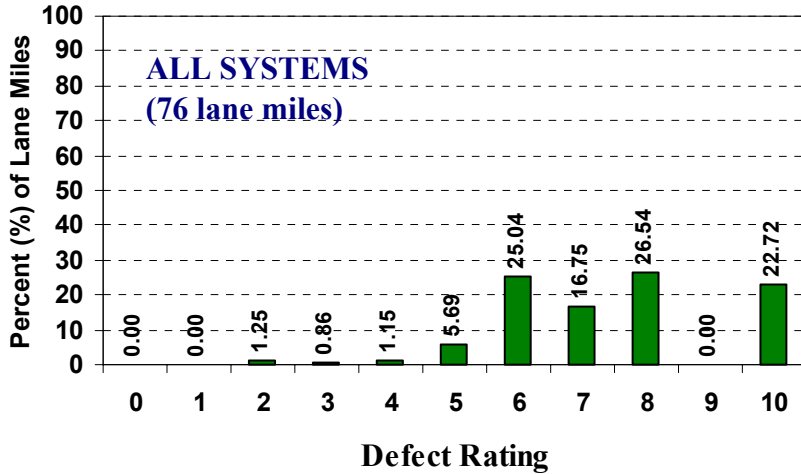
11



Note: No Rigid Pavement on Turnpike System

2003 Defect Distribution by System

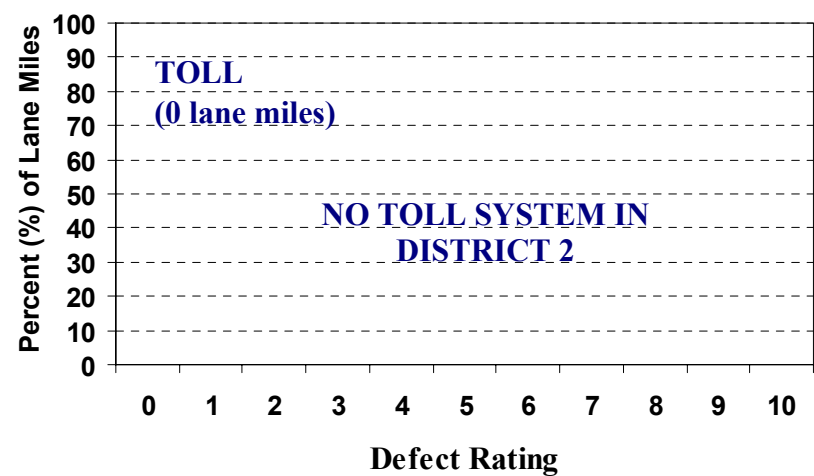
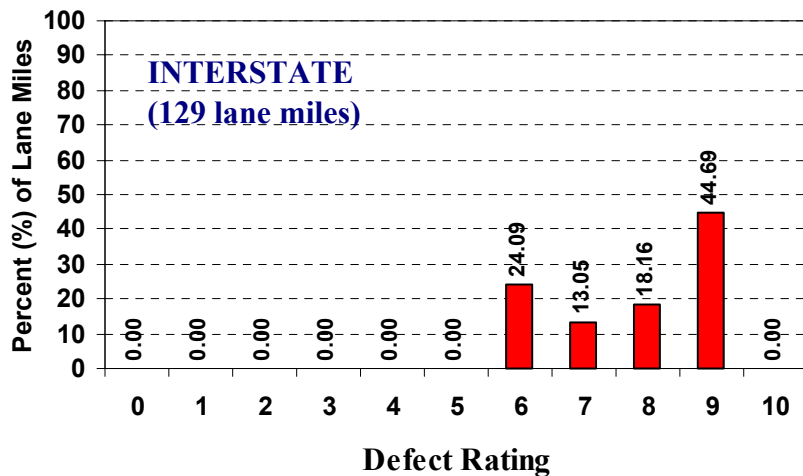
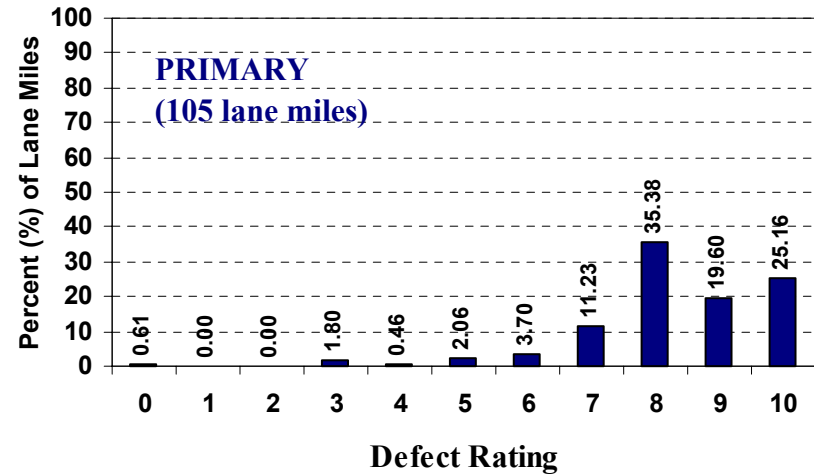
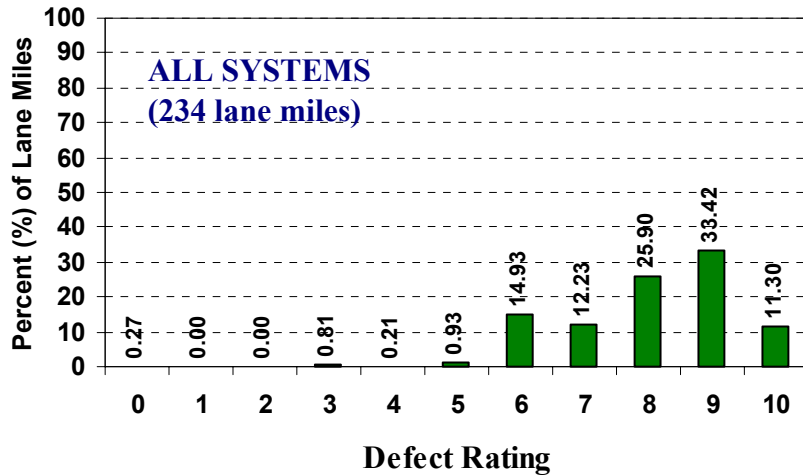
District 1



Note: No Rigid Pavement on Turnpike System

2003 Defect Distribution by System

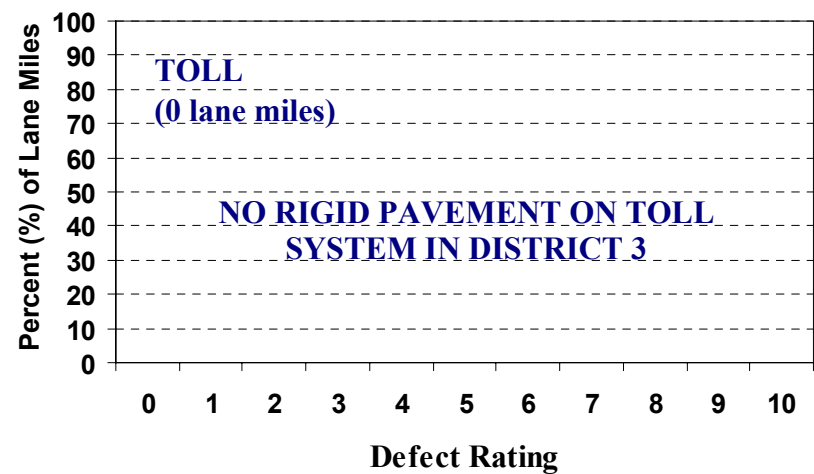
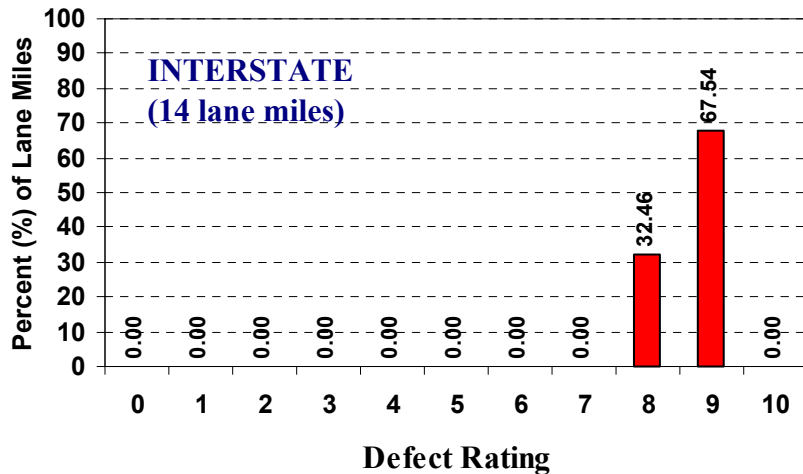
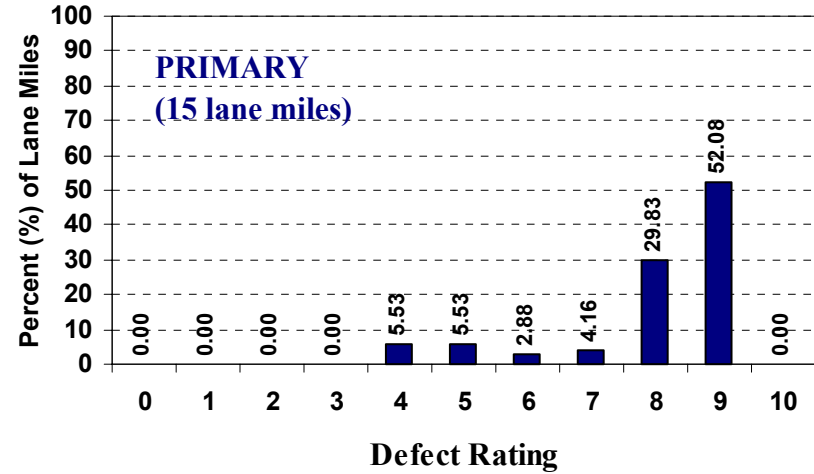
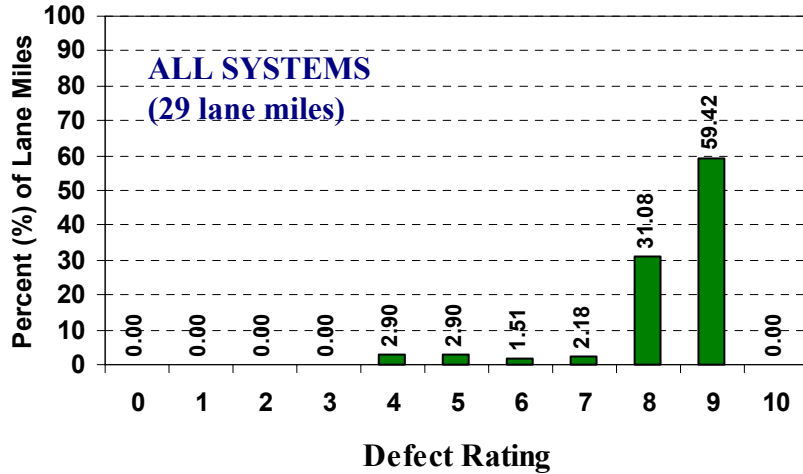
District 2



Note: No Turnpike System in District 2

2003 Defect Distribution by System

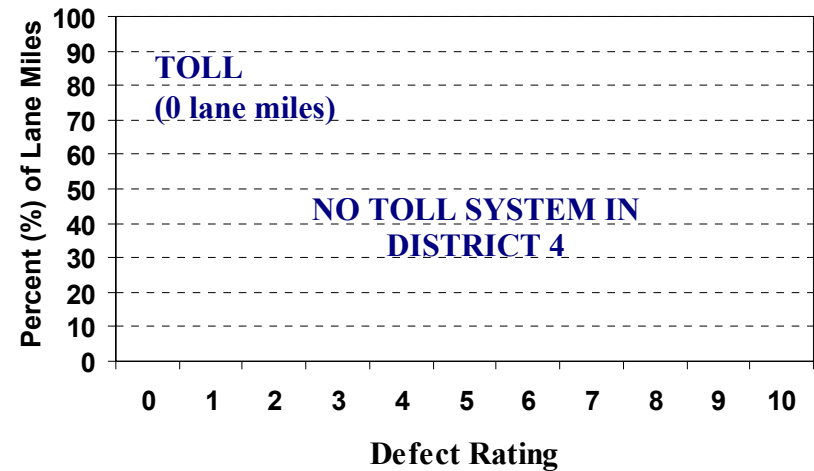
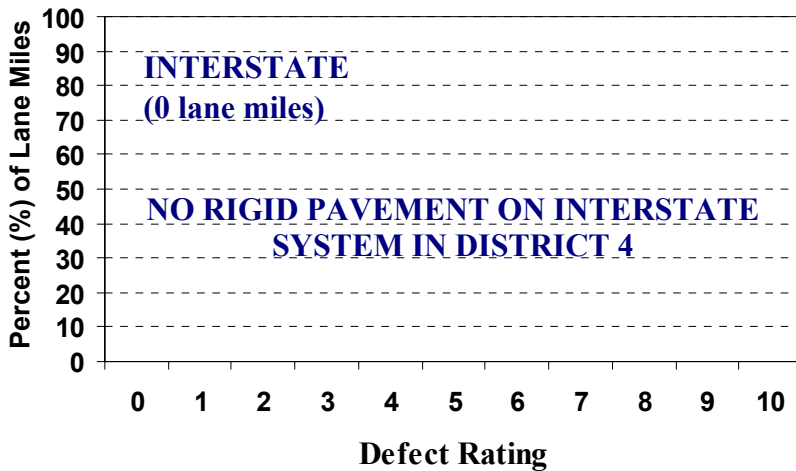
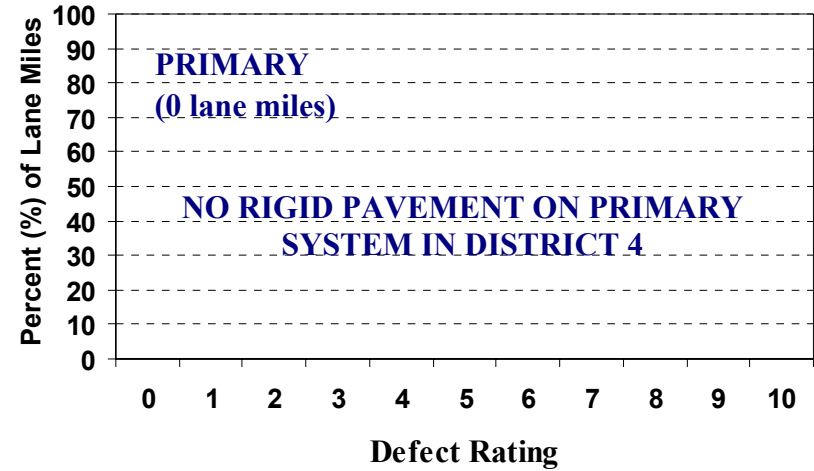
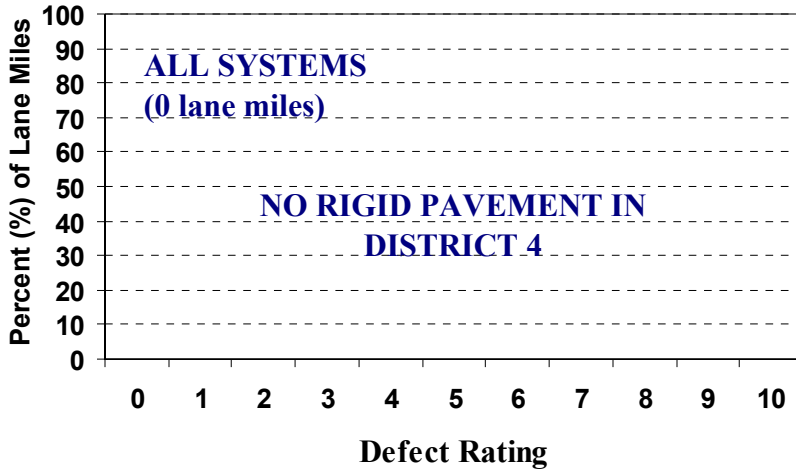
District 3



