

# STATE OF FLORIDA



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**2005  
RIGID PAVEMENT  
CONDITION SURVEY  
FACTS & FIGURES**

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**FL/DOT/SMO/05-483  
April 2005**

**STATE MATERIALS OFFICE**



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# Executive Summary

Since 1985, the Pavement Condition Unit staff of the Pavement Materials Division have 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 the 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 traditionally evaluates the pavement lane that is in the worst condition in each roadway direction. The beginning and ending of pavement sections to be rated are determined by construction limits and/or uniformity of conditions. All sections are rated based on the varying levels and extent 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. The ratings for distresses 2 through 11 are combined to generate an overall Defect Rating.

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. The Central Program Development Office is responsible for reporting the condition of the Florida State Highway System for Pavement Management purposes.

The present report provides essential information on the current condition of the flexible pavement sections of the Florida State Highway System as part of the PCS program. It also includes a summary of the historical condition rating data.

To obtain an electronic copy of this and other reports, and to learn more about our program, please visit the Pavement Materials Division at State Material Office's website:

Intranet: <http://materials.dot.state.fl.us/>

Internet: <http://www.dot.state.fl.us/statematerialsoffice/>



# SECTION I

## Introduction

The Pavement Materials Division of the SMO 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. This report pertains to rigid pavements only which represent about 3% of the State maintained Highway System.

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 rating of rigid pavements is based on two main criteria, namely, 1) Defect Rating, and (2) Ride Rating. A pavement section is rated on a scale of 0 to 10, where a rating of 10 for any of the two criteria indicates a section in excellent condition. Currently, any section with a rating of 6 or less becomes eligible for rehabilitation.

The Defect Rating is obtained by evaluating ten different individual distress types, namely, 1) surface deterioration, 2) spalling, 3) patching, 4) transverse cracking, 5) longitudinal cracking, 6) corner cracking, 7) shattered slab, 8) faulting, 9) pumping, and 10) joint condition. Raters collect this distress data by evaluating pavements from the roadway shoulder.

Each distress type for the lane being rated is assigned a score from 0 to 10, and a "deduct value" depending on the distress type and severity level (light, moderate, or severe). The Defect Rating is obtained by subtracting the sum of the deduct values from 100 and then dividing by 10. Thus, a pavement section with a Defect Rating of 10 indicates a pavement without any observable distress.

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). RN 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 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 efficiency of data collection and 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 PCS, please refer to the latest edition of the Rigid and Flexible PCS Handbooks located online at:

<http://www.dot.state.fl.us/statematerialsoffice/pavement/pavementhome.htm>

The facts and figures contained in this report are for rigid pavements only which represent 2.4% of the entire state highway system lane miles.



# Observations

The review and analysis of the historical PCS distress ratings for rigid pavements have resulted in the following statewide observations:

1. The average Defect Ratings have improved during the past fourteen years from an average rating of 6.67 in 1992 to 8.03 in 2005.
2. The average Ride Ratings have remained constant for the twelve years prior to the 2004 PCS with a mean rating of 7.36 in 2003 and an overall average of 7.29. In 2004 the Ride Rating declined to a statewide average of 6.79. This decline was mainly due to a change in sampling interval used when collecting the data. Prior to the 2004, all surveys were conducted using a 12 in. sampling interval. Beginning with the 2004 survey, a 6 inch sampling interval was implemented. The 2005 Ride Rating dropped to 6.73, slightly lower compared to the average Ride Rating from the 2004 survey.
3. 99.3% of the pavement sections rated in 2005 were within one defect point compared to the 2004 ratings. (1)
4. 99.3% of the pavement sections rated in 2005 for Ride was within one point compared to the 2004 ratings. (1)

\* Note (1): Sections that had undergone notable changes such as new construction or total rehabilitation were excluded from the analysis.

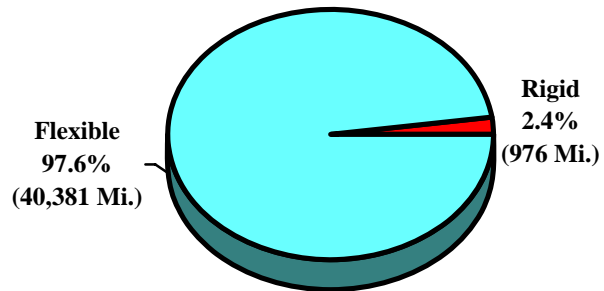
# General Notes

1. For multi-lane roadways: The worst lane in each direction is rated (normally the outermost traffic lane).
2. For two-lane roadways: The worst lane is rated (normally the same lane tested the previous year).
3. Rated sections are determined by construction limits and/or significant changes in visual condition of the pavement.
4. Ride Rating data is collected using four identical roadway profiler units.
5. Defect Rating is based on manual and visual distress measurements collected by the rater from the shoulder of the roadway.
6. Ultrasonic sensors were replaced with Laser sensors beginning with the 1999 survey, along with the use of RN as the method of calculating Ride Ratings. This may explain the increase in serviceability observed thereafter.

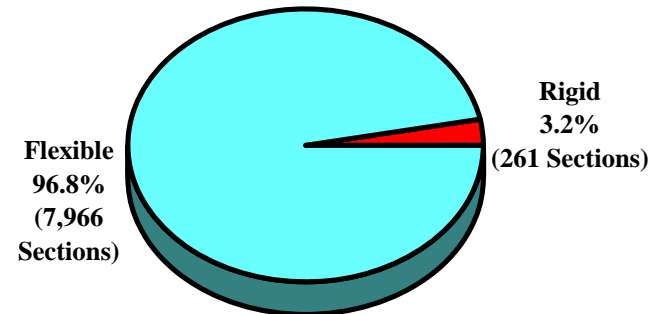
# 2005 PCS Production Summary

## Statewide

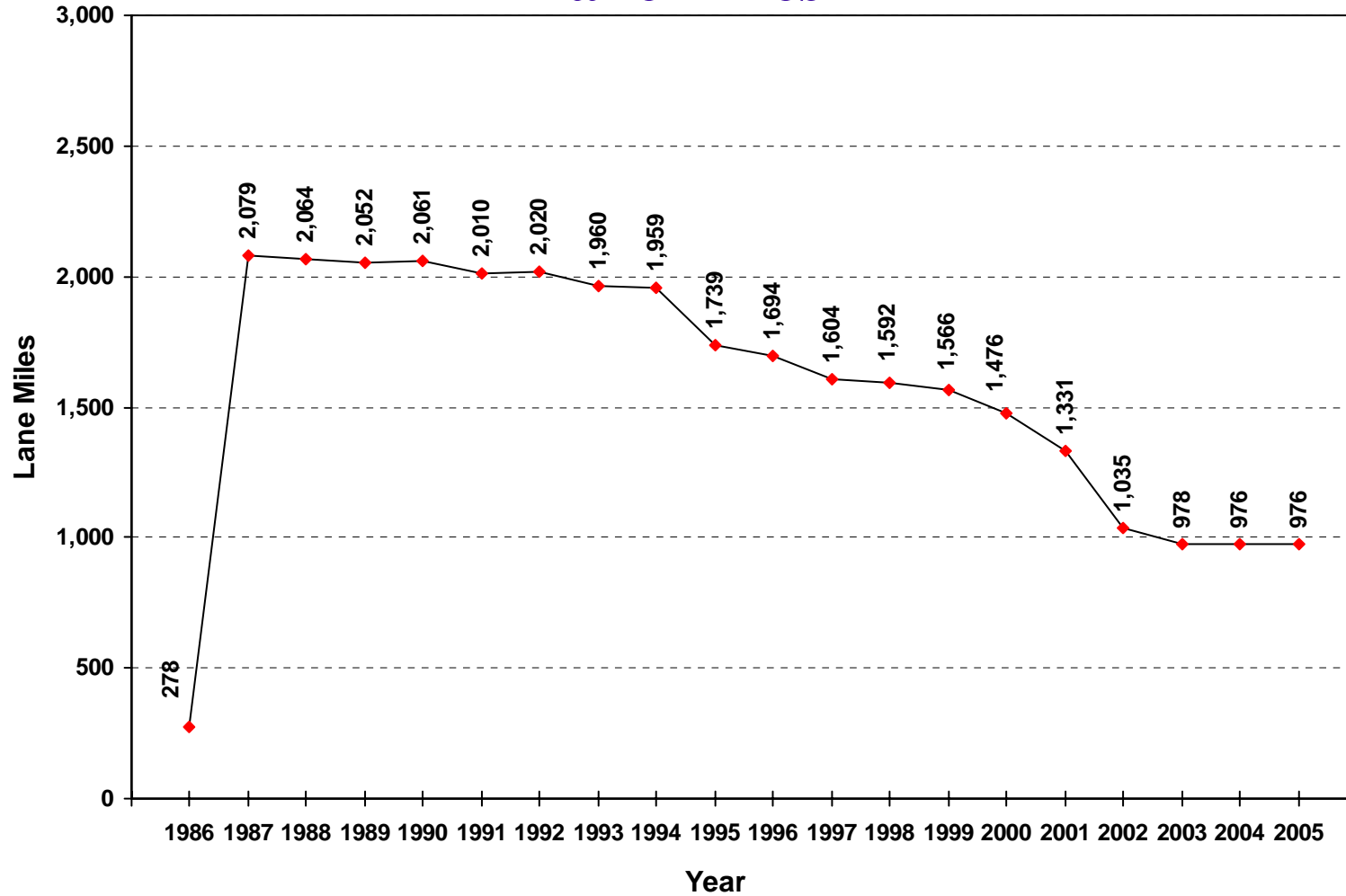
**Total Lane Miles: 41,357 Mi.**  
**(Flexible and Rigid Combined)**