Note: No Turnpike System in District 3

2003 Defect Distribution by System

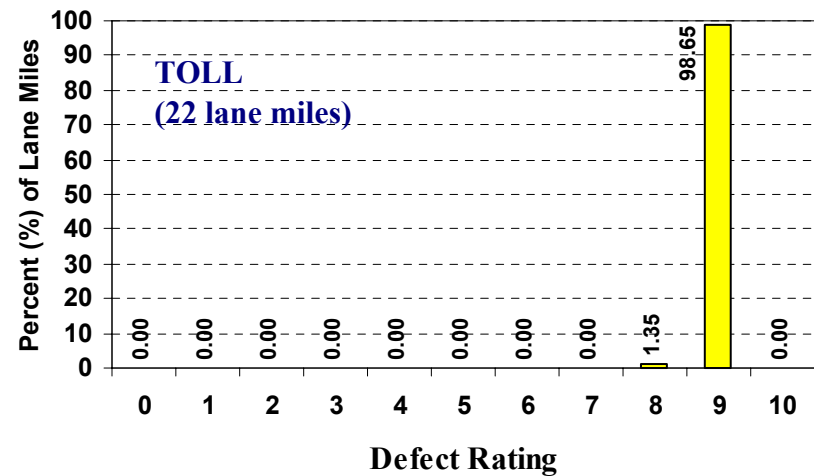
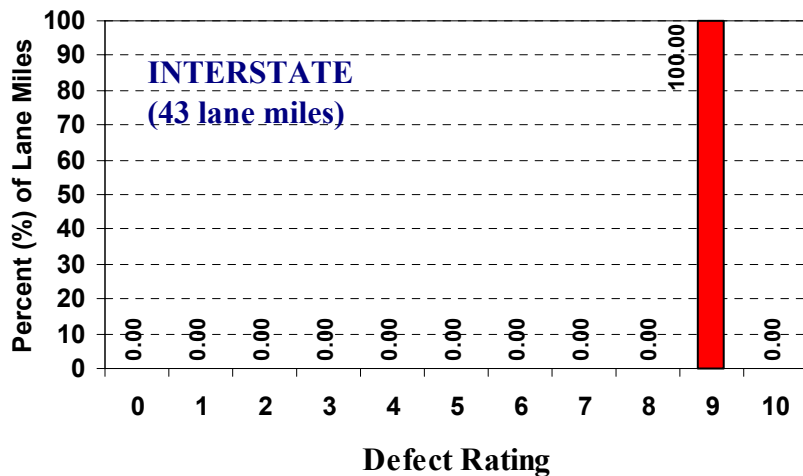
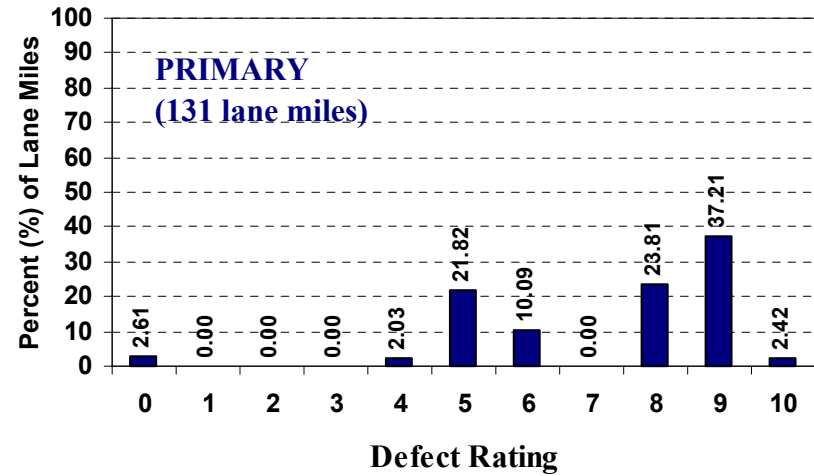
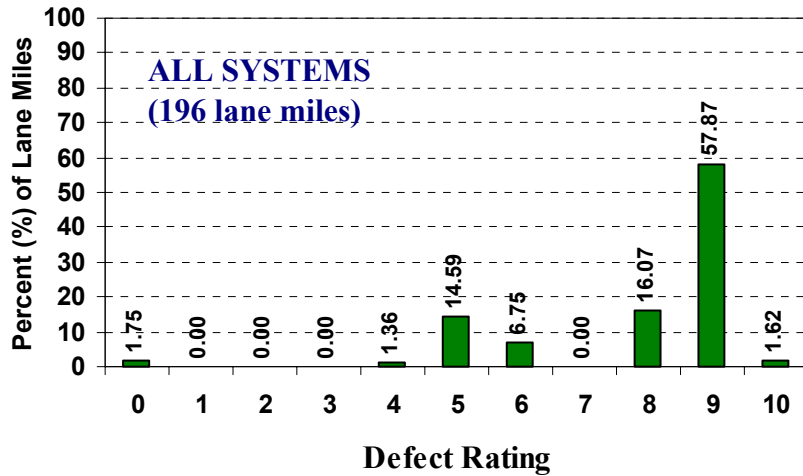
District 4



Note: No Rigid Pavement on Turnpike System

2003 Defect Distribution by System

District 5

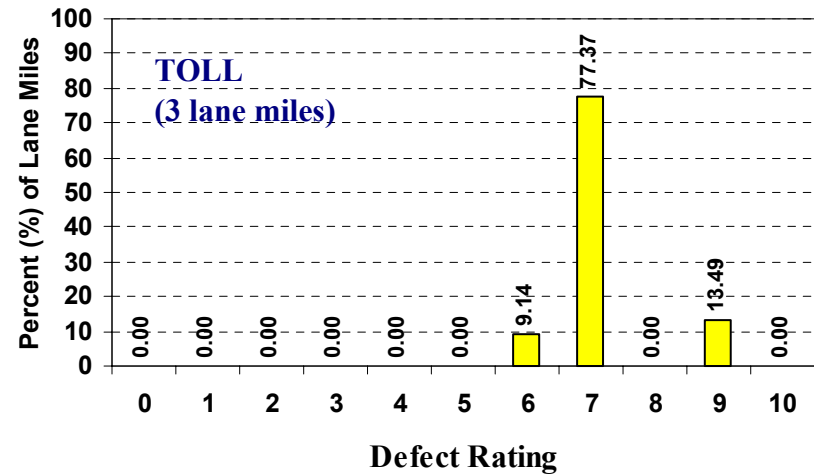
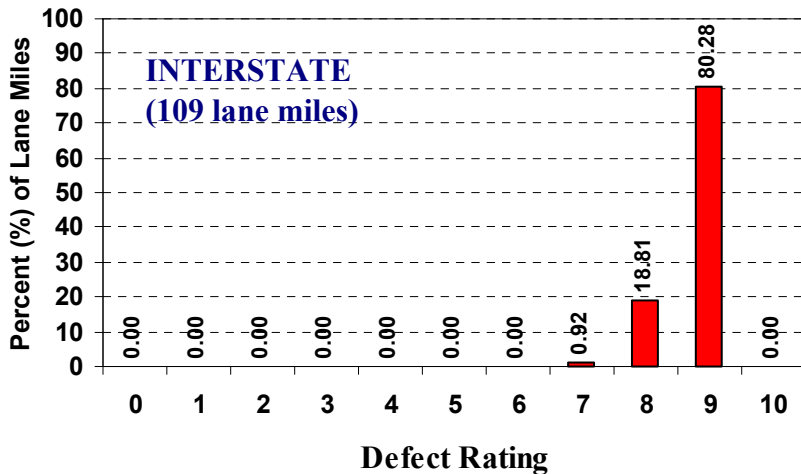
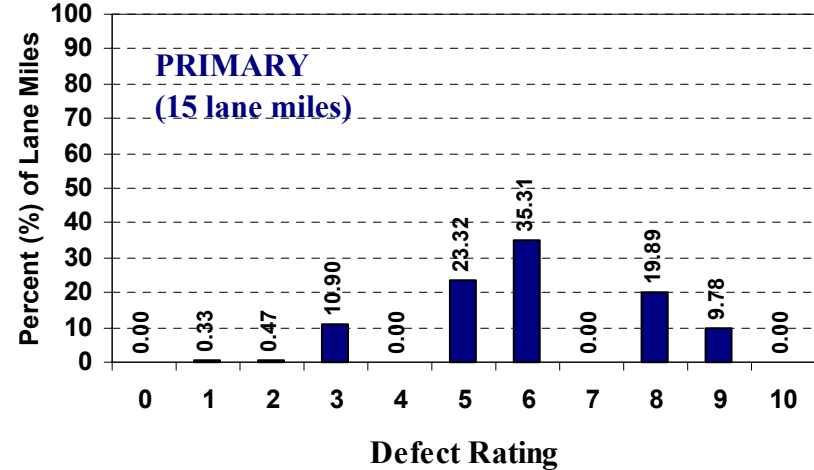
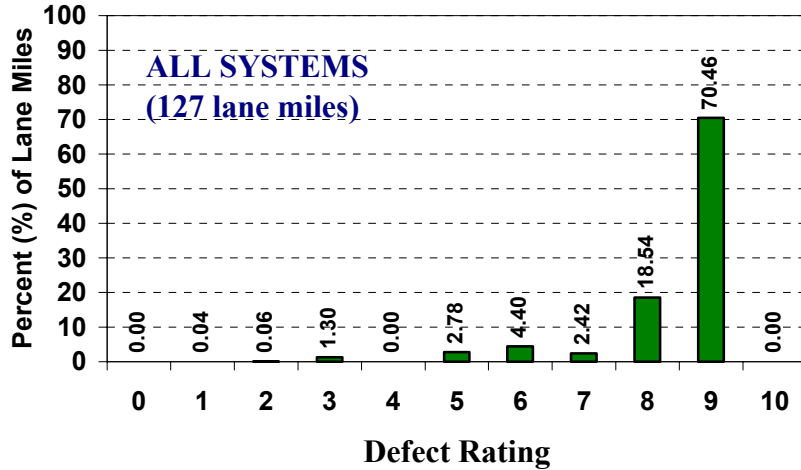


Note: No Rigid Pavement on Turnpike System

2003 Defect Distribution by System

District 6

L1

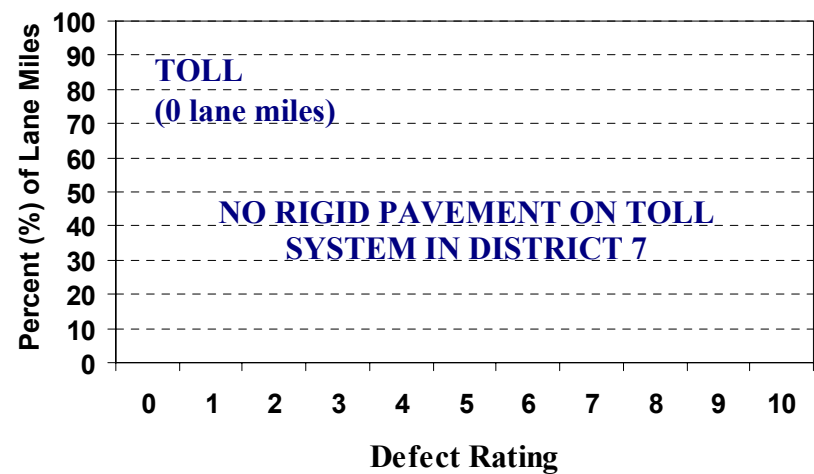
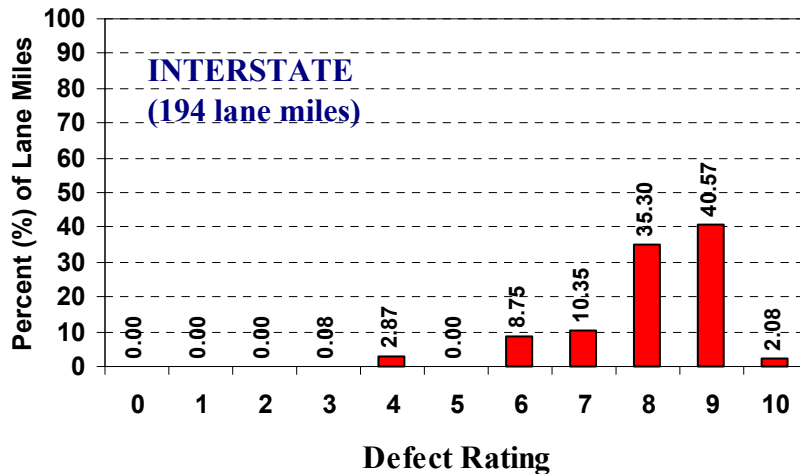
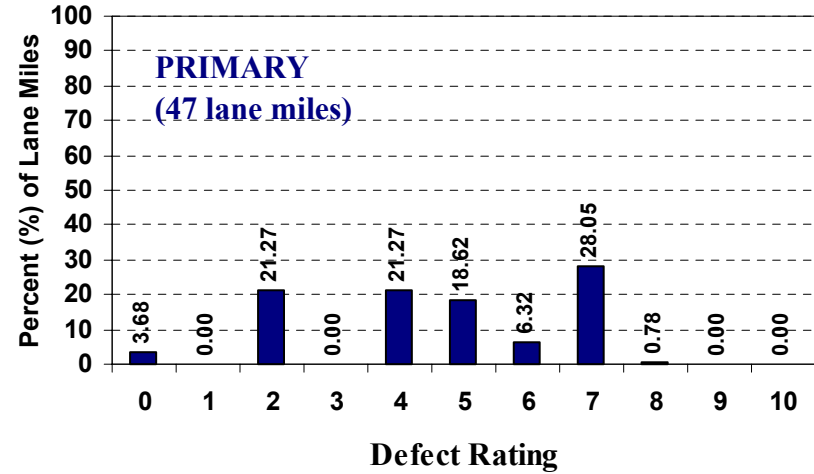
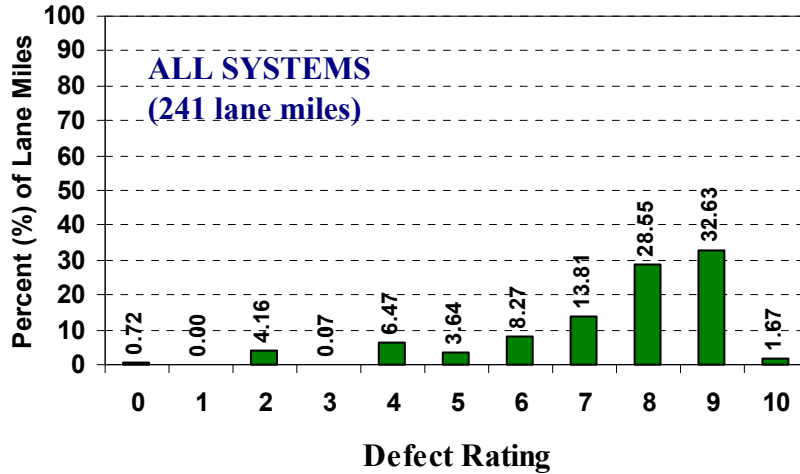