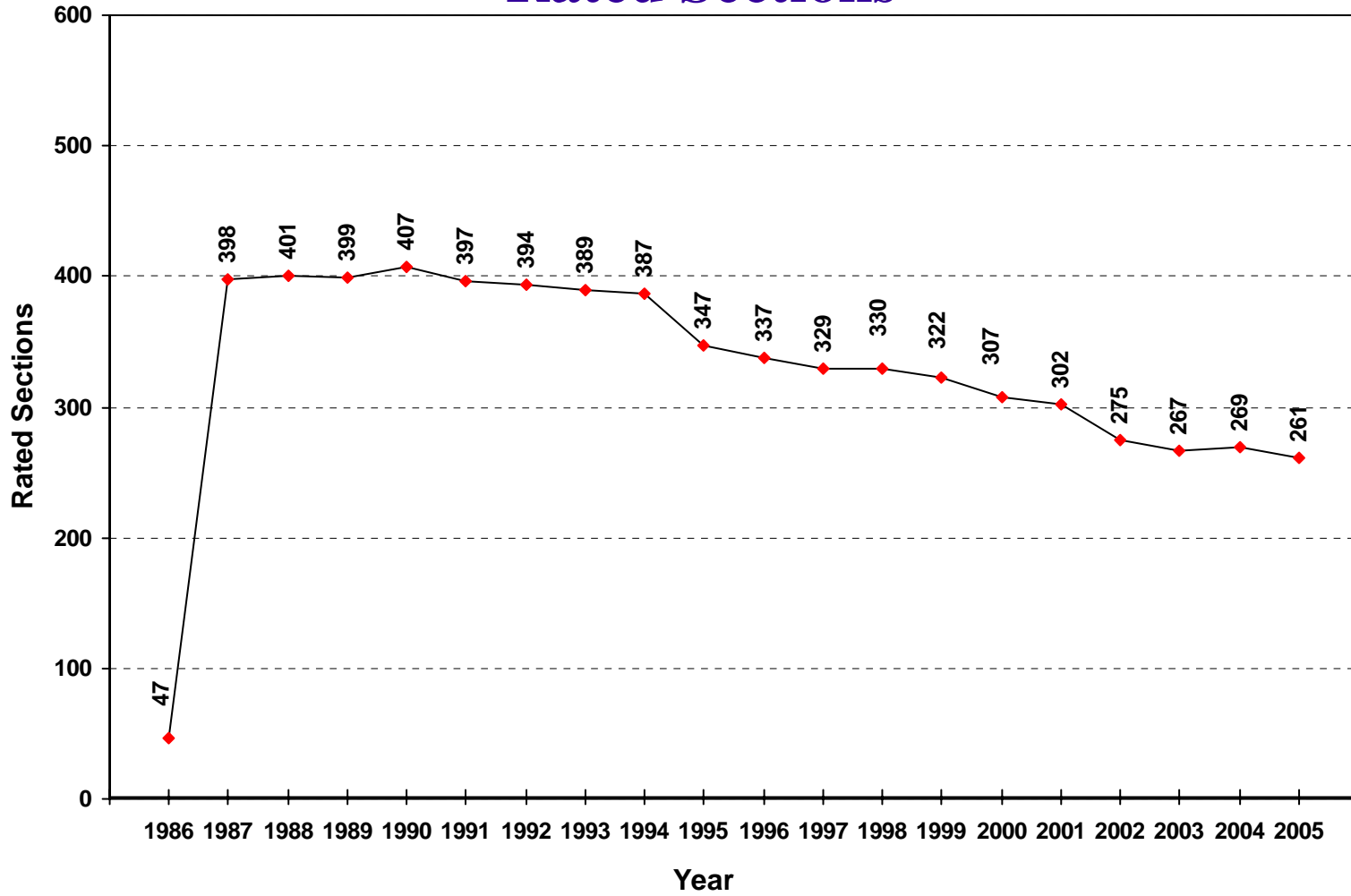
**Total Rated Sections: 8,227**  
**(Flexible and Rigid Combined)**



# Rigid Pavement Condition Survey Production History Lane Miles



# Rigid Pavement Condition Survey Production History Rated Sections



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# **SECTION II**

## **DEFECT RATING**

**BY**

**SYSTEM AND DISTRICT**



## **SECTION II**

### **Defect Rating by System and District**

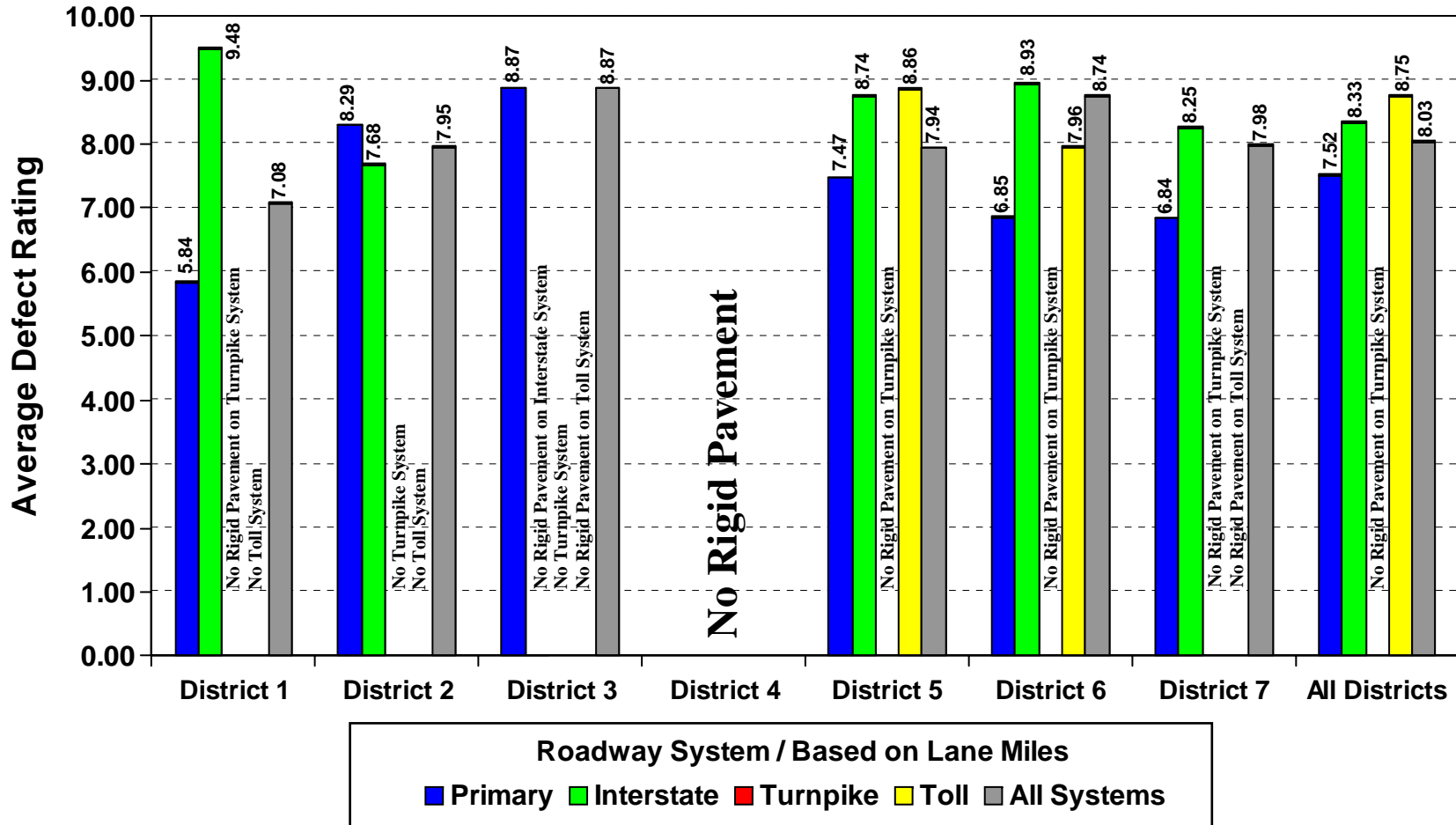
#### **Defect Rating Criteria**

- 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 individual deduct values associated with each various form of distress from 100, and then by 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 PCS Handbook.

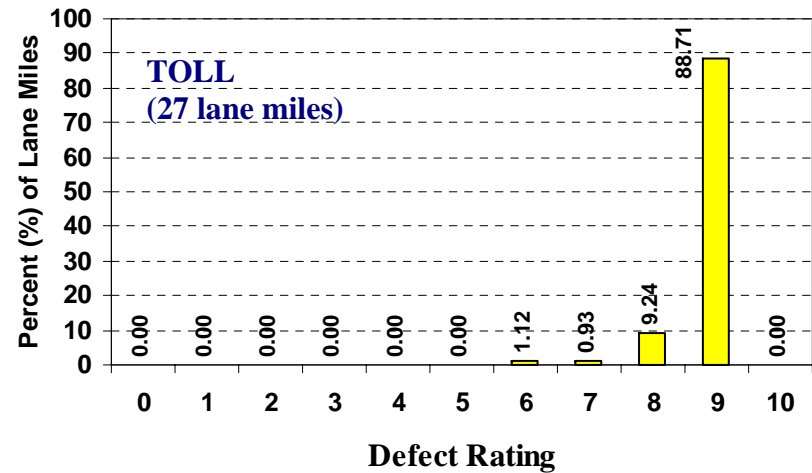
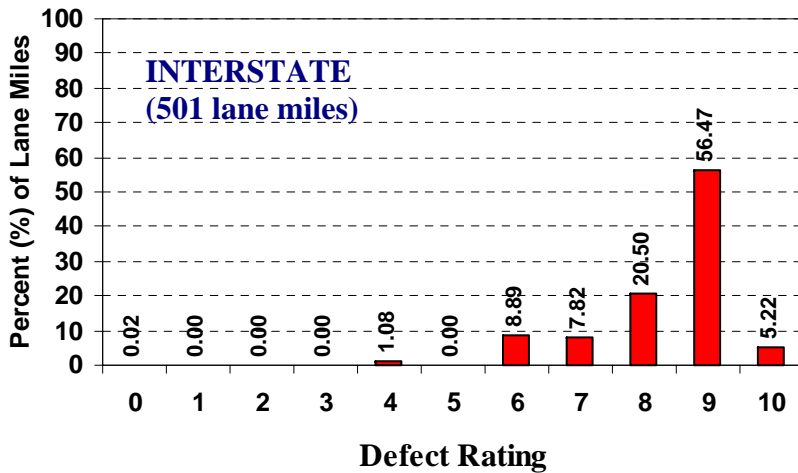
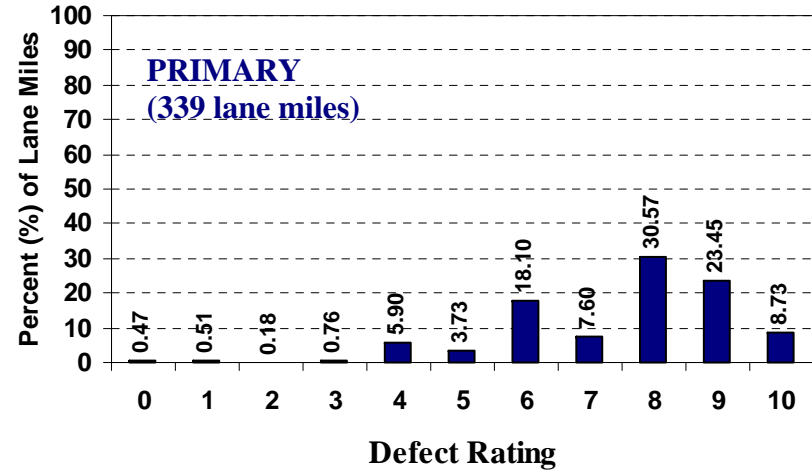
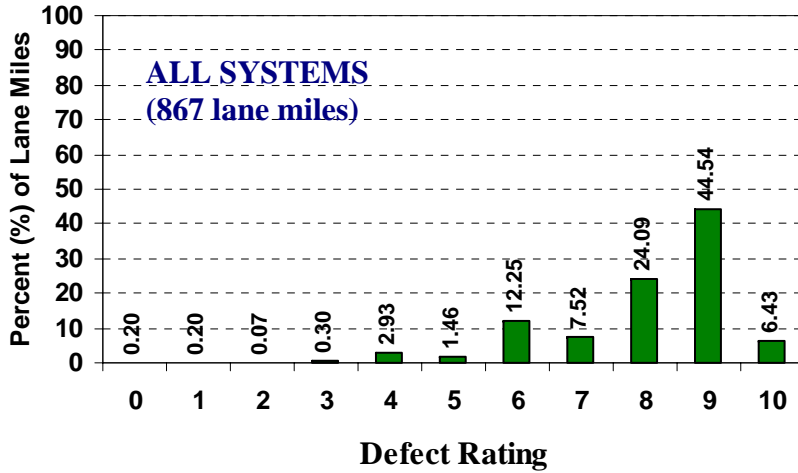
# 2005 Defect Rating by System and District