Note: No Rigid Pavement on Turnpike System

2003 Defect Distribution by System

District 7

81



Note: No Rigid Pavement on Turnpike System

SECTION III

RIDE RATING

BY

SYSTEM AND DISTRICT



SECTION III

Ride Rating by System and District

Ride Rating Criteria

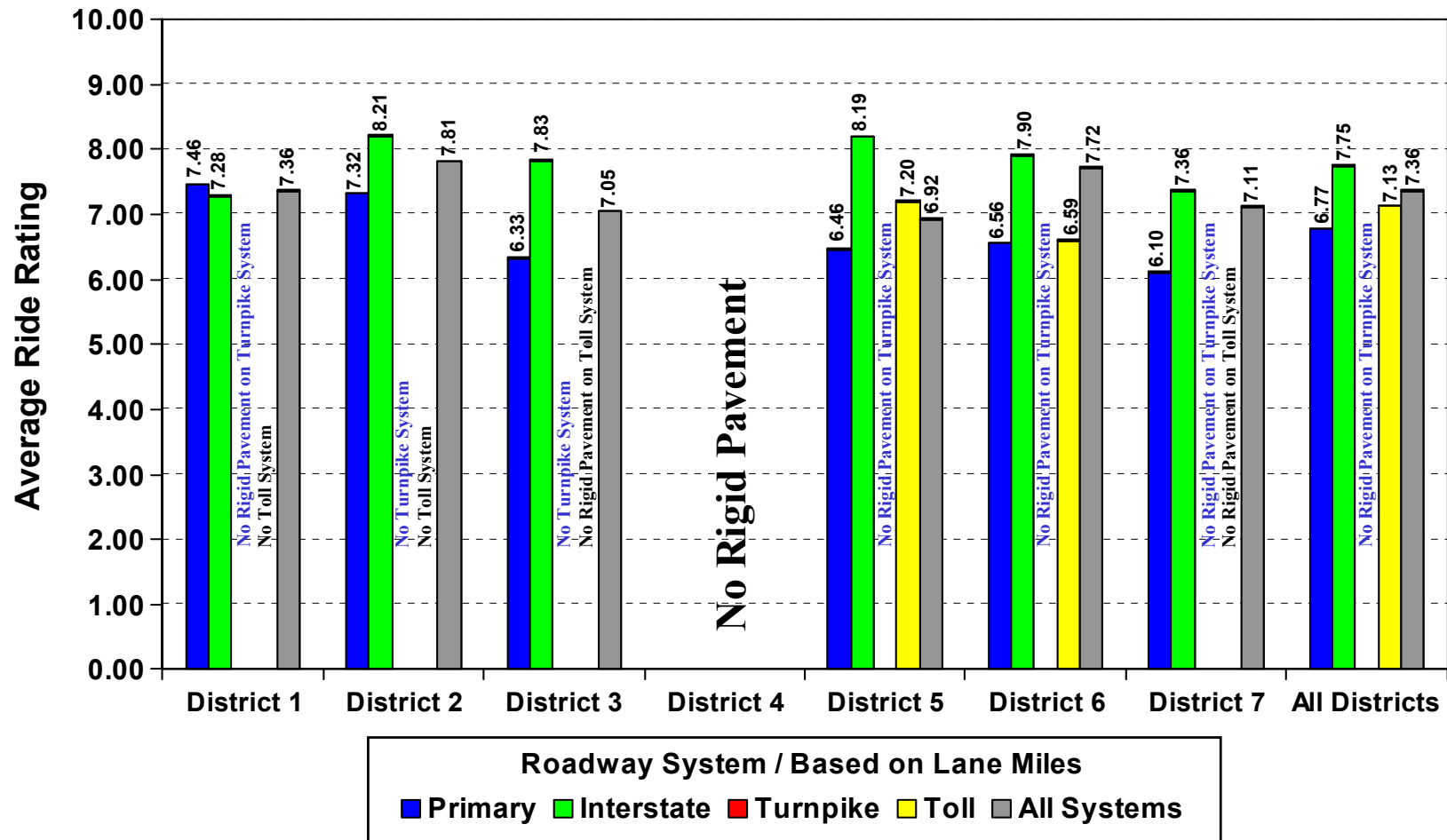
- Ride Ratings measure the ride quality of a pavement section. It is an indication of the degree of smoothness or roughness of the wearing surface.
- Ride Ratings are calculated from Ride Number (ASTM E-1489).

Ride Number x 2 = Ride Rating

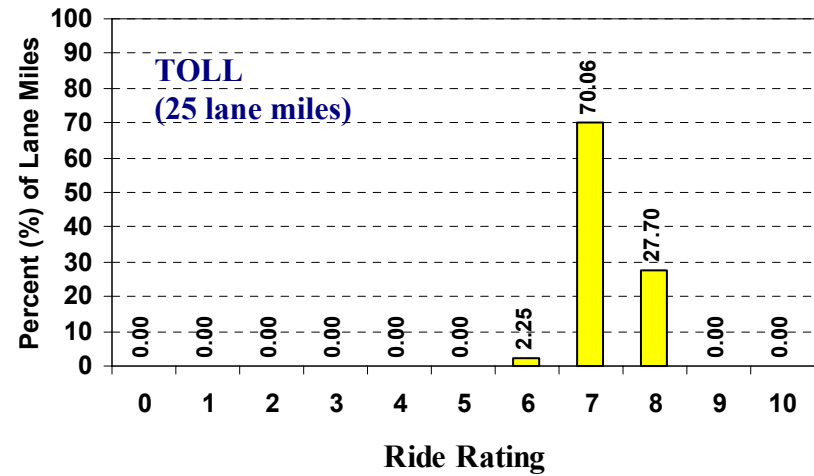
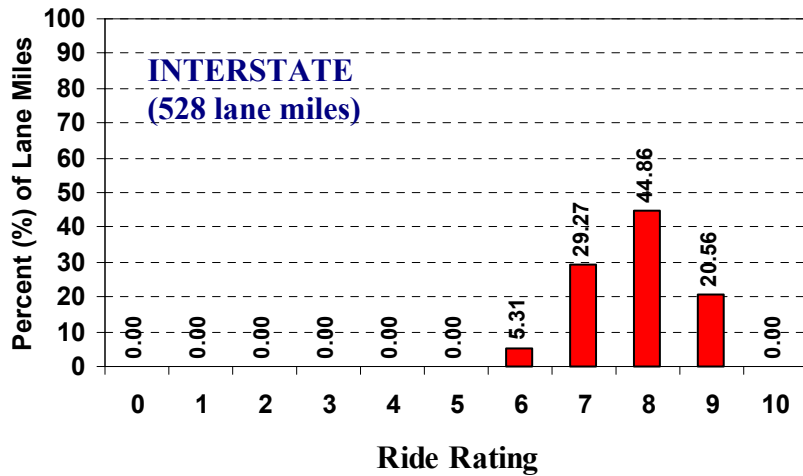
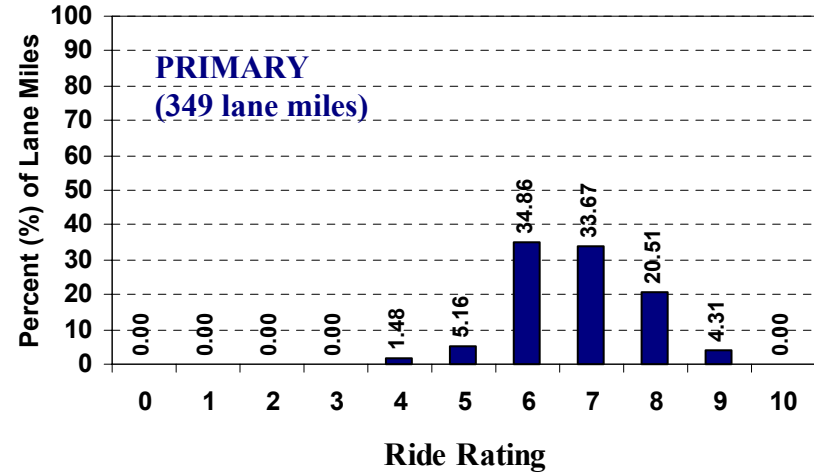
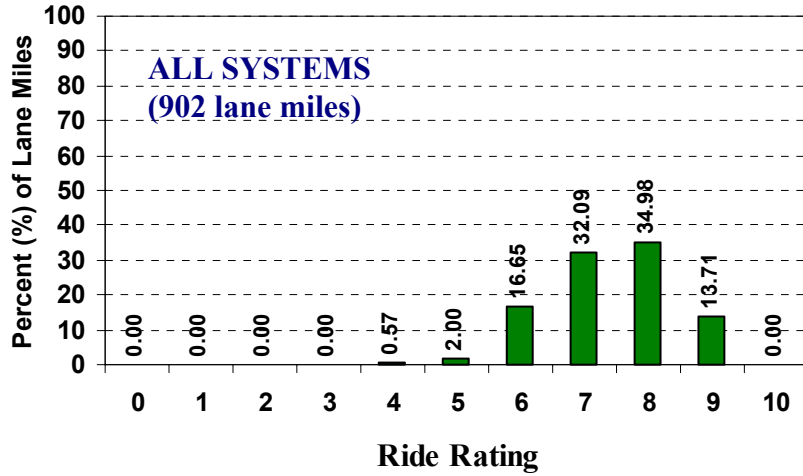
Ride Number is a mathematical processing of longitudinal profile measurements to produce an estimate of a drivers subjective perception of the ride quality of a roadway. Ride Number is based on an algorithm published in the National Cooperative Highway Research Project (NCHRP) 1-23 report and is defined in ASTM Standard E-1489.

- Rideability is greatly affected by factors that include the following:
 - ▶ Original pavement profile
 - ▶ Profiles from intersecting roads
 - ▶ Utility patches and manhole covers, and
 - ▶ Surface and structural deterioration
- Ride deficiency is based on a 0 to 10 scale, where 10 represents a pavement with no roughness while ratings of 6 or less represent a pavement with an undesirable ride quality.

Ride Rating by System and District



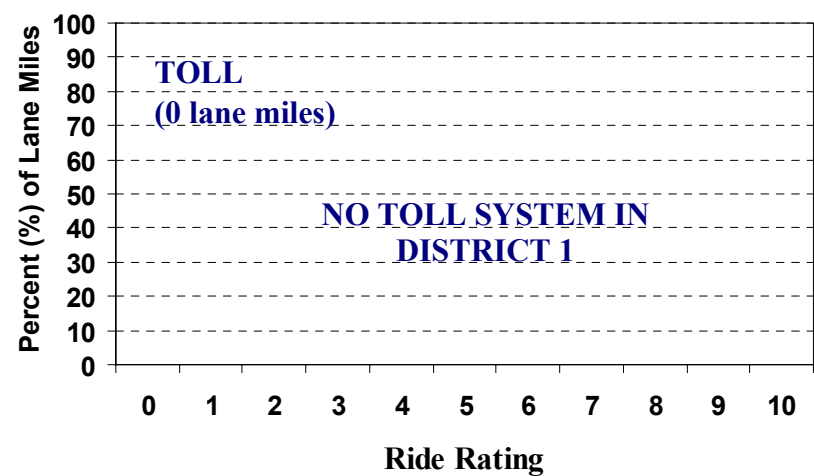
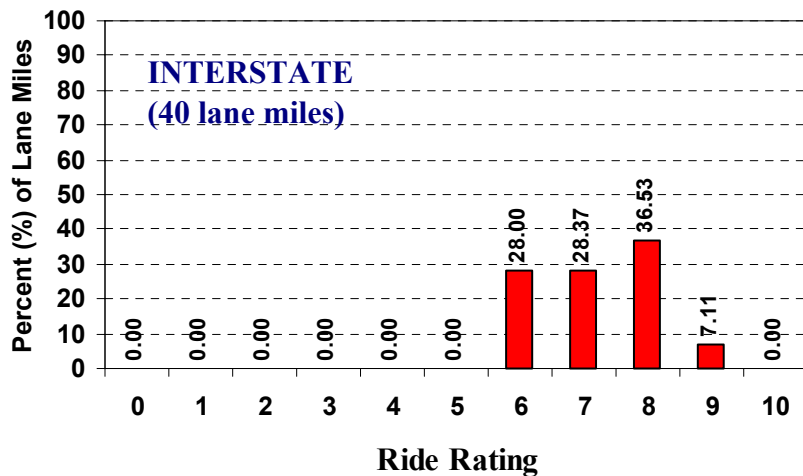
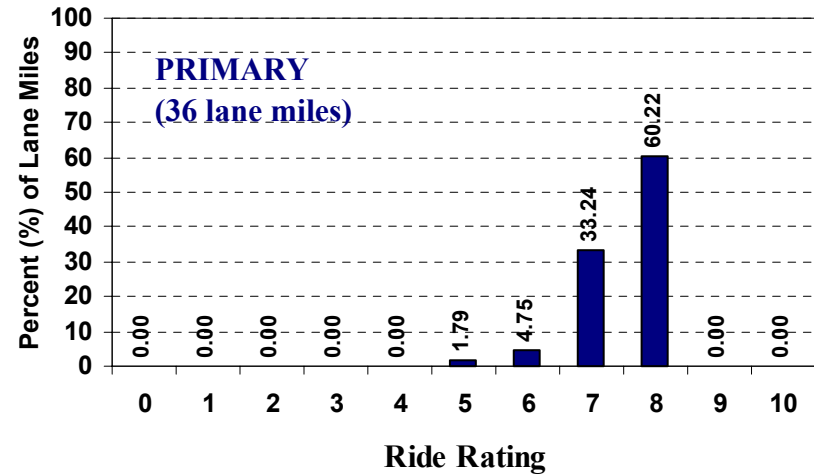
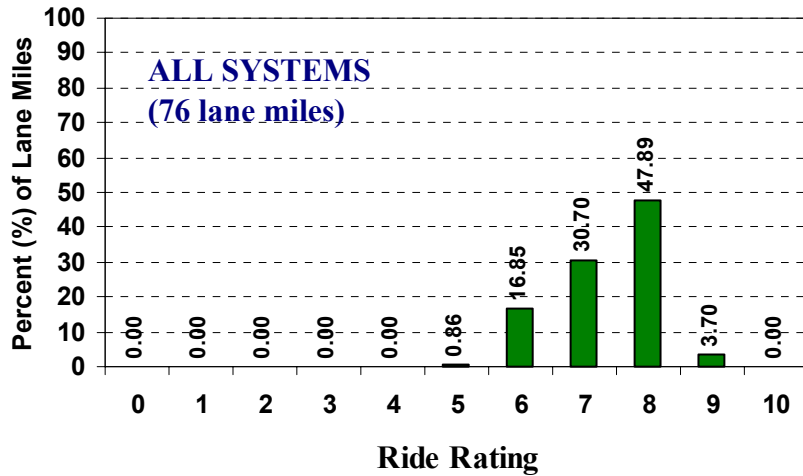
2003 Ride Distribution by System Statewide