01



# 2005 Defect Distribution by System Statewide

11

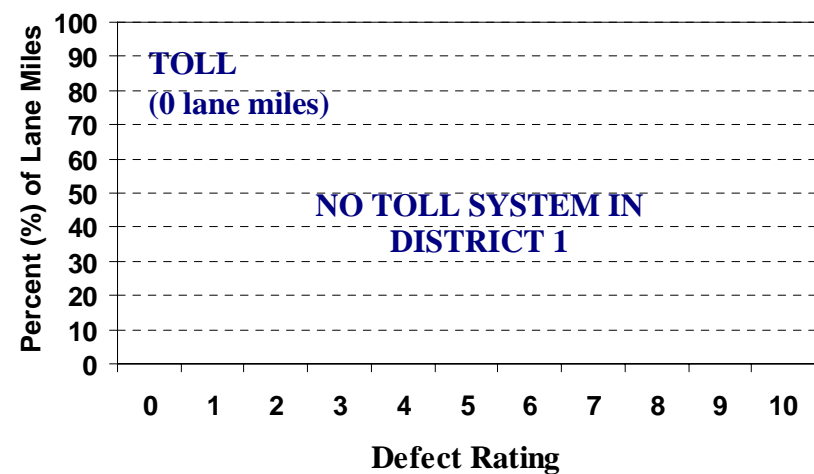
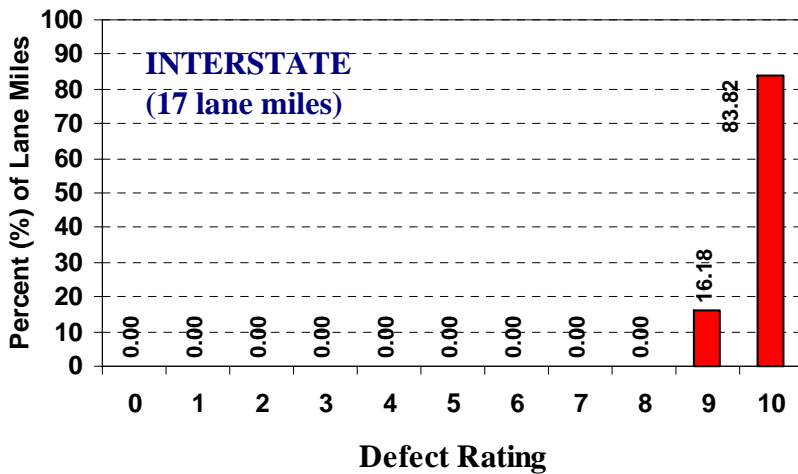
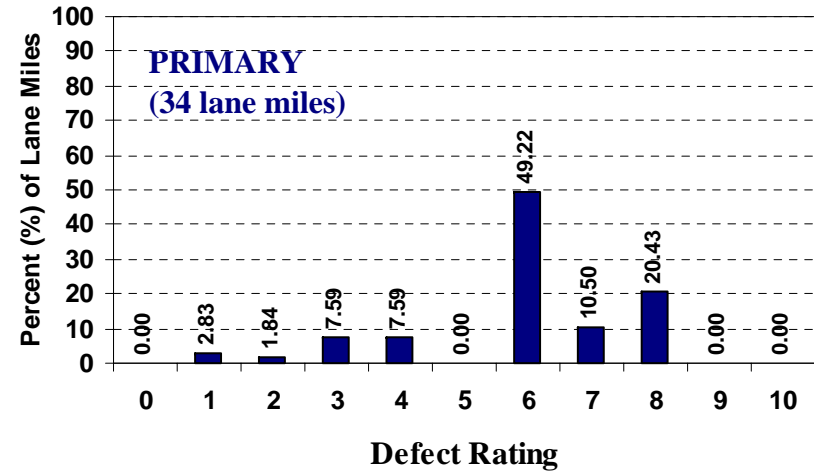
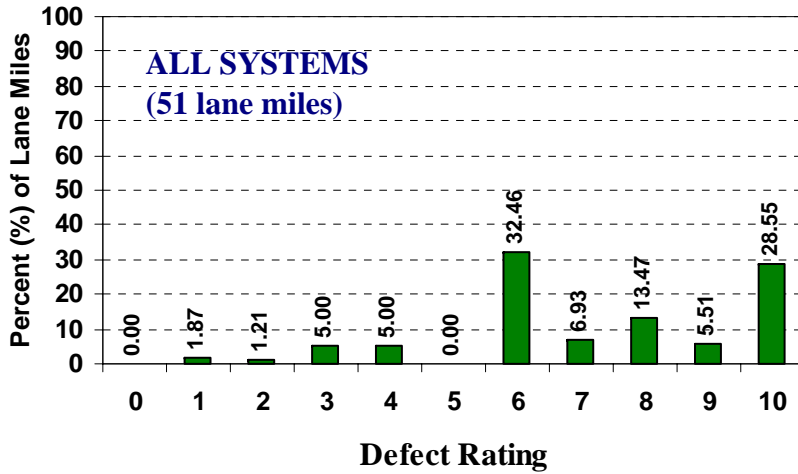


Note: No Rigid Pavement on Turnpike System



# 2005 Defect Distribution by System

## District 1

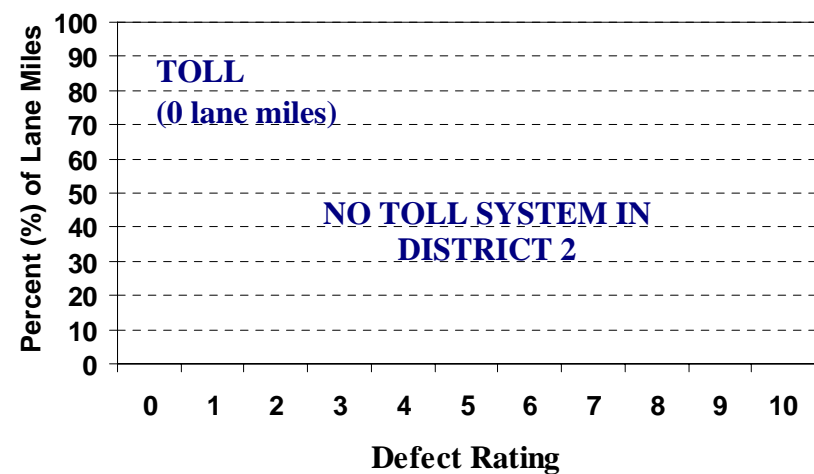
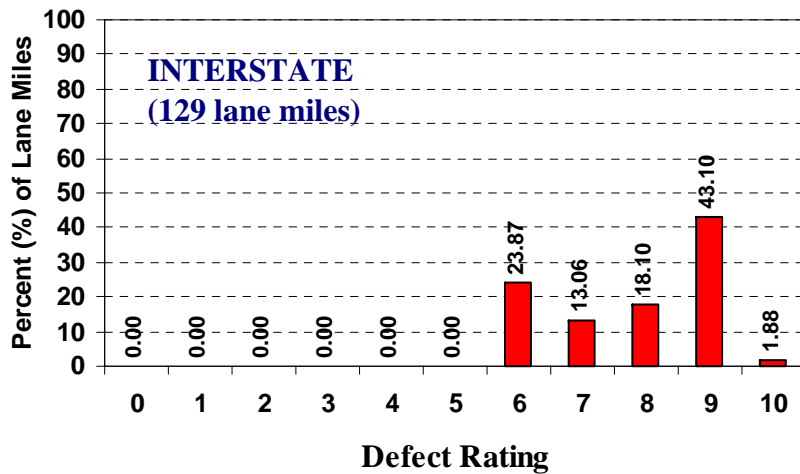
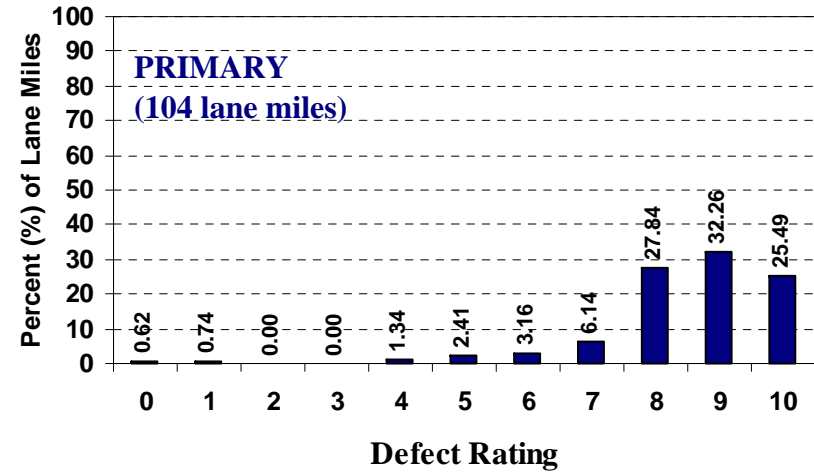
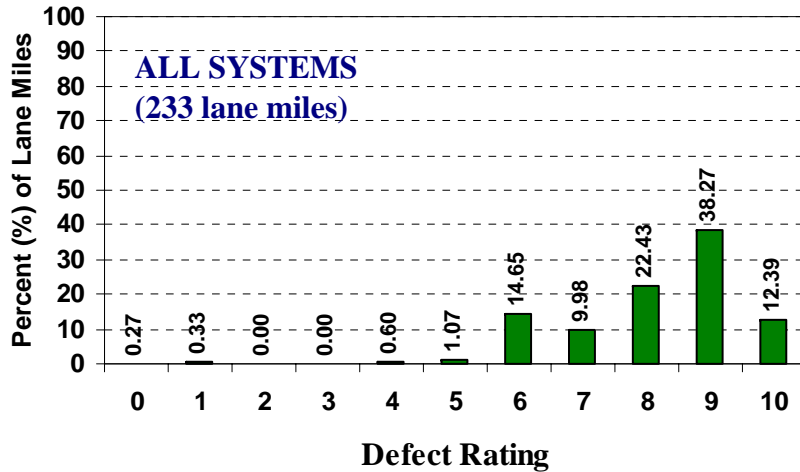