Note: No Rigid Pavement on Turnpike System

2003 Ride Distribution by System

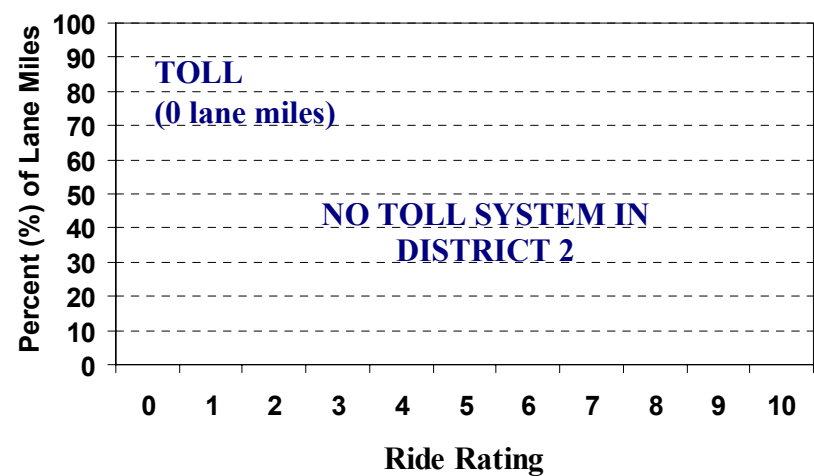
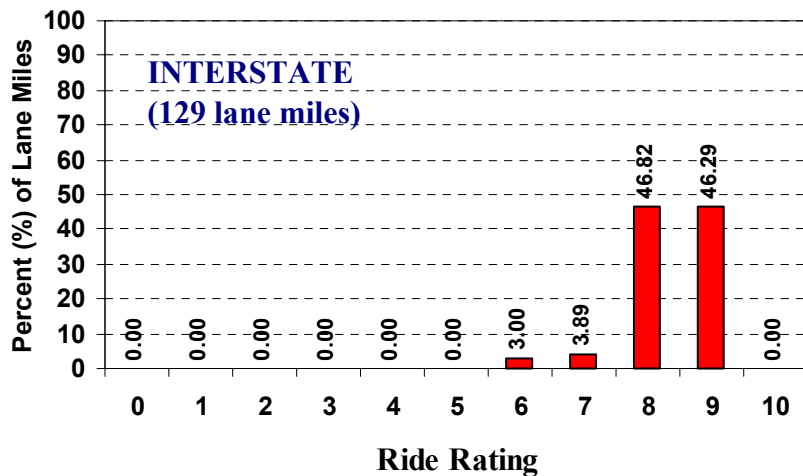
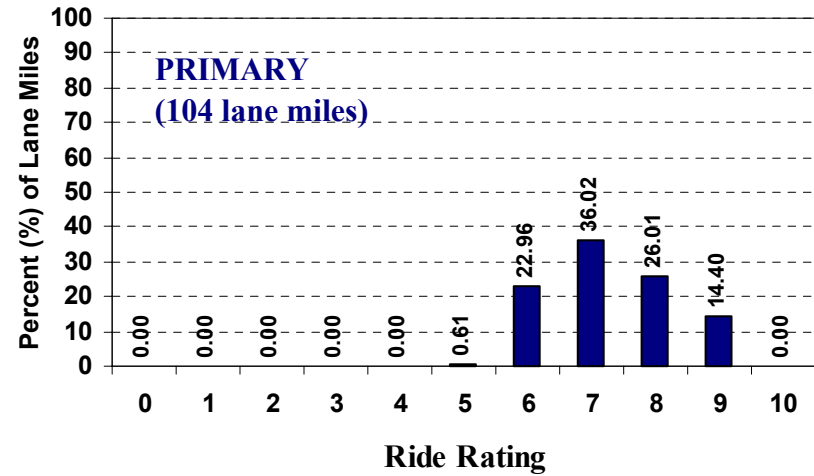
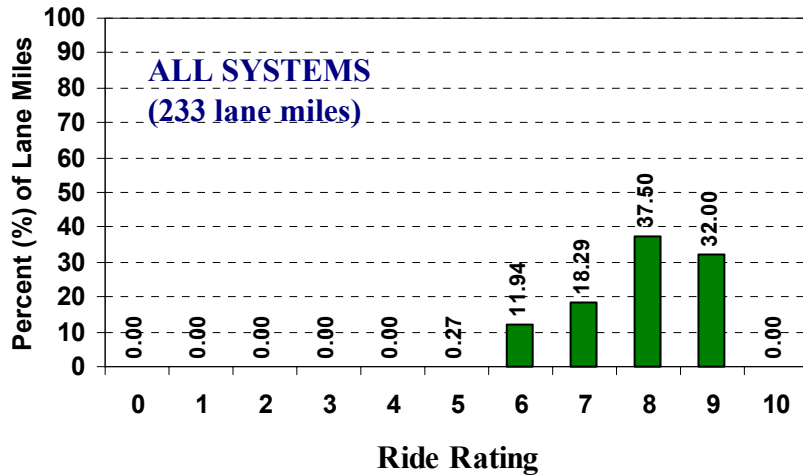
District 1



Note: No Rigid Pavement on Turnpike System

2003 Ride Distribution by System

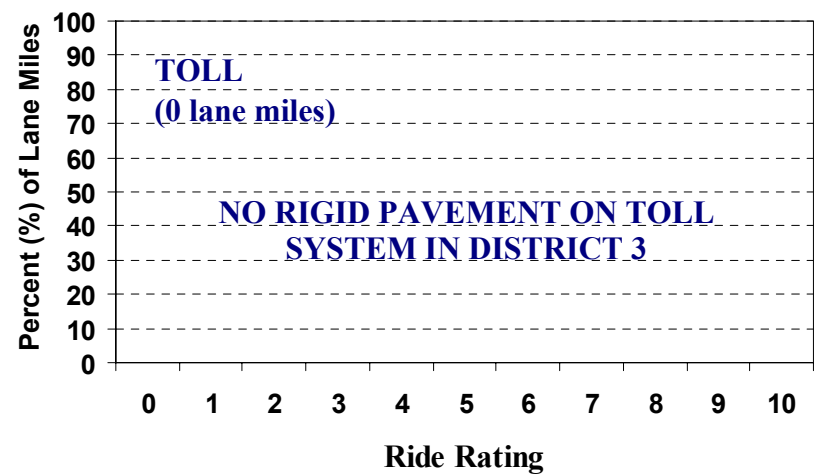
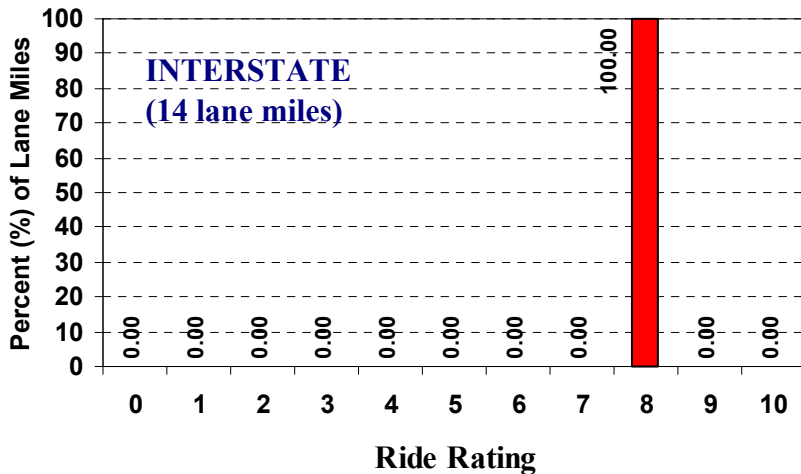
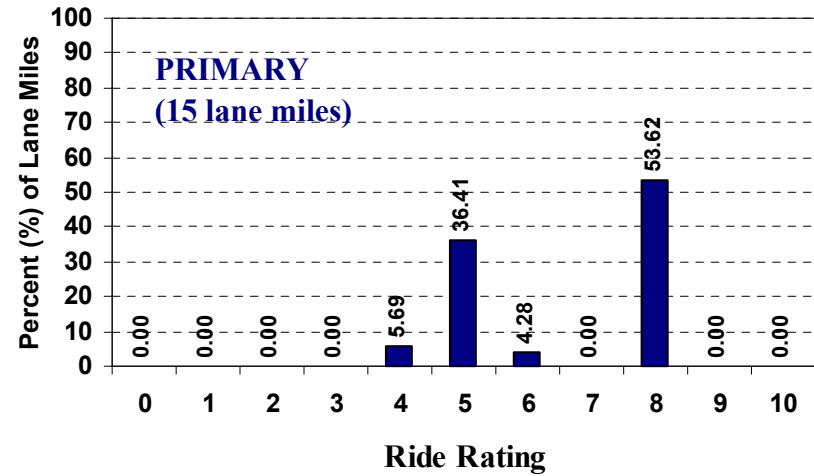
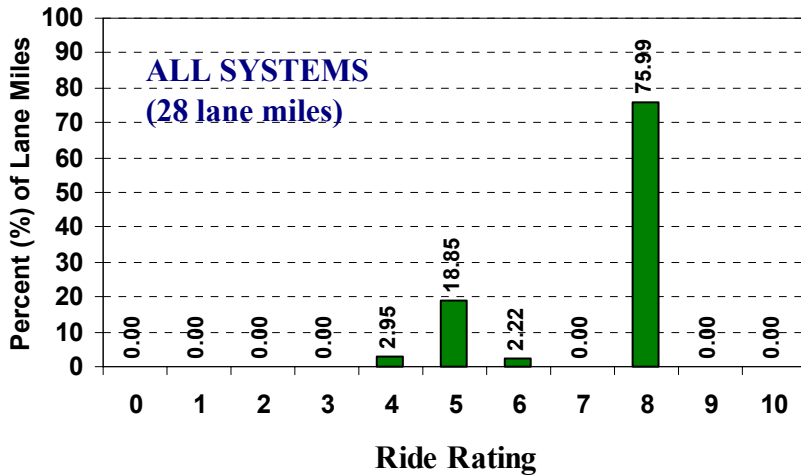
District 2



Note: No Rigid Pavement on Turnpike System

2003 Ride Distribution by System

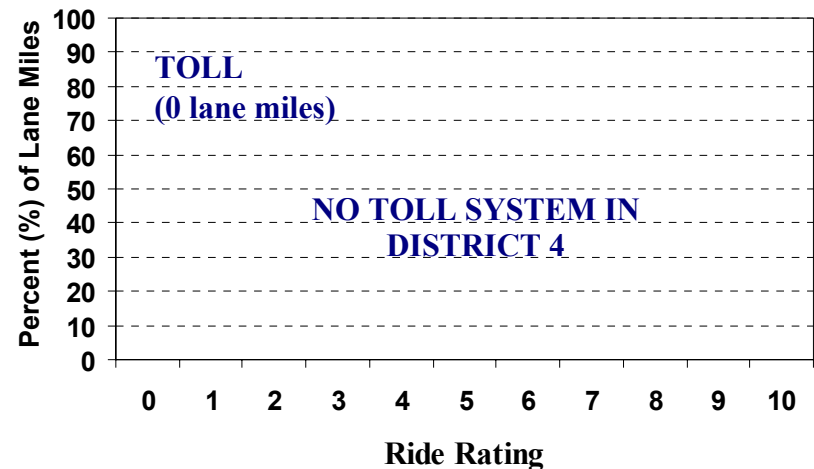
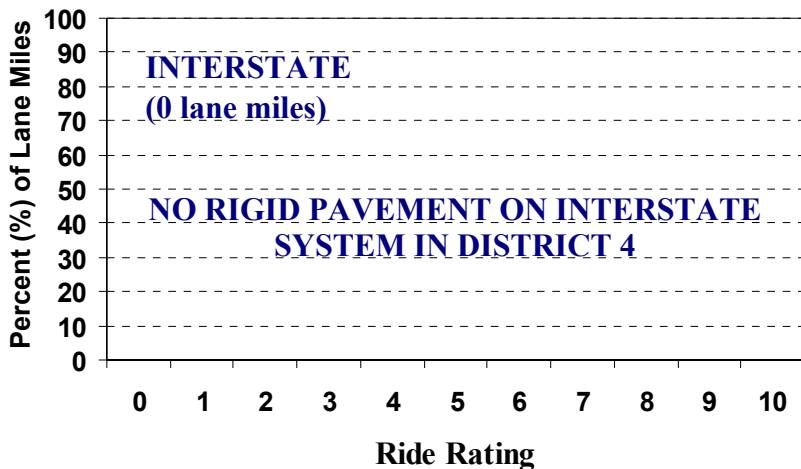
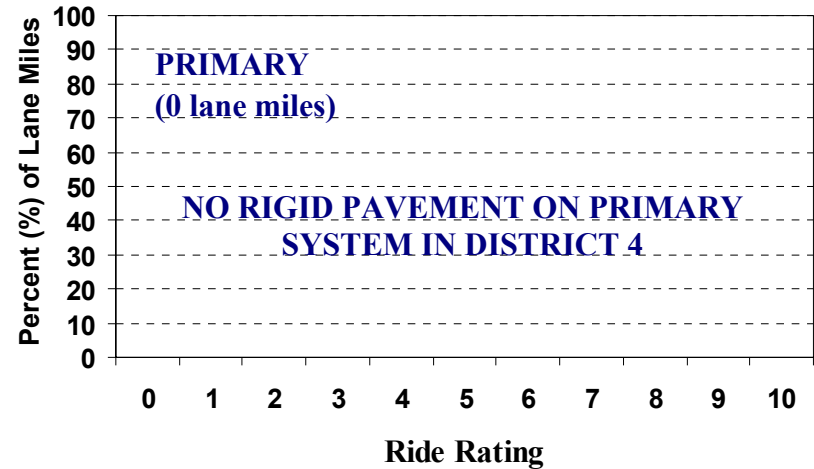
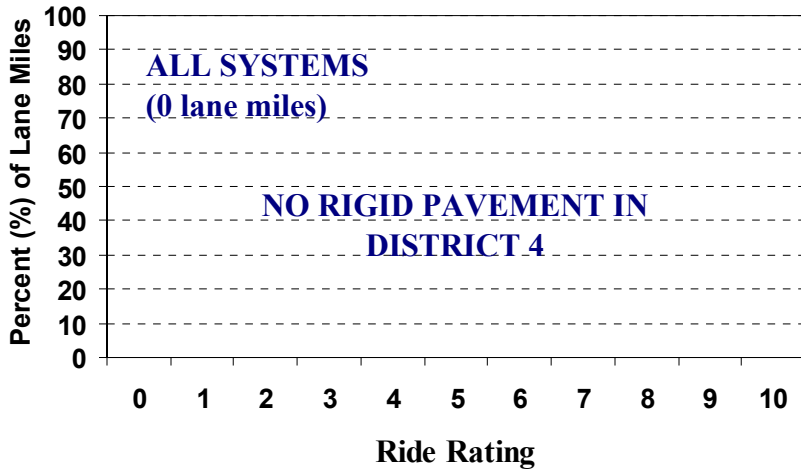
District 3