Note: No Rigid Pavement on Turnpike System

# 2005 Defect Distribution by System

## District 2

13

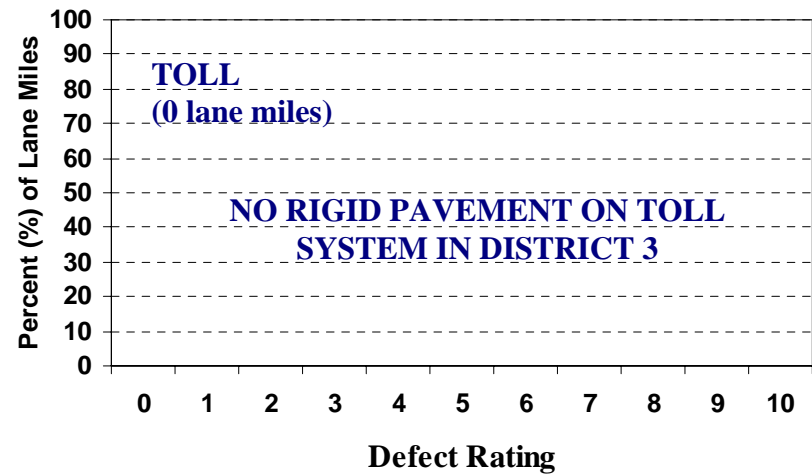
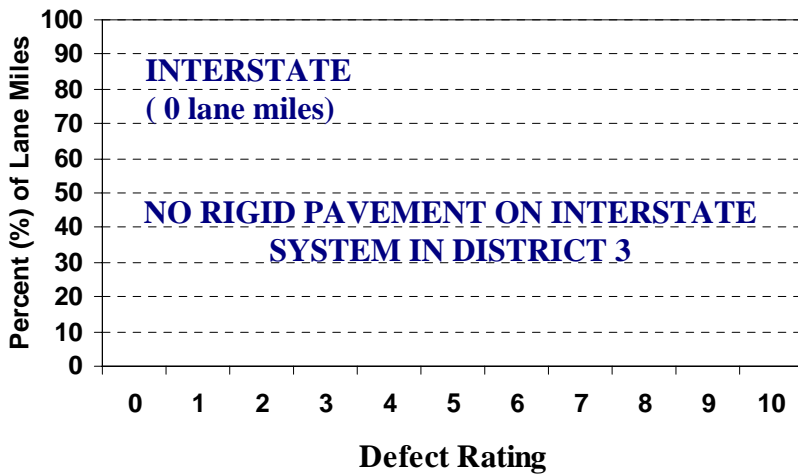
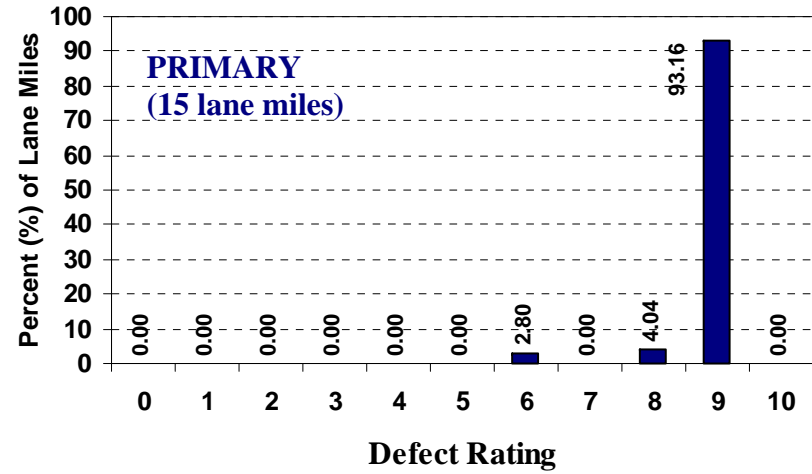
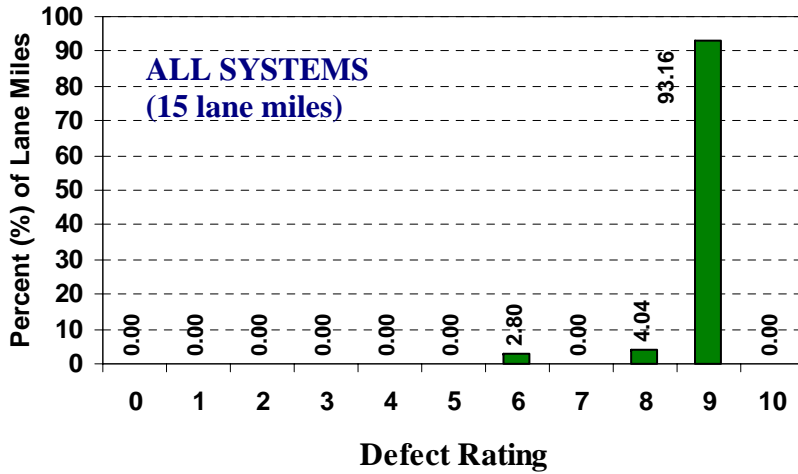


Note: No Turnpike System in District 2

# 2005 Defect Distribution by System

## District 3

14

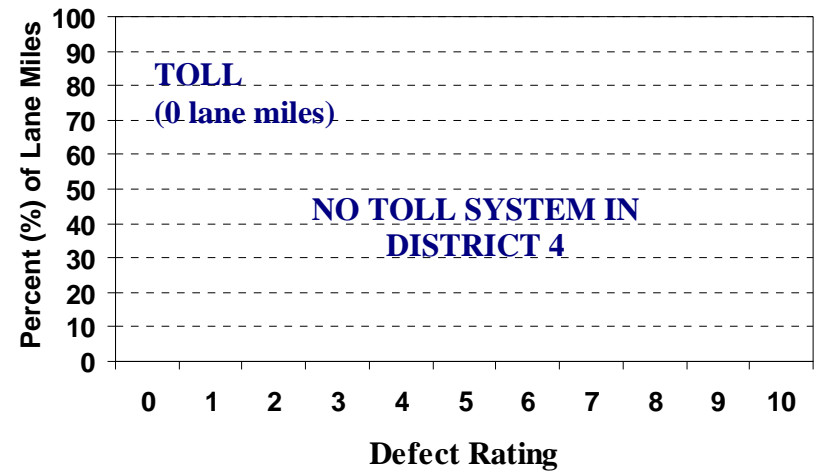
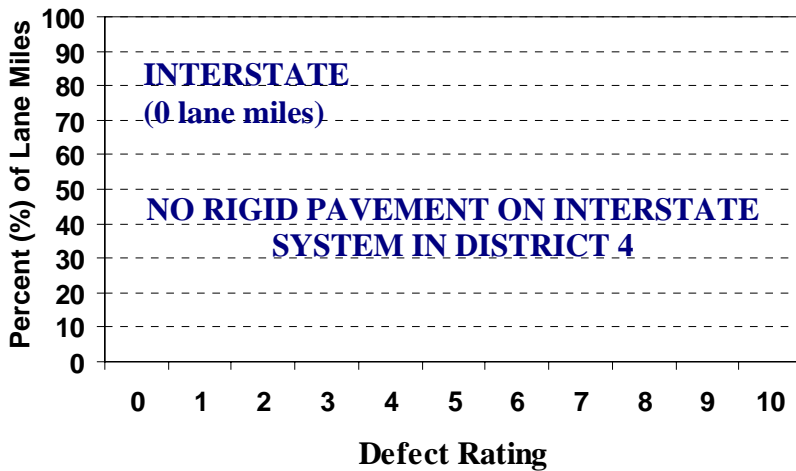
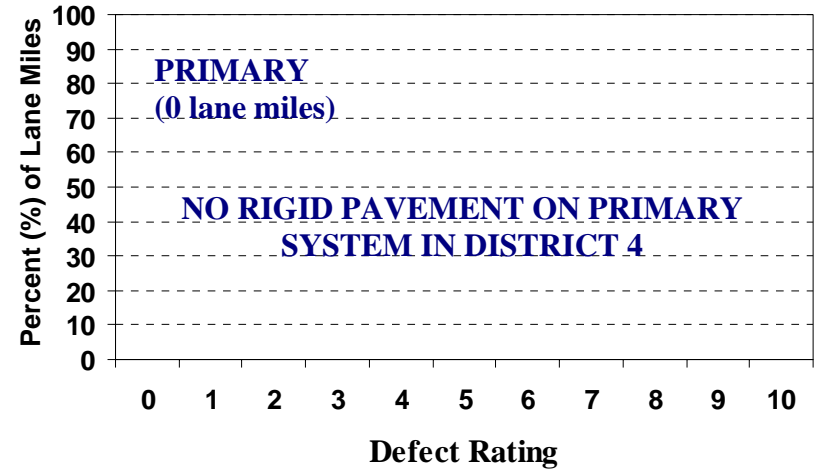
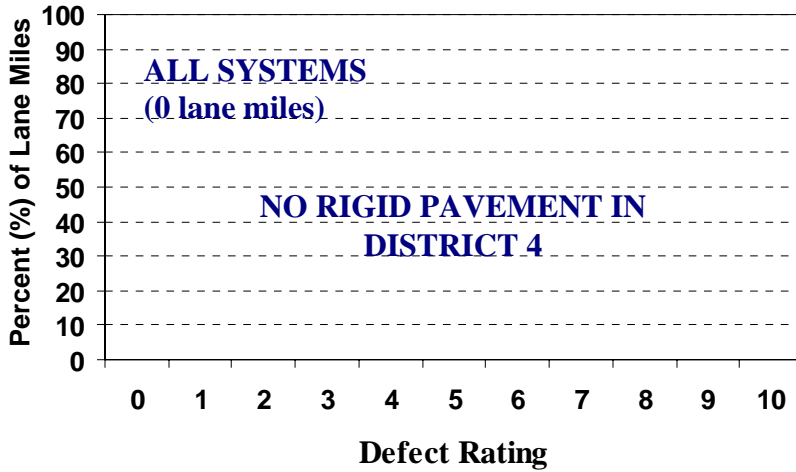