Note: No Rigid Pavement on Turnpike System

2003 Ride Distribution by System

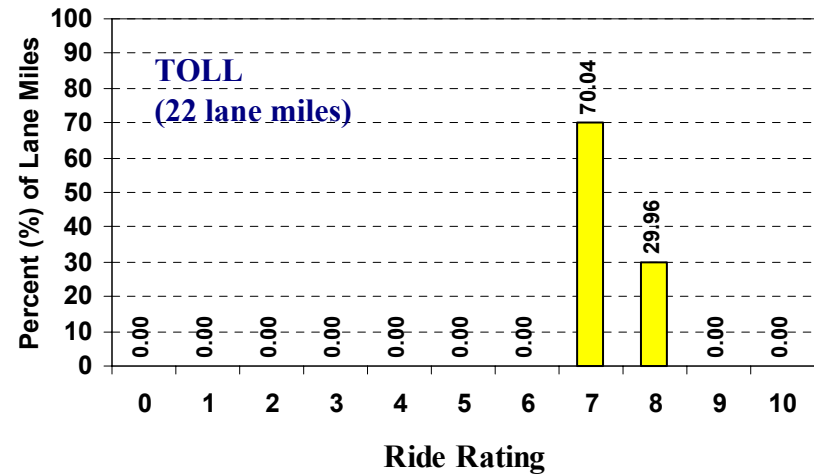
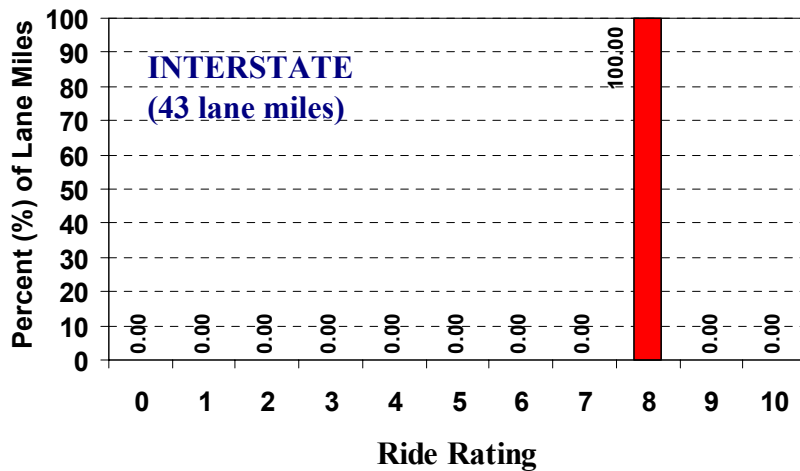
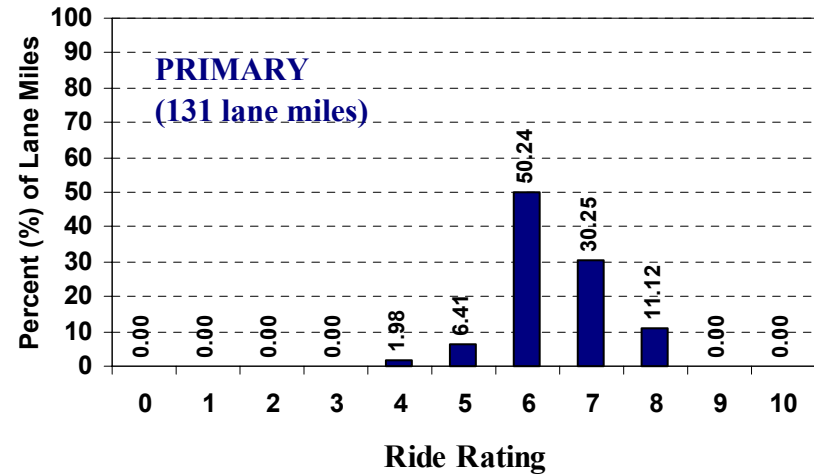
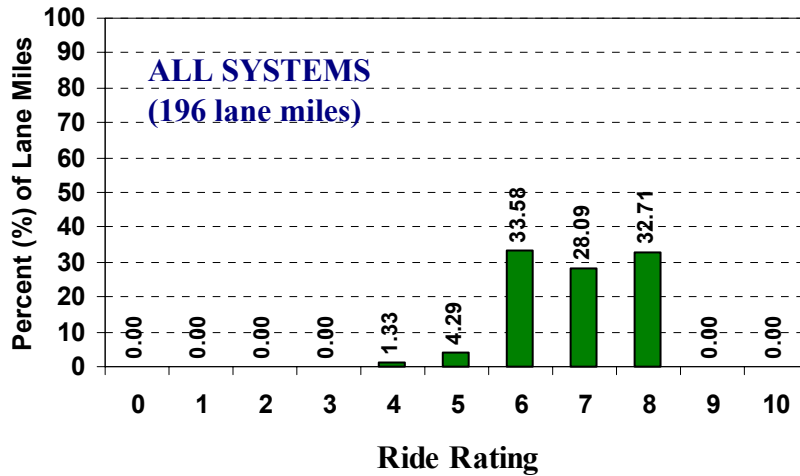
District 4



Note: No Rigid Pavement on Turnpike System

2003 Ride Distribution by System

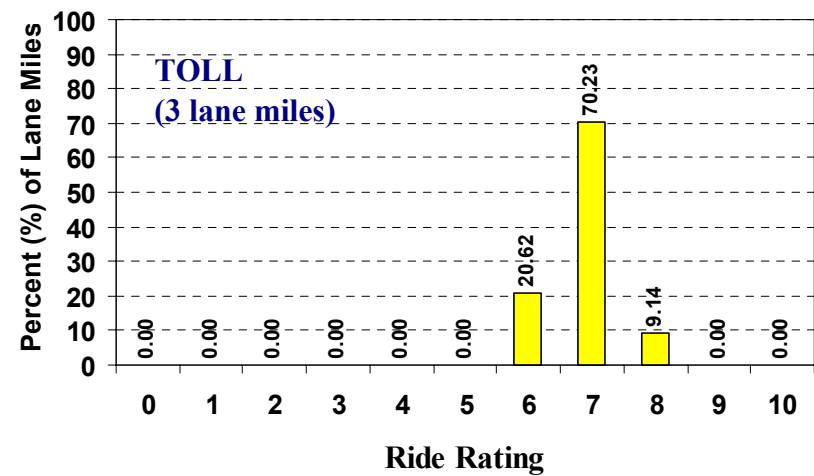
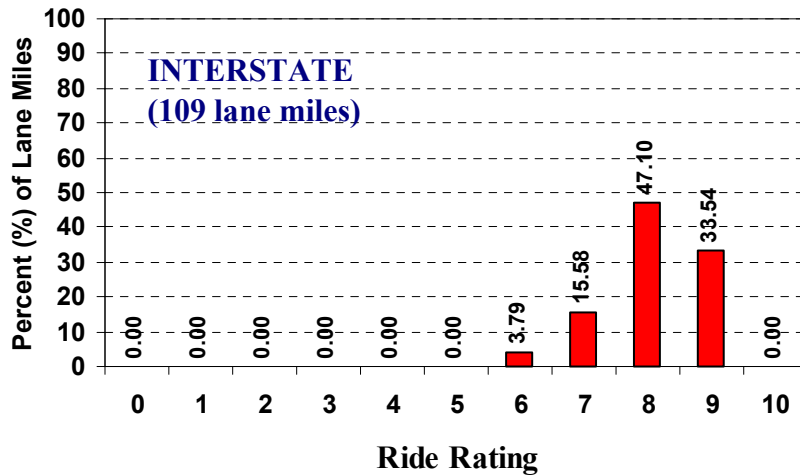
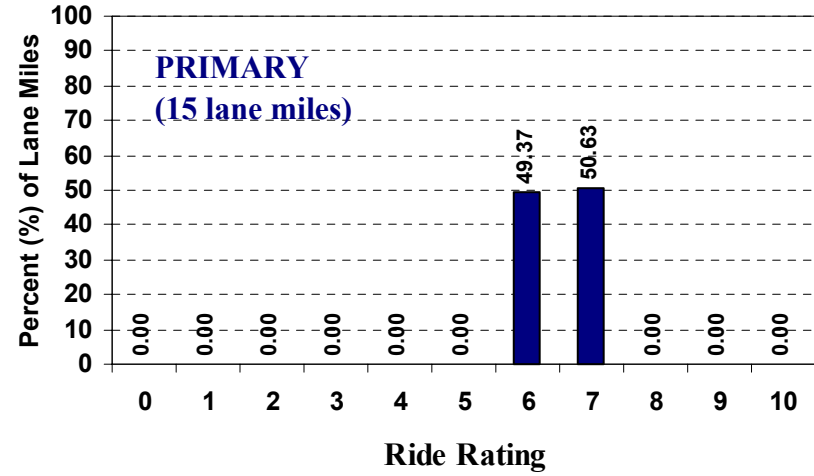
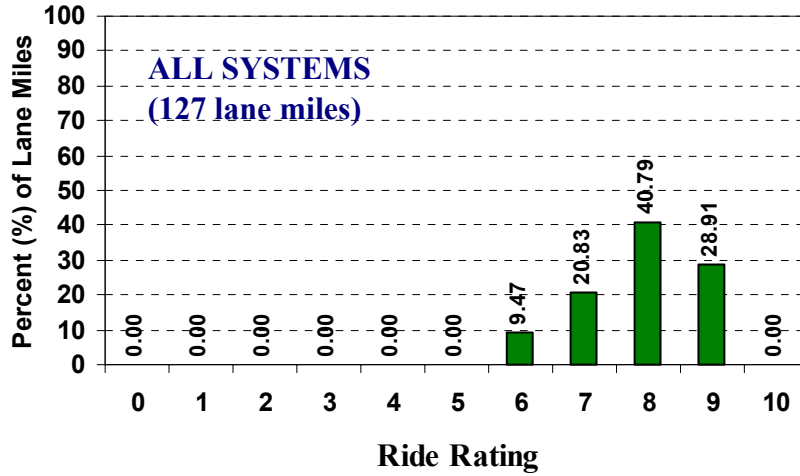
District 5



Note: No Rigid Pavement on Turnpike System

2003 Ride Distribution by System

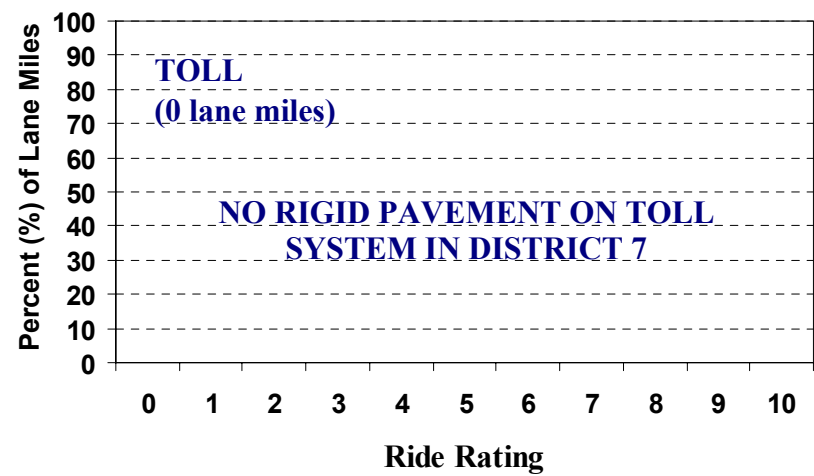
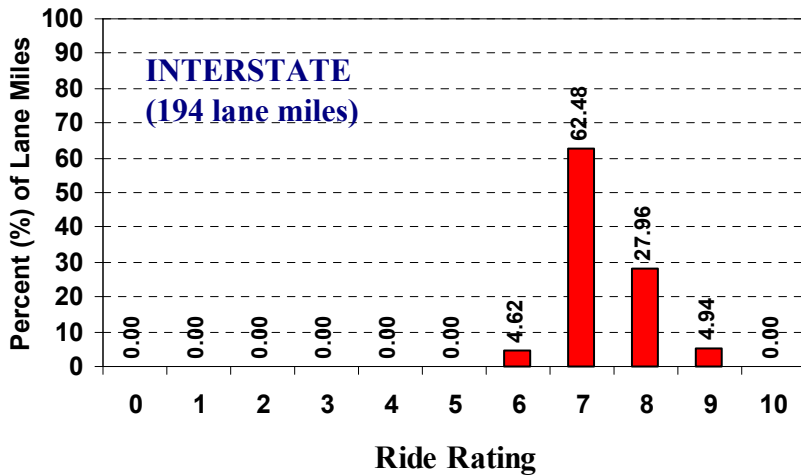
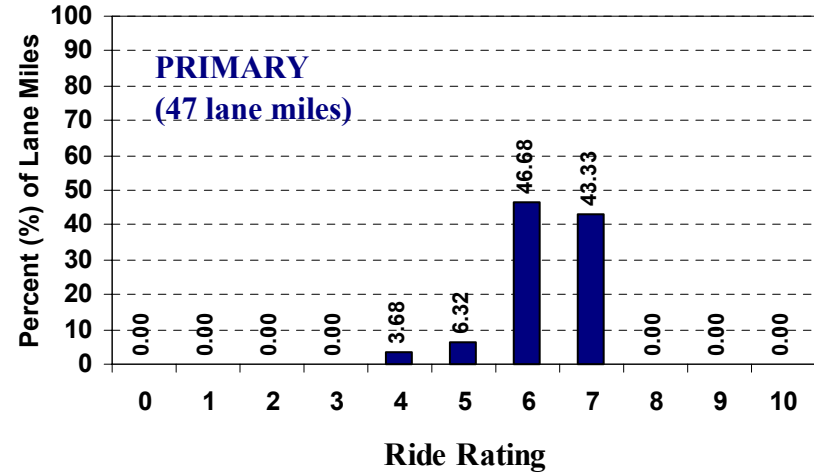
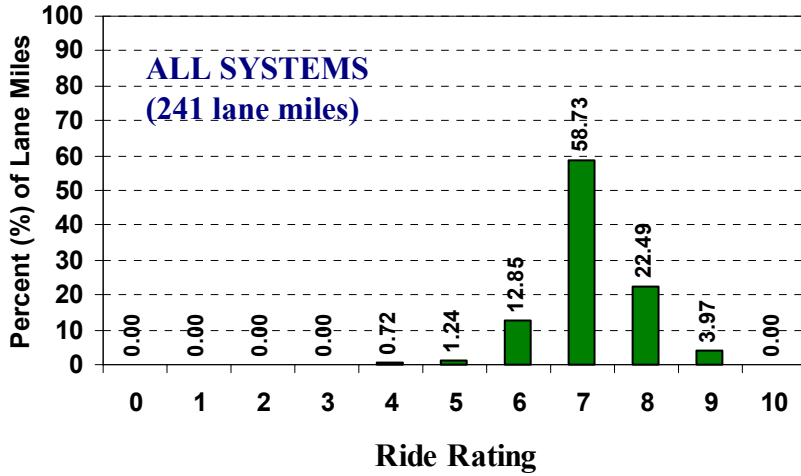
District 6