Note: No Turnpike System in District 3

# 2005 Defect Distribution by System

## District 4

15

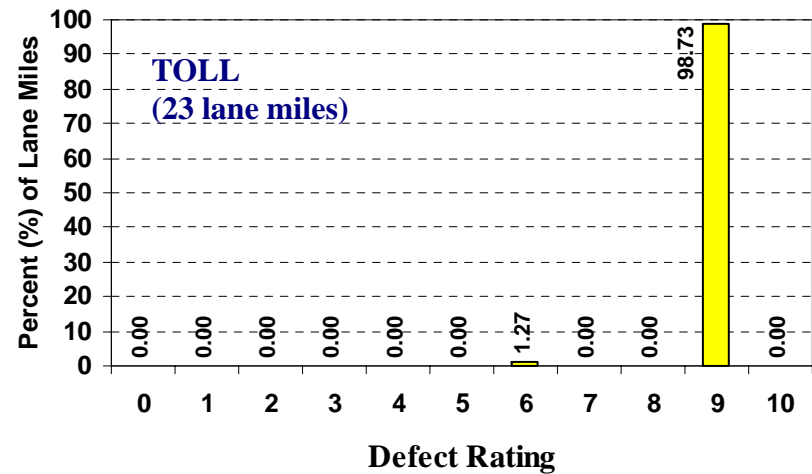
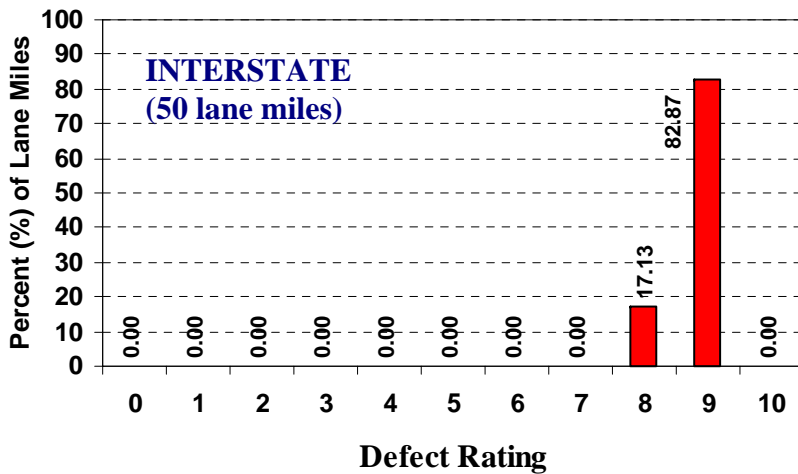
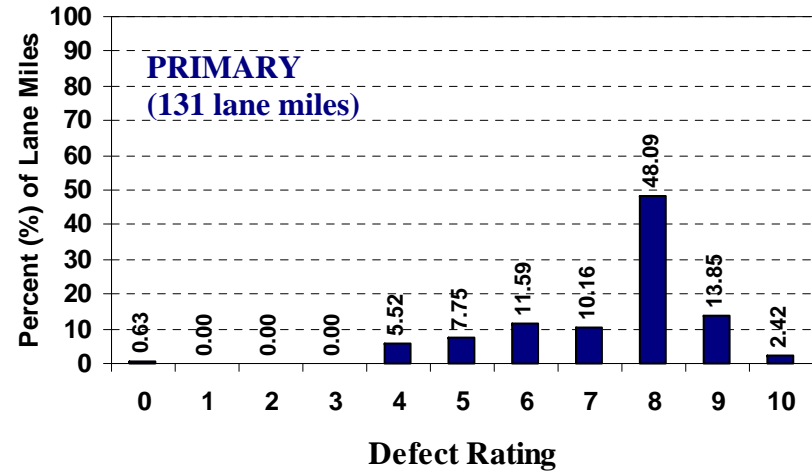
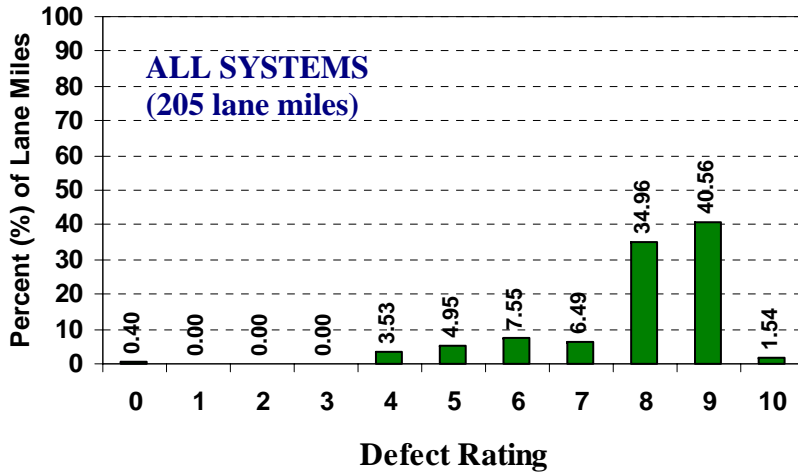


Note: No Rigid Pavement on Turnpike System

# 2005 Defect Distribution by System

## District 5

91

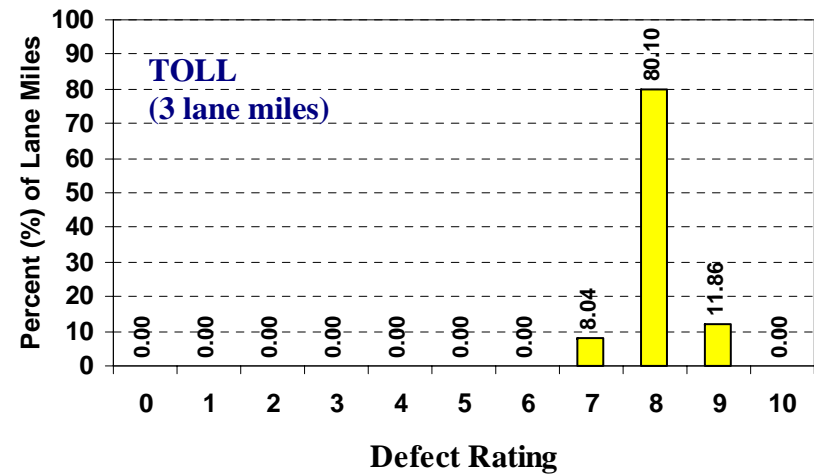
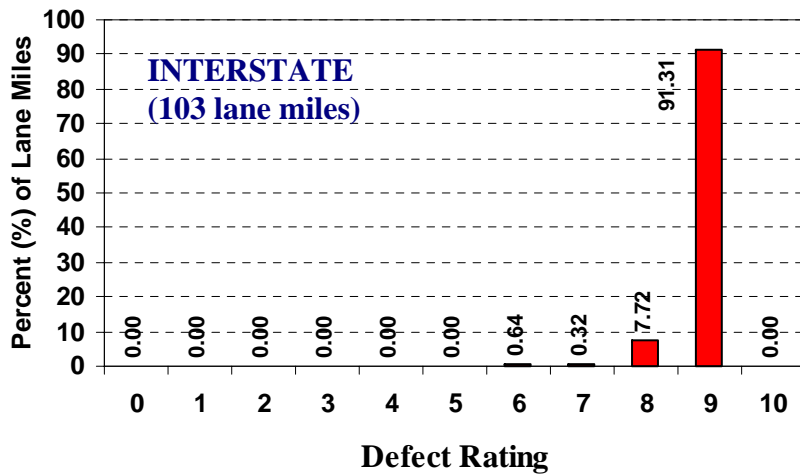
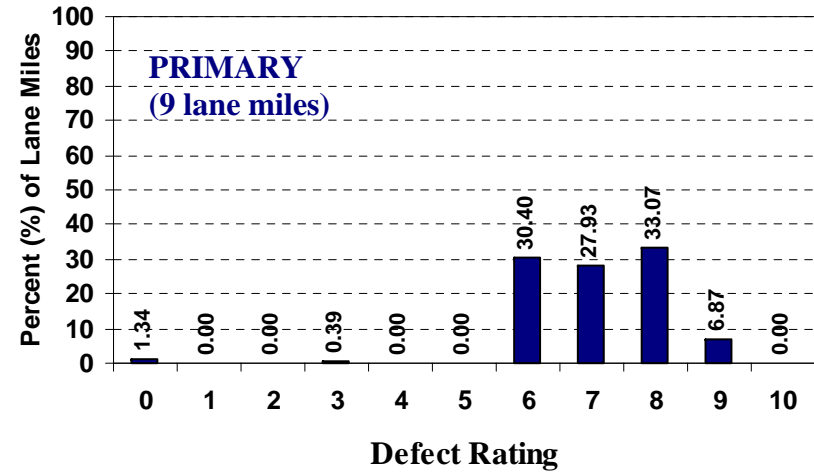
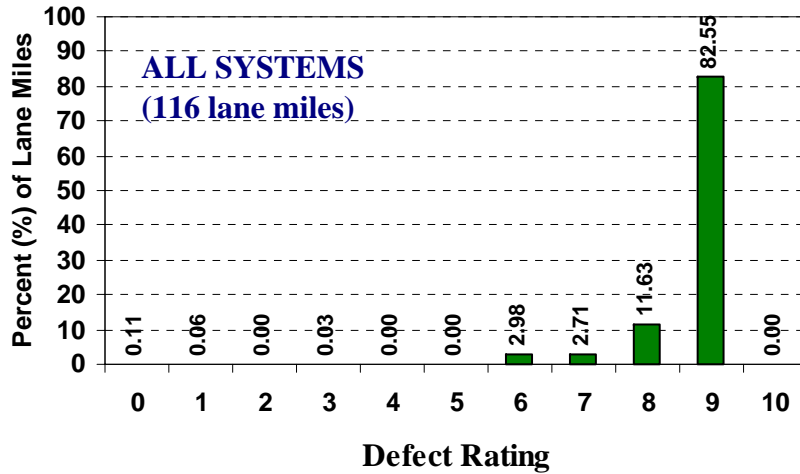


Note: No Rigid Pavement on Turnpike System

# 2005 Defect Distribution by System

## District 6

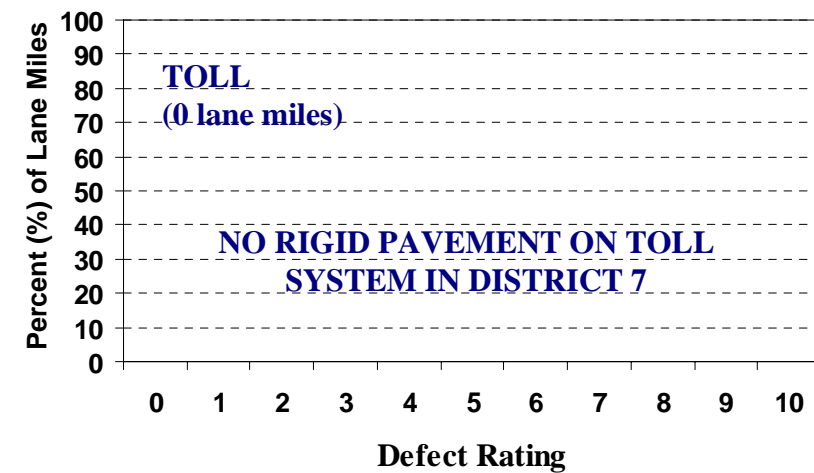
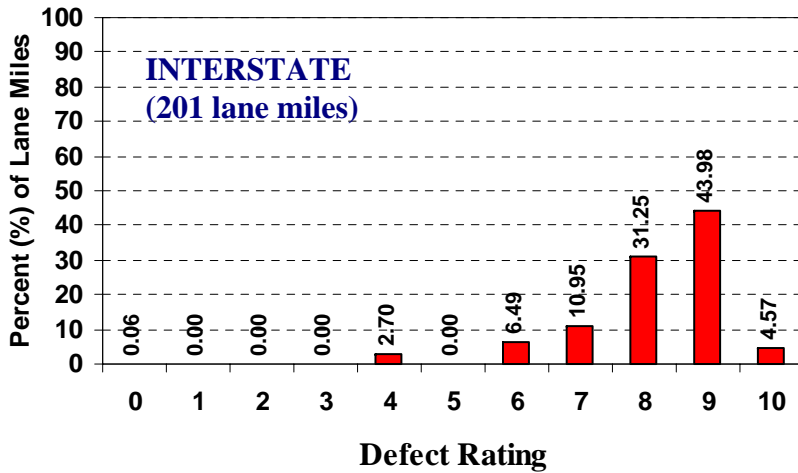
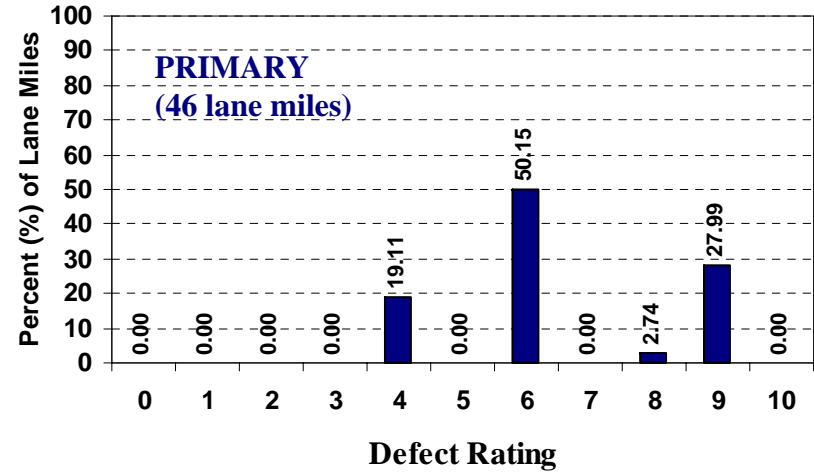
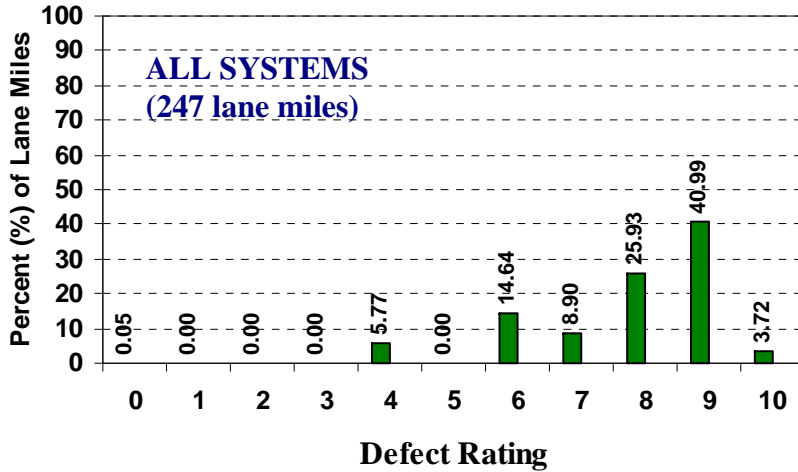
LI



Note: No Rigid Pavement on Turnpike System

# 2005 Defect Distribution by System

## District 7



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

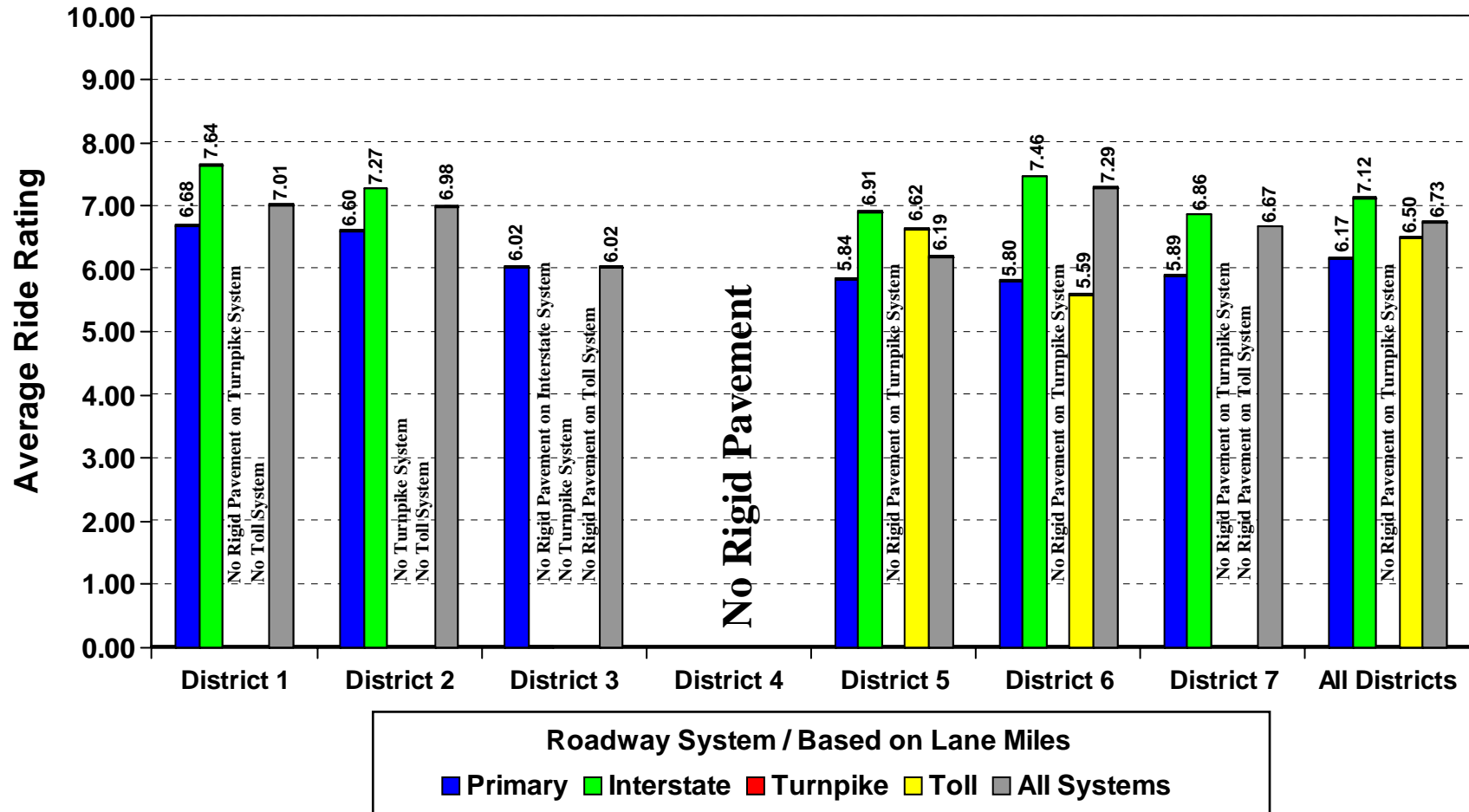
- Ride Ratings measure the ride quality of a pavement section. It is an indication of the degree of smoothness or roughness of the wearing surface.
- Ride Ratings are calculated from RN (ASTM E-1489).