Note: No Rigid Pavement on Turnpike System

2003 Ride Distribution by System

District 7



Note: No Rigid Pavement on Turnpike System

SECTION IV

HISTORICAL

DISTRESS RATINGS

BY

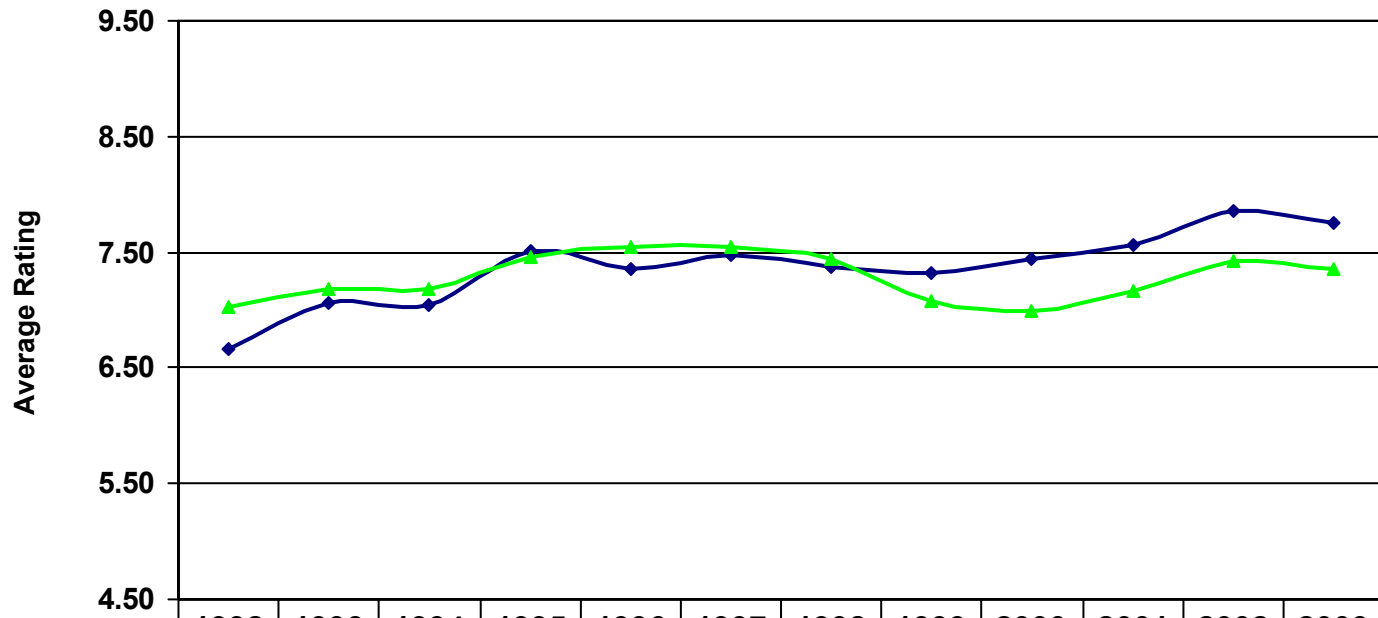
DISTRICT

(ALL SYSTEMS COMBINED)



Historical Distress Ratings

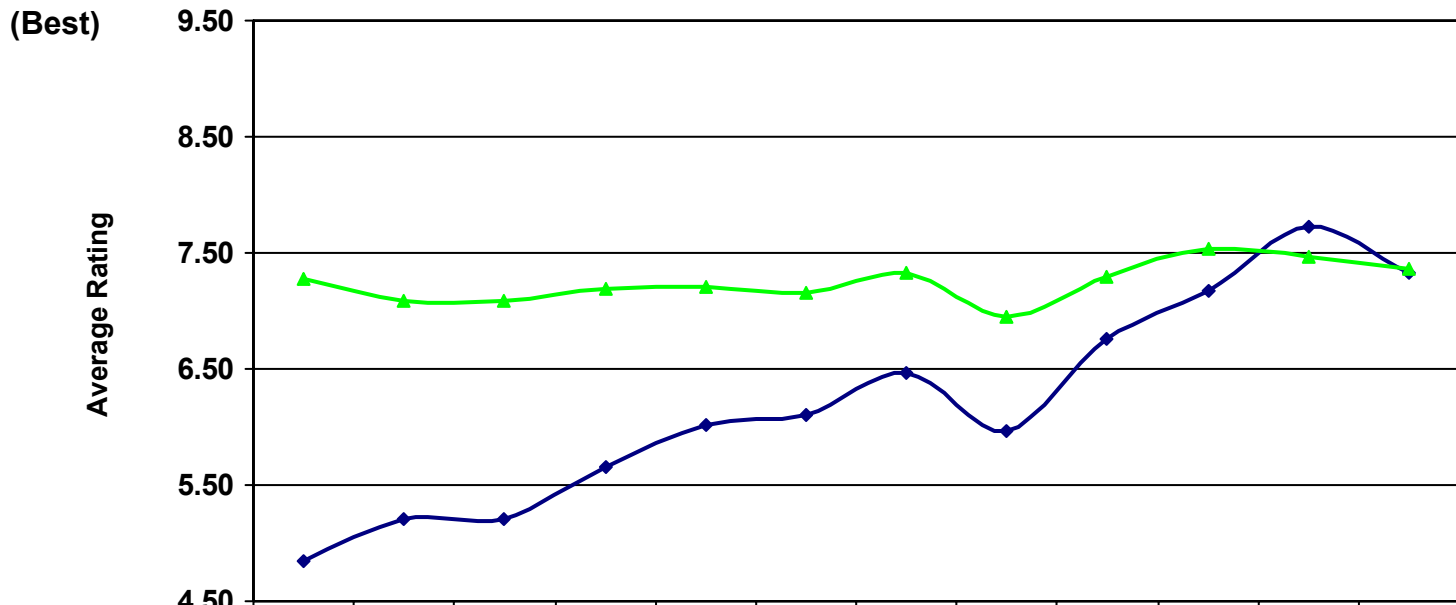
Statewide (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	6.67	7.06	7.05	7.51	7.36	7.47	7.38	7.32	7.44	7.56	7.86	7.76
▲ Ride Rating	7.03	7.18	7.18	7.46	7.55	7.54	7.44	7.08	7.00	7.17	7.43	7.36
Lane Miles Defected	1984	1632	1632	1657	1572	1434	1442	1416	1373	1205	896	903

Historical Distress Ratings

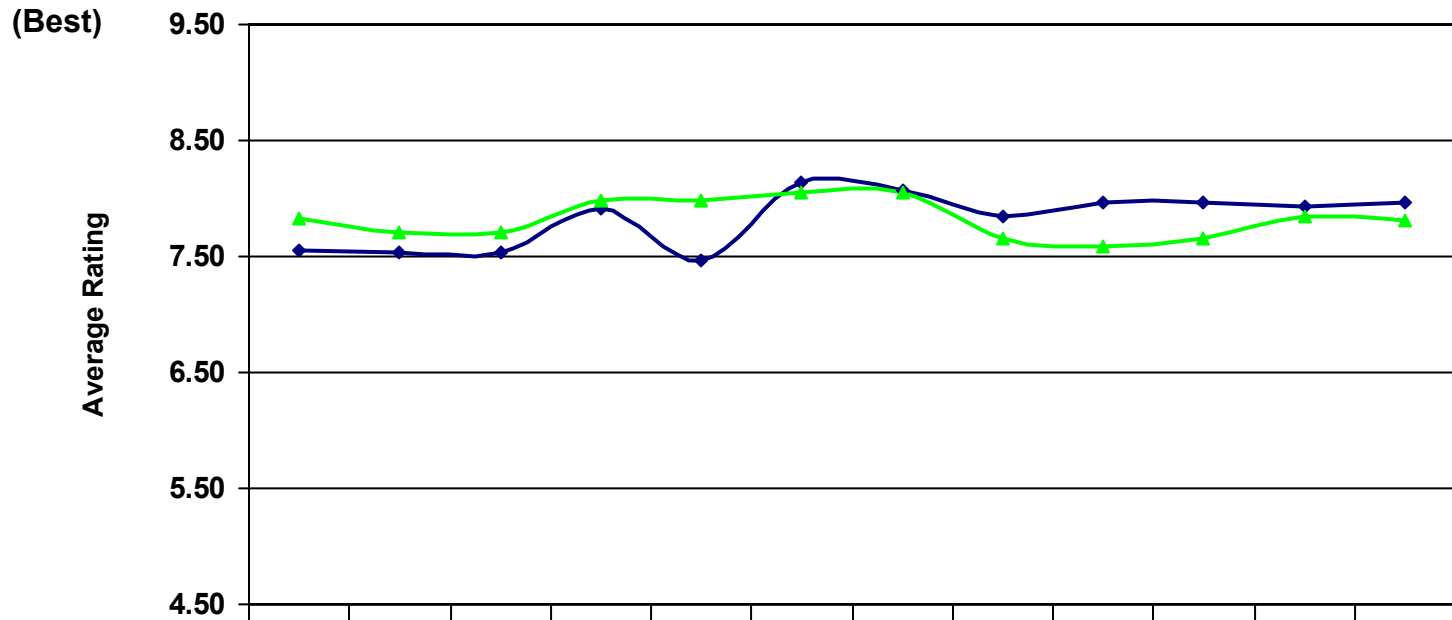
District 1 (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	4.85	5.21	5.21	5.66	6.01	6.10	6.46	5.96	6.76	7.18	7.73	7.33
▲ Ride Rating	7.27	7.09	7.09	7.19	7.21	7.15	7.33	6.95	7.29	7.54	7.46	7.36
Lane Miles Defected	234	198	198	153	153	92	70	59	76	76	76	76

Historical Distress Ratings

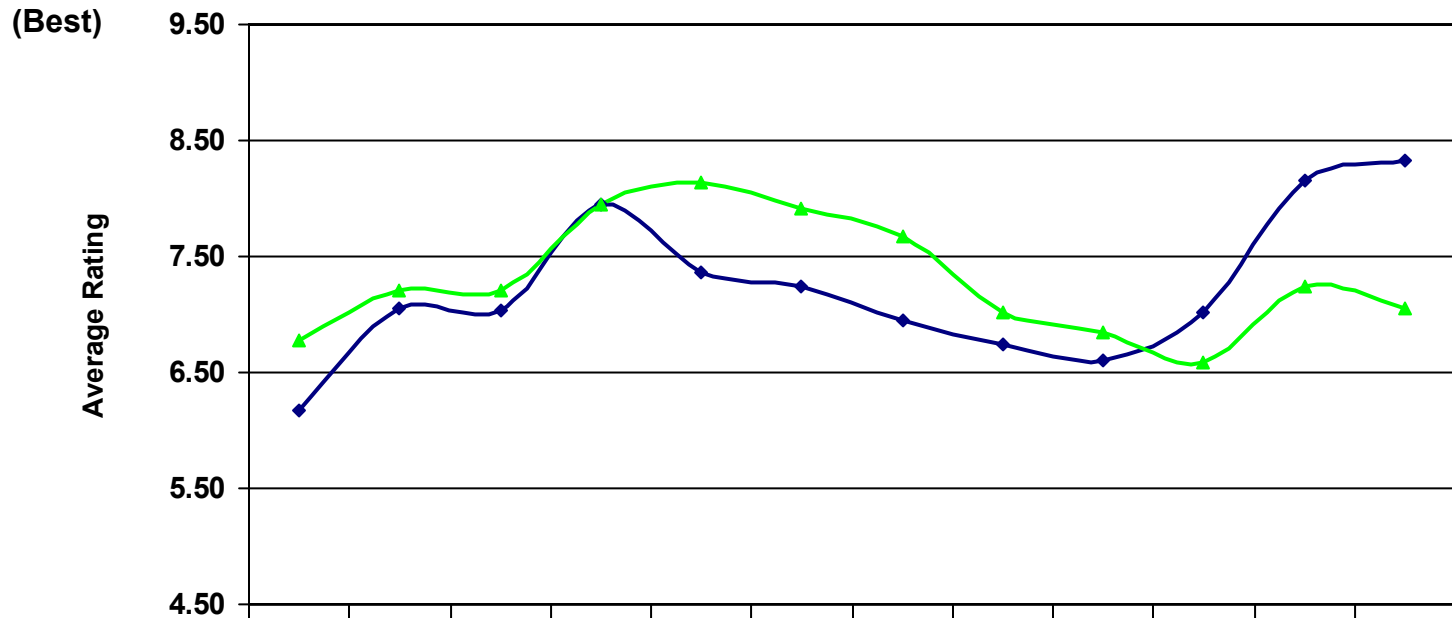
District 2 (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	7.56	7.53	7.53	7.92	7.46	8.14	8.07	7.84	7.96	7.96	7.93	7.96
▲ Ride Rating	7.83	7.70	7.70	7.98	7.98	8.05	8.06	7.66	7.58	7.65	7.84	7.81
Lane Miles Defected	213	214	214	200	202	152	147	208	228	216	237	234

Historical Distress Ratings

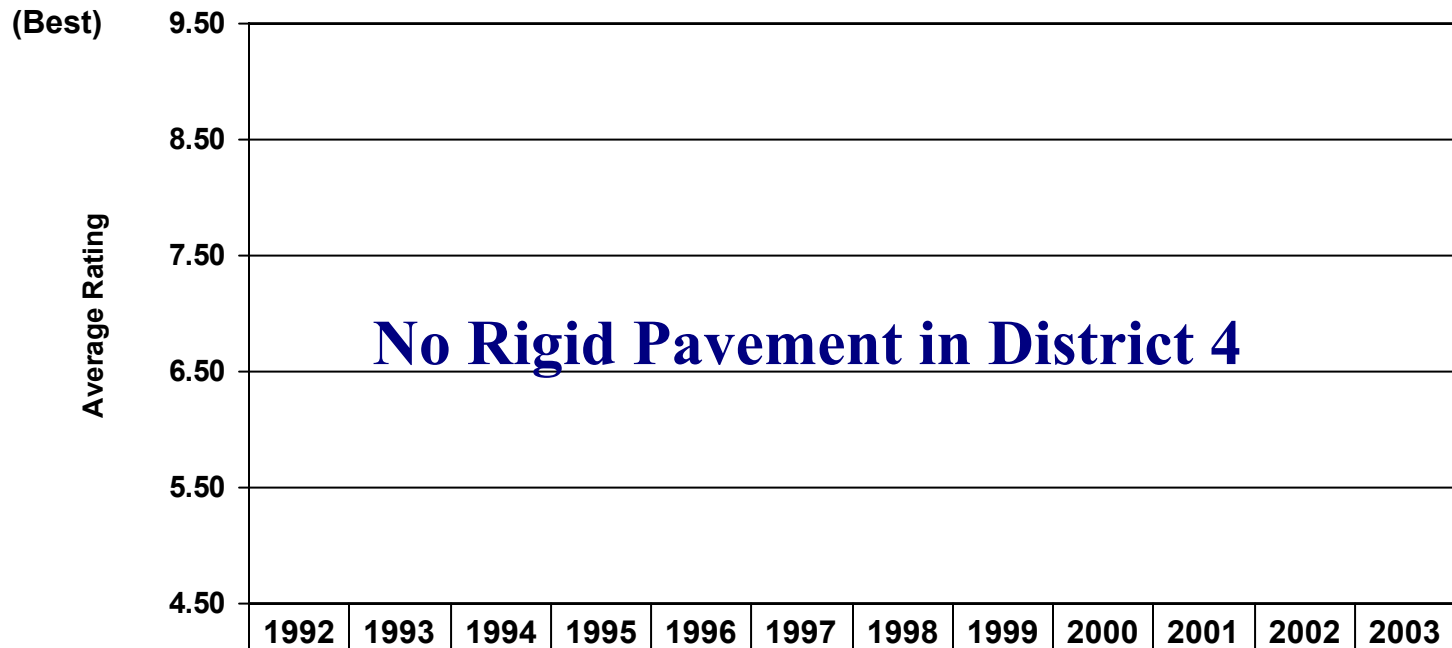
District 3 (All Systems)