$$RN \times 2 = \text{Ride Rating}$$

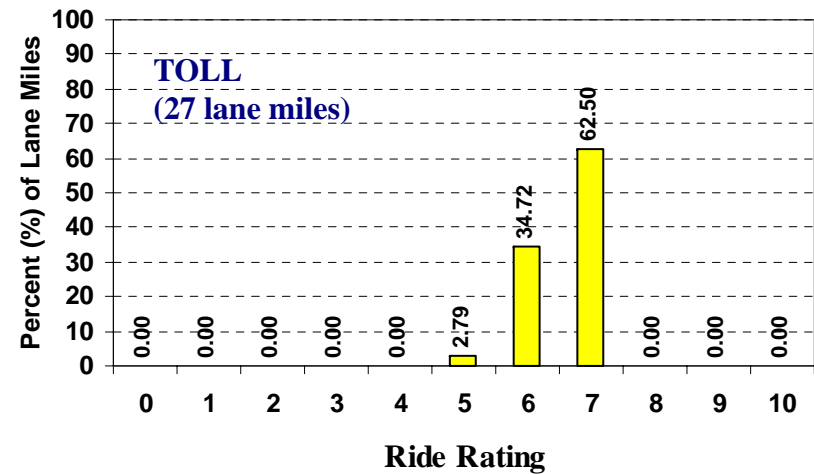
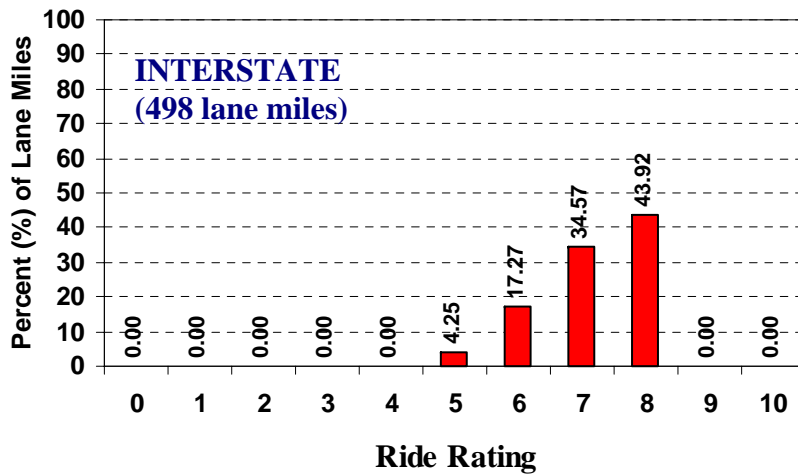
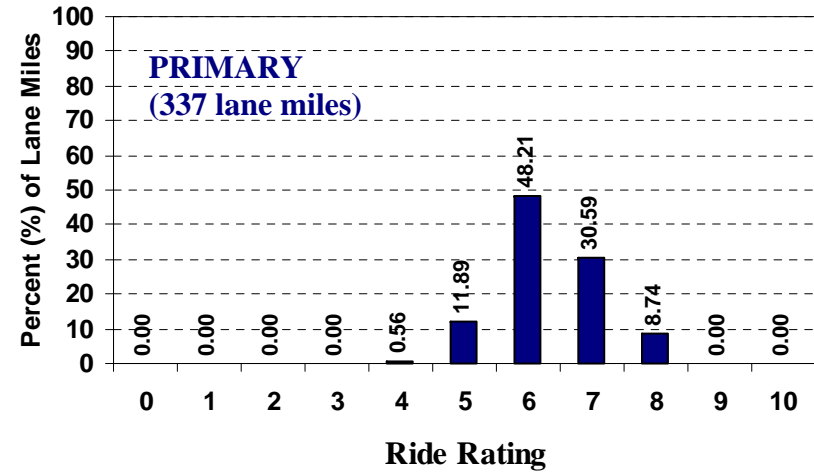
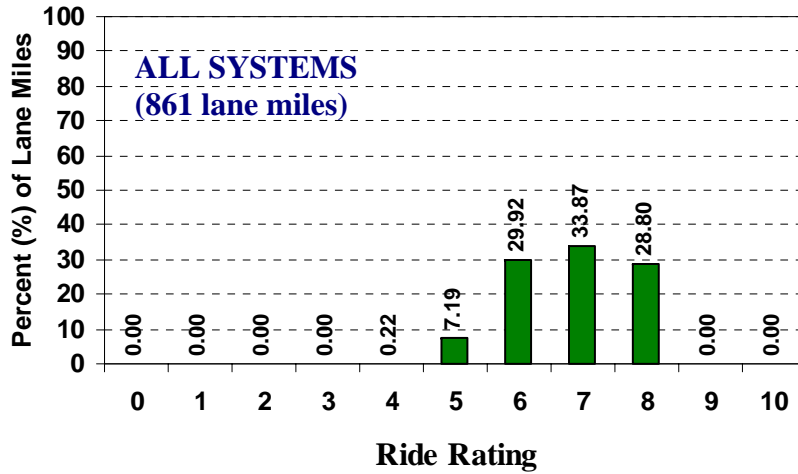
RN is a mathematical processing of longitudinal profile measurements to produce an estimate of a driver's subjective perception of the ride quality of a roadway. RN is based on an algorithm published in the National Cooperative Highway Research Project (NCHRP) 1-23 report and is defined in ASTM Standard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

# 2005 Ride Rating by System and District



# 2005 Ride Rating Distribution by System Statewide

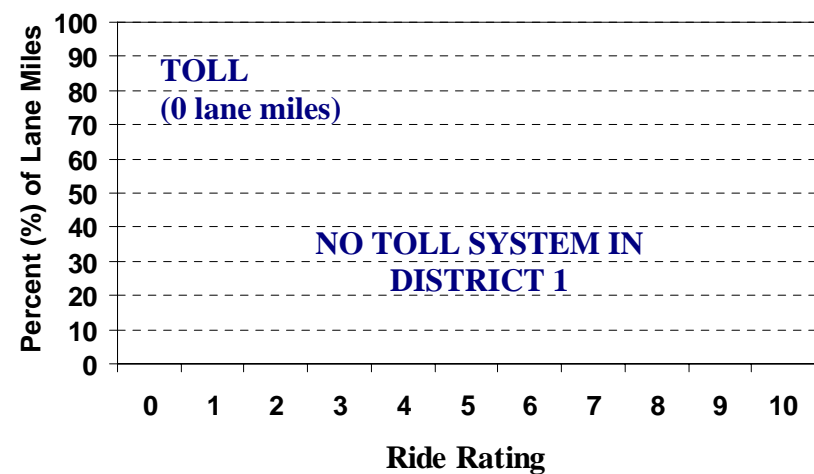
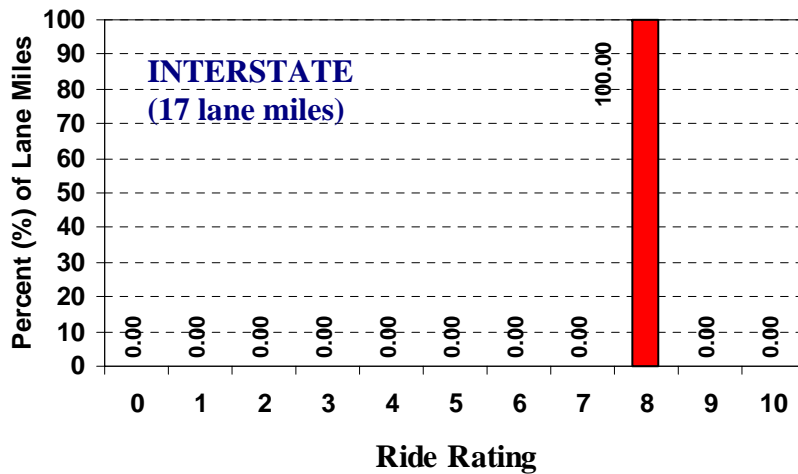
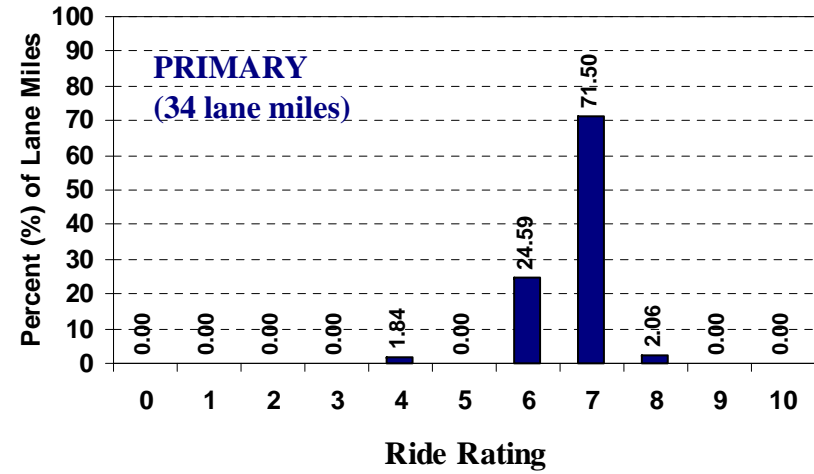
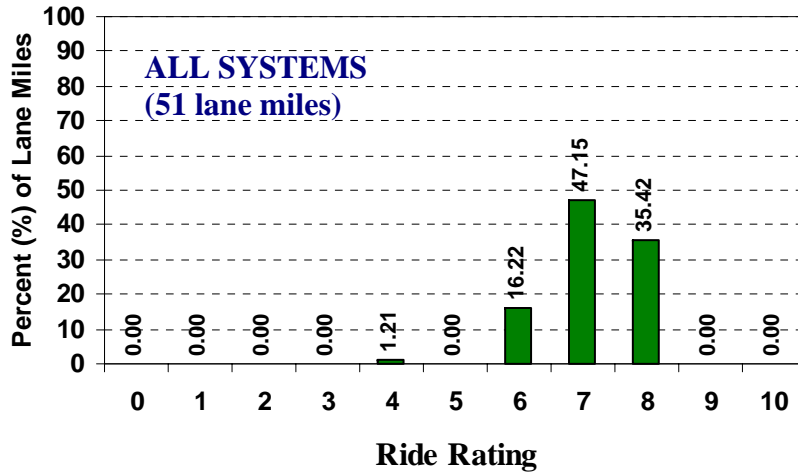