◆ Defect Rating	6.17	7.06	7.04	7.95	7.37	7.25	6.94	6.74	6.60	7.01	8.16	8.32
▲ Ride Rating	6.78	7.21	7.21	7.95	8.14	7.91	7.67	7.01	6.85	6.59	7.25	7.05
Lane Miles Defected	828	524	524	585	520	571	570	516	443	335	38	29

Historical Distress Ratings

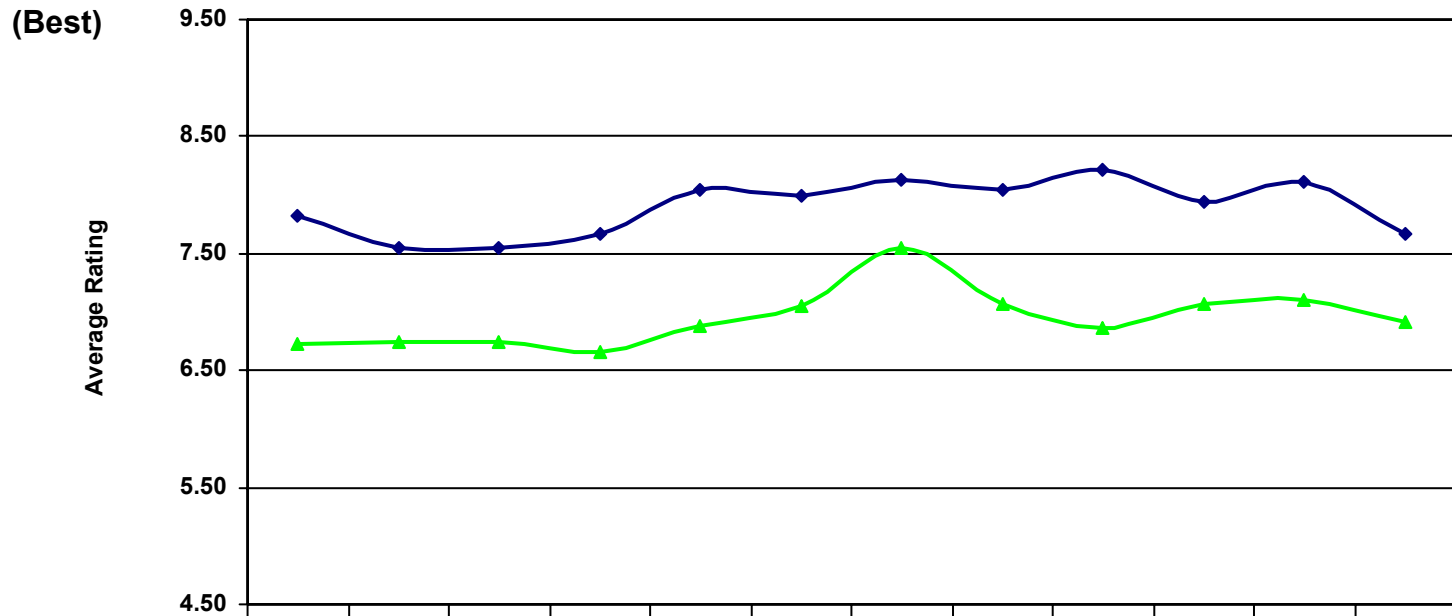
District 4 (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating												
▲ Ride Rating												
Lane Miles Defected												

Historical Distress Ratings

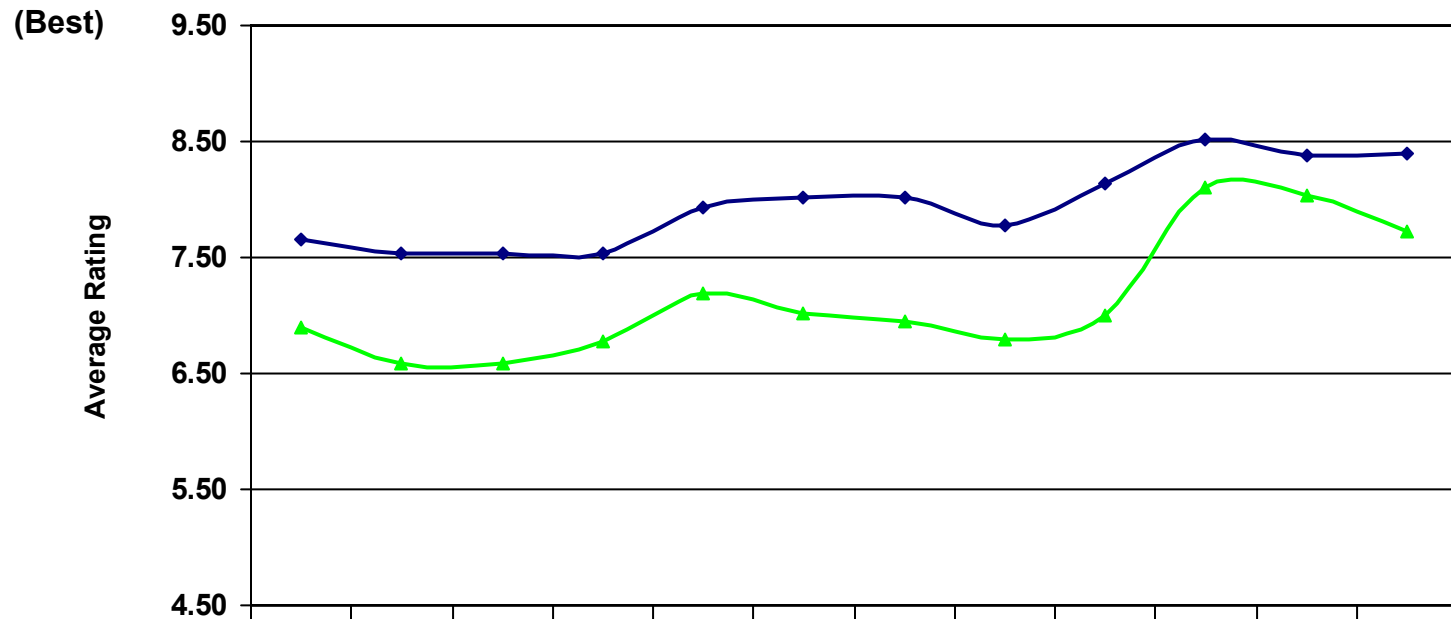
District 5 (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	7.83	7.54	7.54	7.66	8.04	8.00	8.13	8.05	8.22	7.94	8.12	7.67
▲ Ride Rating	6.73	6.75	6.75	6.65	6.88	7.05	7.54	7.06	6.86	7.06	7.11	6.92
Lane Miles Defected	224	212	212	213	194	188	195	197	202	202	194	196

Historical Distress Ratings

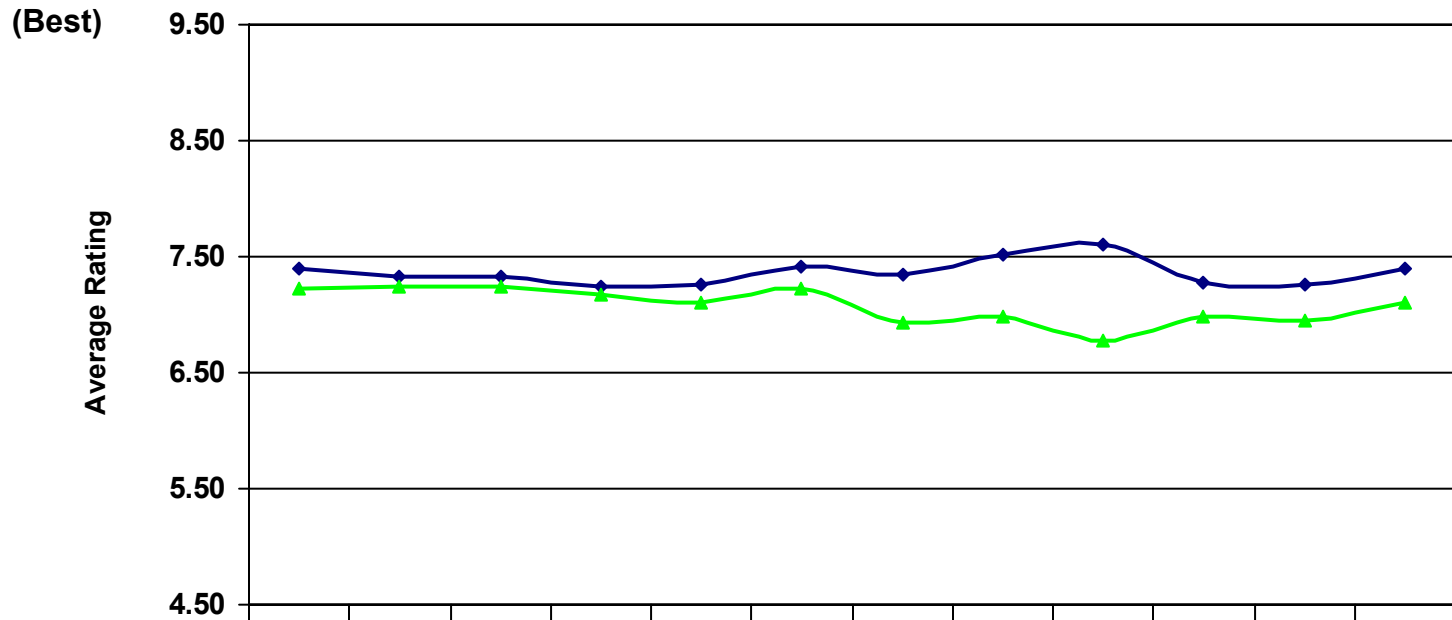
District 6 (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	7.65	7.54	7.54	7.53	7.93	8.02	8.01	7.78	8.13	8.51	8.38	8.39
▲ Ride Rating	6.90	6.59	6.59	6.77	7.19	7.01	6.95	6.80	7.00	8.11	8.04	7.72
Lane Miles Defected	142	142	142	143	140	136	135	155	146	131	129	127

Historical Distress Ratings

District 7 (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	7.40	7.33	7.33	7.24	7.26	7.41	7.34	7.52	7.60	7.28	7.26	7.39
▲ Ride Rating	7.22	7.24	7.24	7.18	7.11	7.22	6.93	6.98	6.77	6.99	6.95	7.11
Lane Miles Defected	343	342	342	363	363	296	326	281	280	246	223	242

SECTION V

HISTORICAL

DISTRESS RATINGS

BY

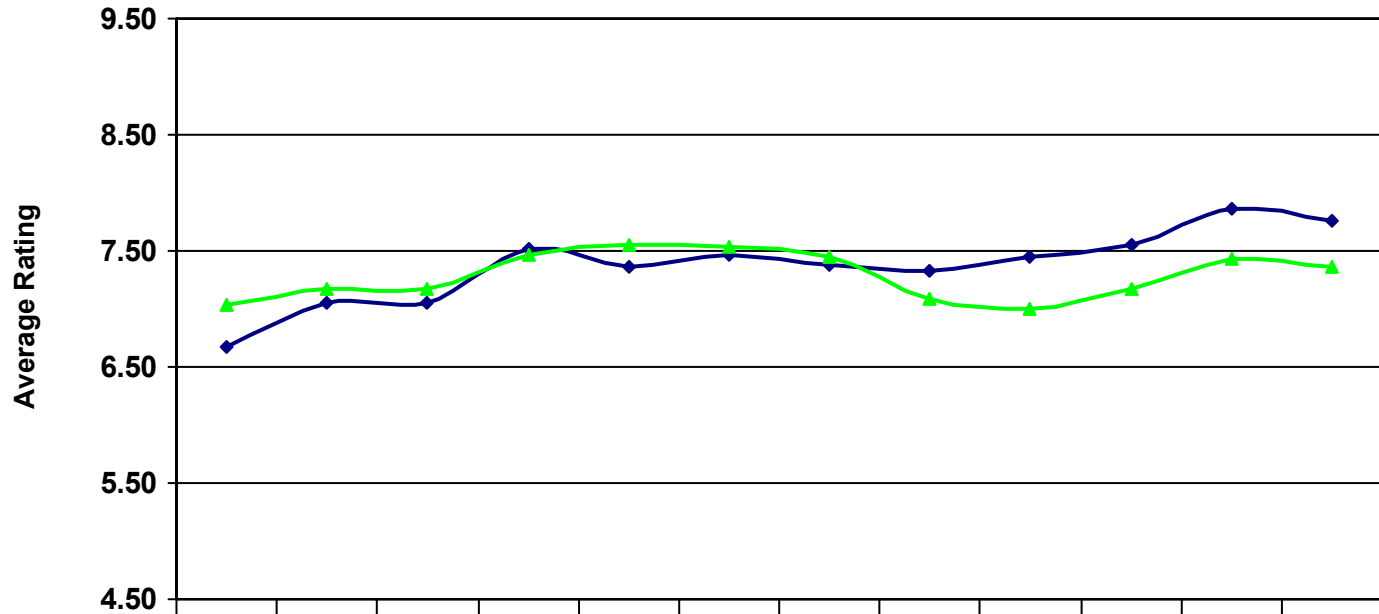
SYSTEM

(ALL DISTRICTS COMBINED)



Historical Distress Ratings

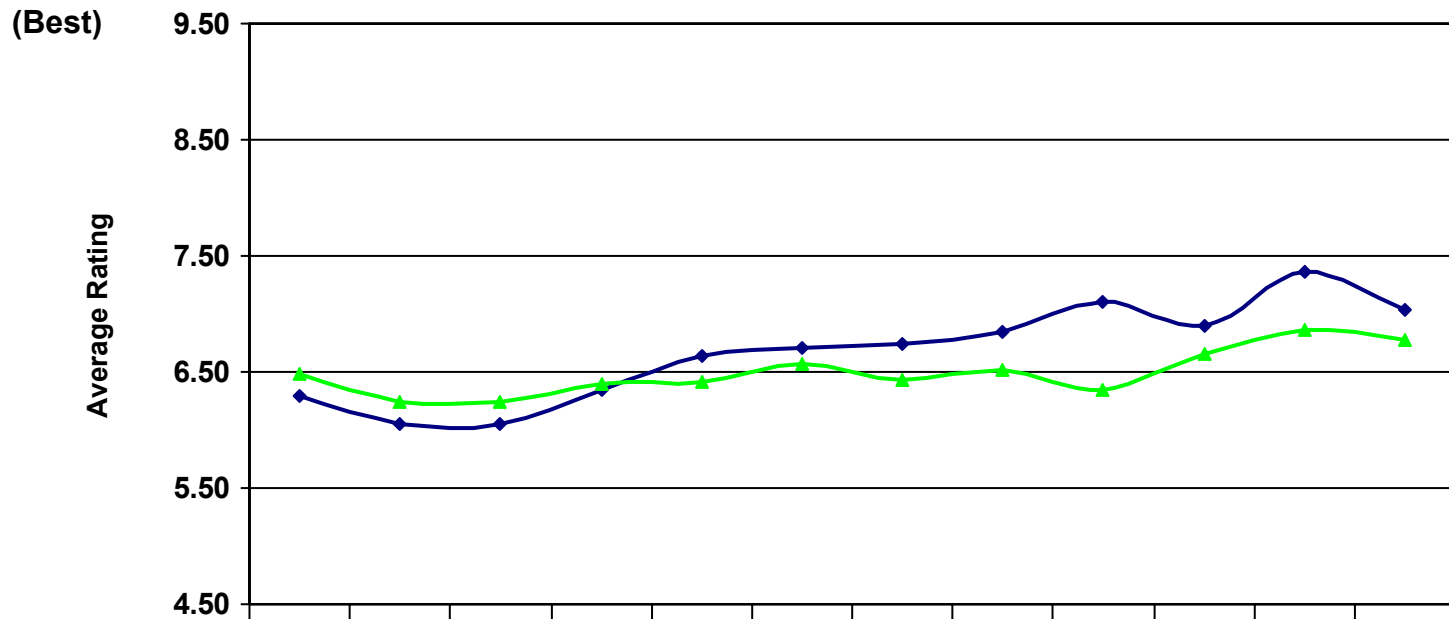
All Systems (All Districts)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	6.67	7.06	7.05	7.51	7.36	7.47	7.38	7.32	7.44	7.56	7.86	7.76
▲ Ride Rating	7.03	7.18	7.18	7.46	7.55	7.54	7.44	7.08	7.00	7.17	7.43	7.36
Lane Miles Defected	1984	1632	1632	1657	1572	1434	1442	1416	1373	1205	896	903

Historical Distress Ratings

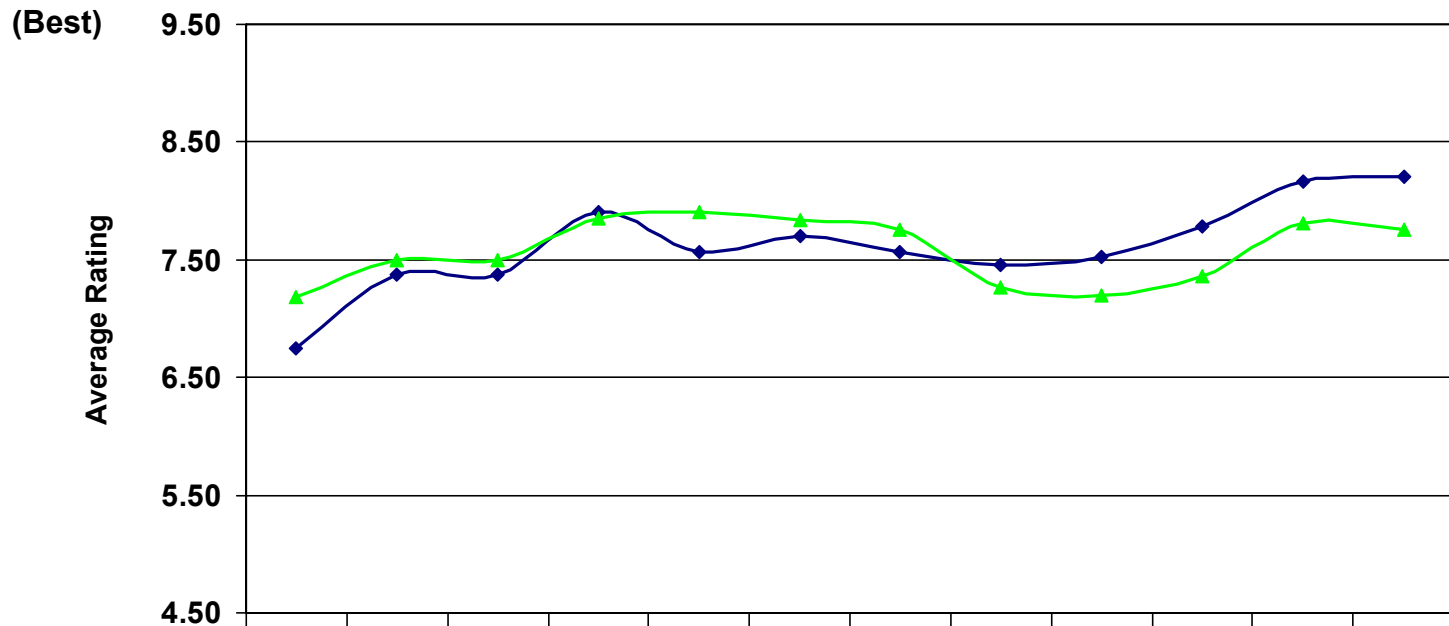
Primary System (All Districts)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating	6.30	6.05	6.05	6.35	6.64	6.71	6.75	6.84	7.10	6.90	7.36	7.04
▲ Ride Rating	6.49	6.25	6.25	6.40	6.42	6.57	6.43	6.52	6.34	6.66	6.87	6.77
Lane Miles Defected	424	409	409	424	375	344	346	350	344	344	352	350

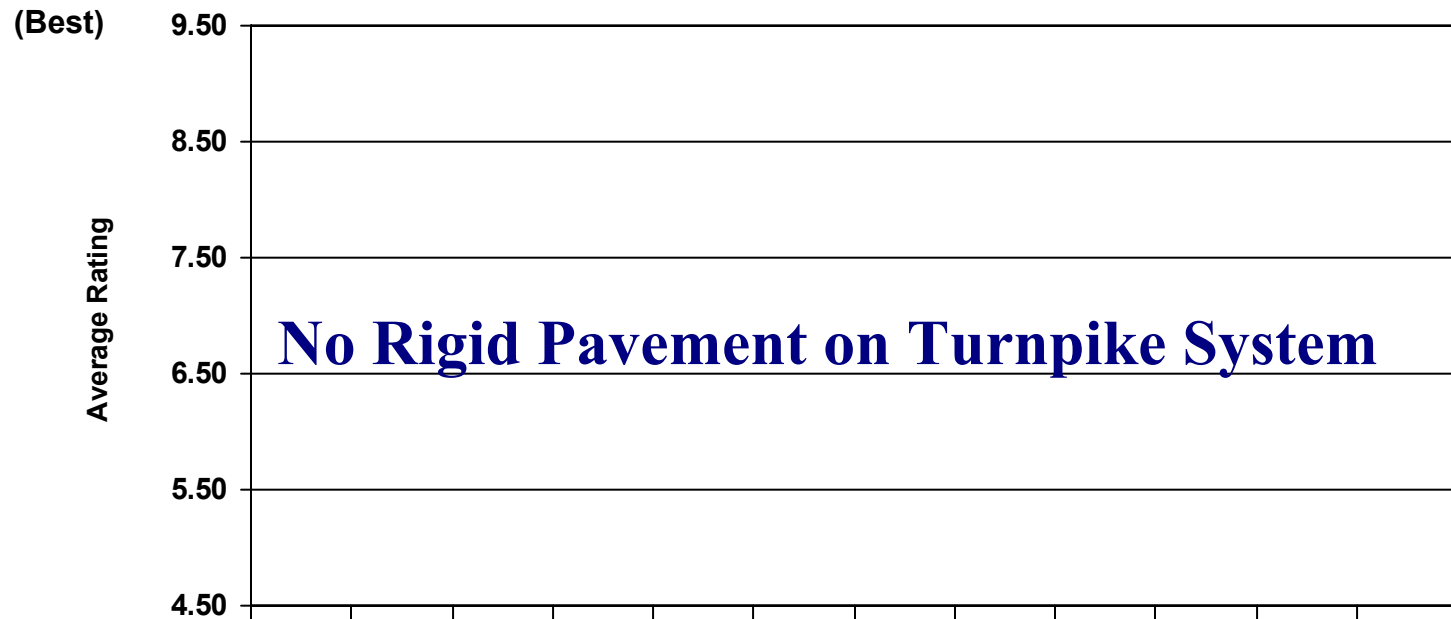
Historical Distress Ratings

Interstate System (All Districts)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Defect Rating	6.75	7.38	7.37	7.91	7.56	7.70	7.56	7.45	7.53	7.79	8.16	8.20
Ride Rating	7.19	7.50	7.50	7.85	7.91	7.84	7.75	7.26	7.20	7.36	7.81	7.75
Lane Miles Defected	1541	1203	1203	1226	1167	1069	1065	1035	998	830	519	529

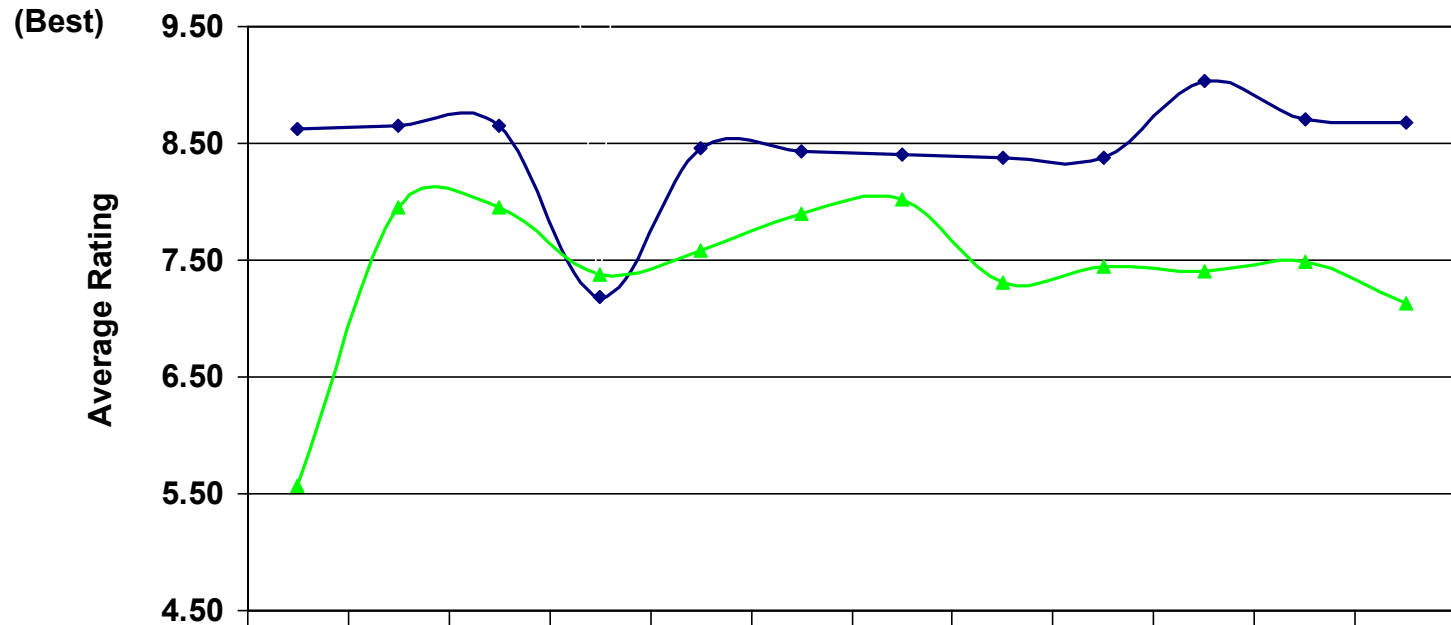
Historical Distress Ratings Turnpike System (All Districts)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
◆ Defect Rating												
▲ Ride Rating												
Lane Miles Defected												

Historical Distress Ratings

Toll System (All Districts)

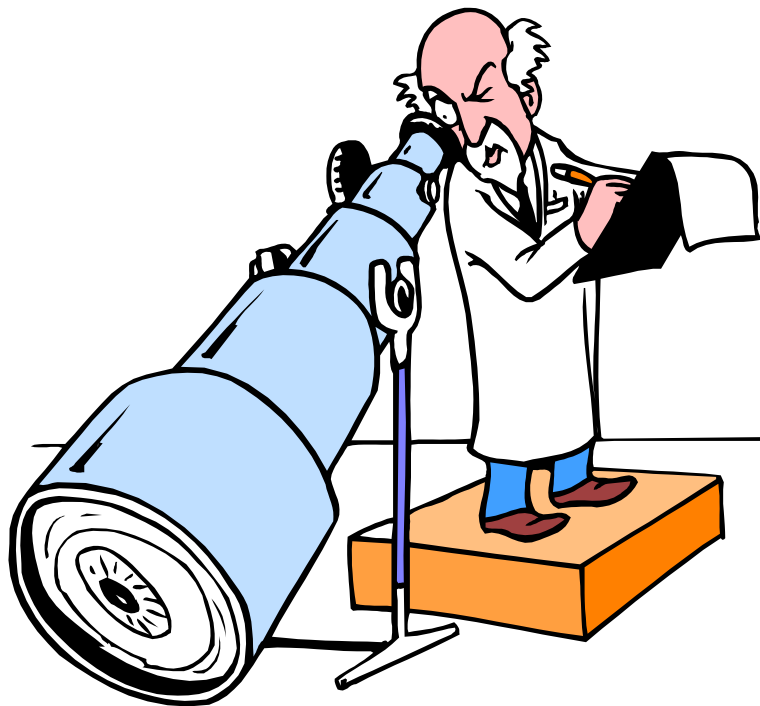


◆ Defect Rating	8.63	8.65	8.65	7.19	8.46	8.43	8.41	8.37	8.38	9.03	8.71	8.68
▲ Ride Rating	5.57	7.95	7.95	7.38	7.58	7.90	8.02	7.31	7.45	7.40	7.48	7.13
Lane Miles Defected	20	20	20	7	31	21	31	31	31	31	25	25

SECTION VI

DEFECT AND RIDE RATING COMPARISON

2002 VS. 2003



SECTION VI

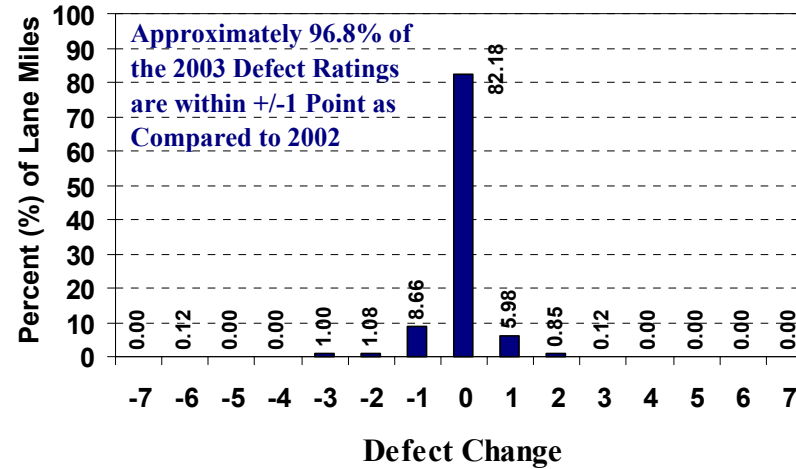
Defect and Ride Rating Comparison

Rating Comparison Criteria

The following pavement types have been omitted from this comparative analysis since they exhibit notable changes to the pavement surface as indicated below:

- Type 0 - Pavement sections not State-maintained, duplicated under another county section number, or added under the flexible pavement condition survey.
- Type 1 - Flexible Pavements
- Type 2 - Pavement improvement without new construction, such as intersection improvements, bridge approach, crack sealing or grinding.
- Type 5 - New Construction
- Type 6 - No Ride taken for this section (normally because of length constraint)
- Type 7 - Rehabilitated Pavement
- Type 8 - Under Construction
- Type 9 - Structures or exceptions that are State-maintained

Defect Rating Change (2002 to 2003)



NEGATIVE VALUES INDICATE DETERIORATION IN THE PAVEMENT AND/OR VARIABILITY IN THE DATA COLLECTION PROCESS

POSITIVE VALUES INDICATE VARIABILITY IN THE DATA COLLECTION PROCESS

Ride Rating Change (2002 to 2003)