Note: No Rigid Pavement on Turnpike System

# 2005 Ride Rating Distribution by System

## District 1

23

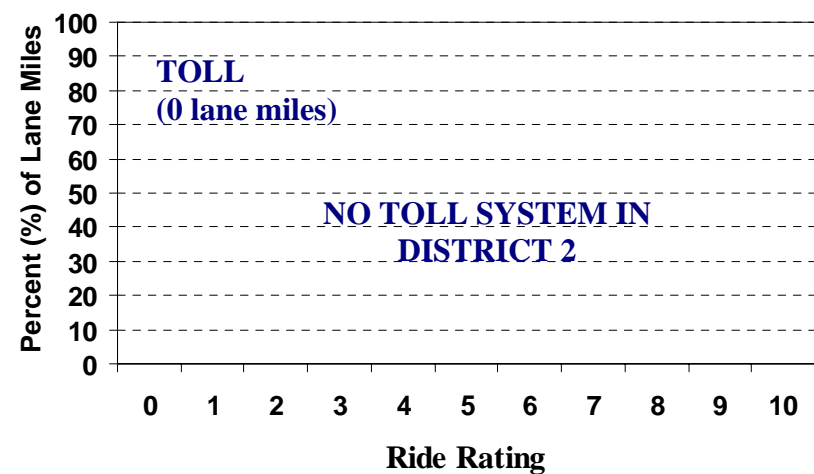
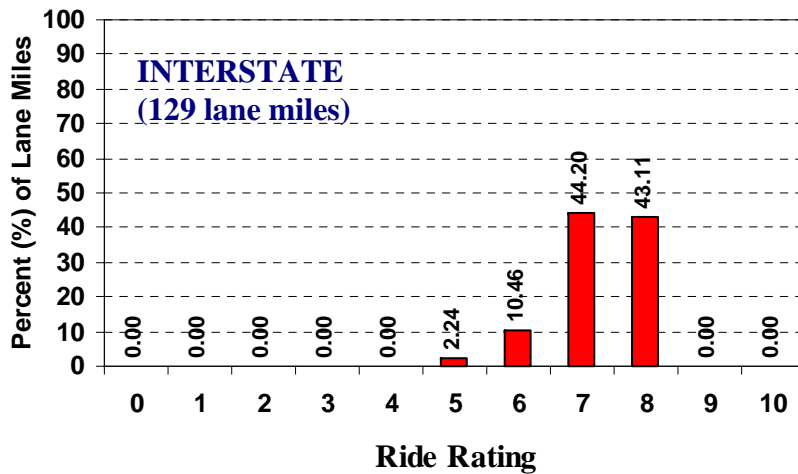
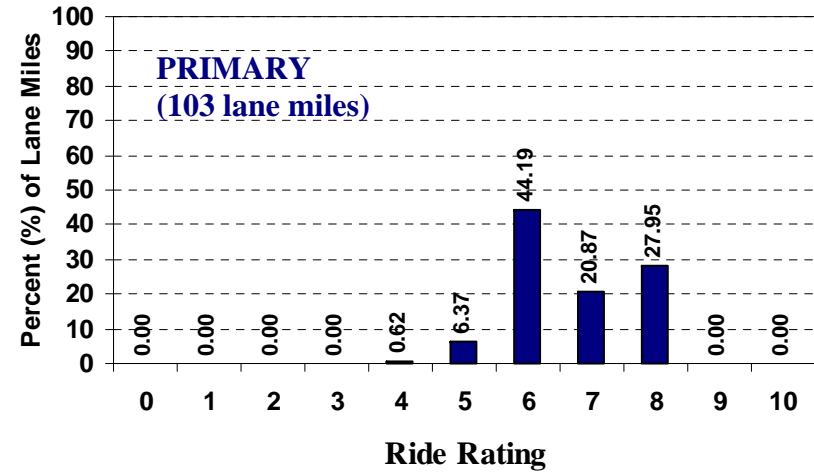
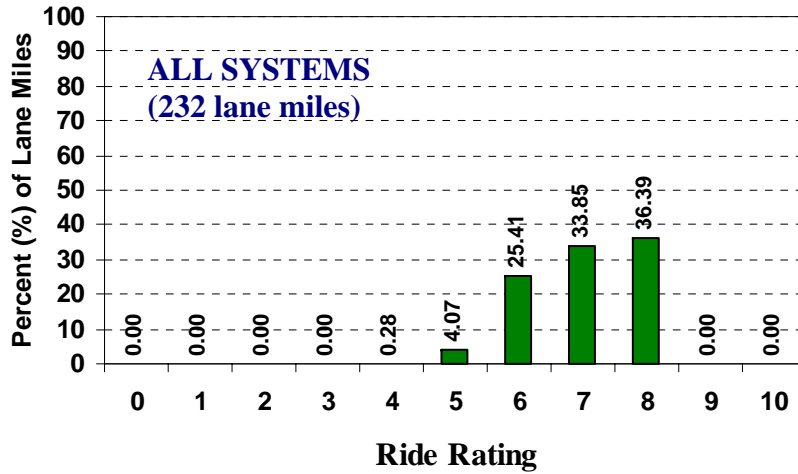


Note: No Rigid Pavement on Turnpike System

# 2005 Ride Rating Distribution by System

## District 2

24

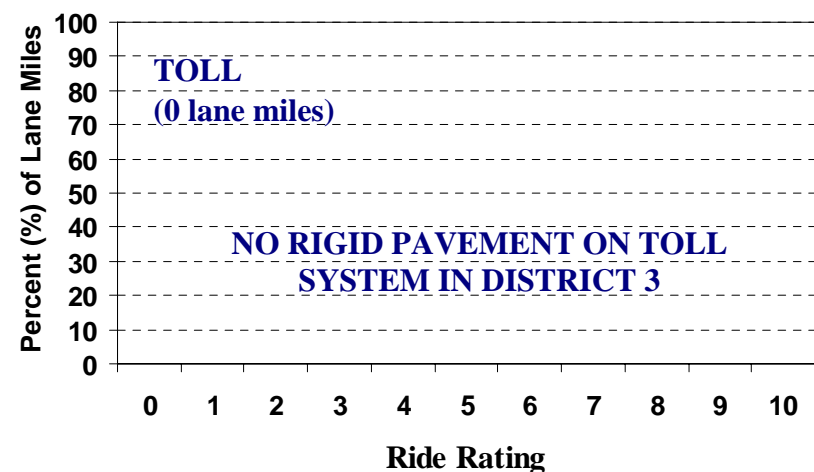
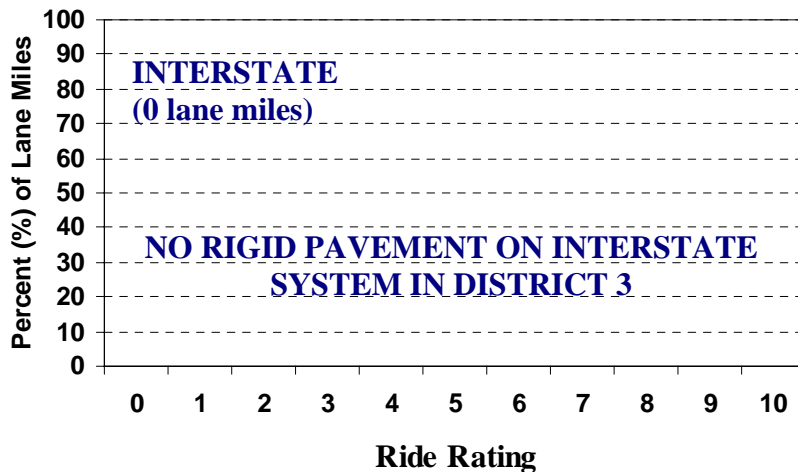
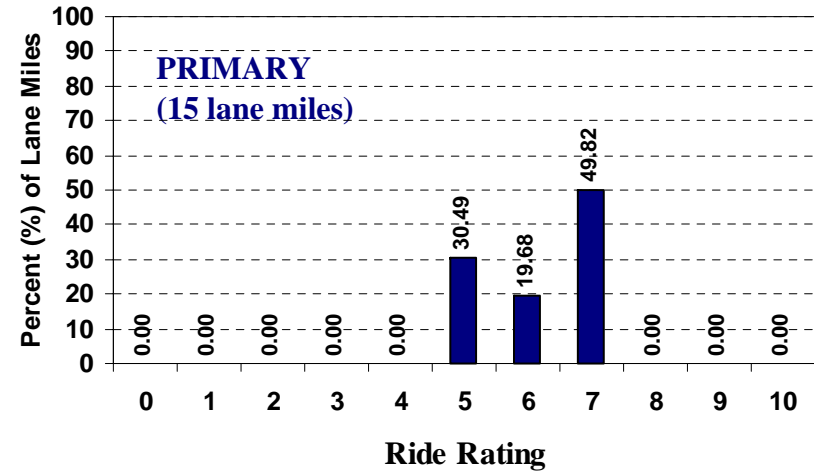
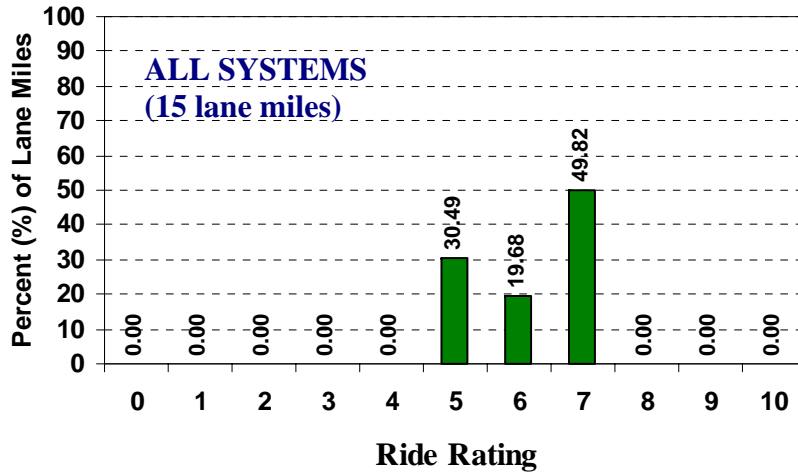


Note: No Rigid Pavement on Turnpike System

# 2005 Ride Rating Distribution by System

## District 3

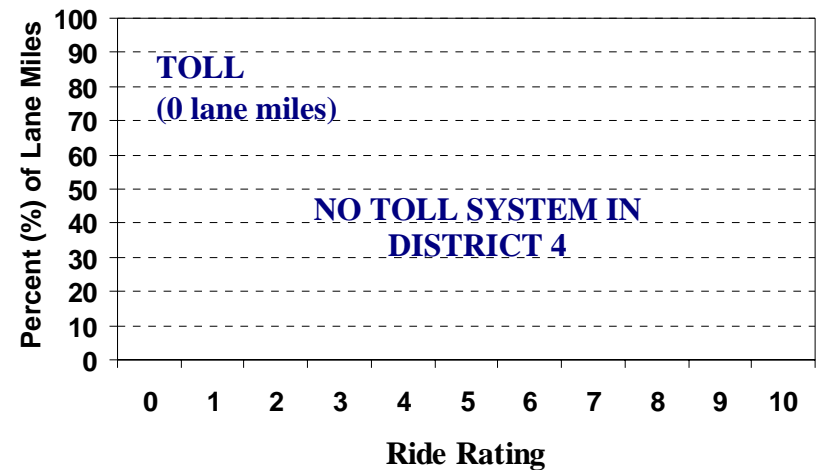
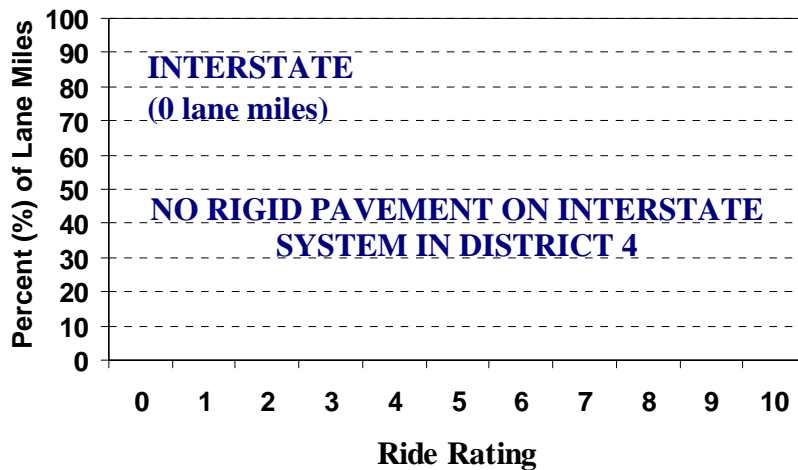
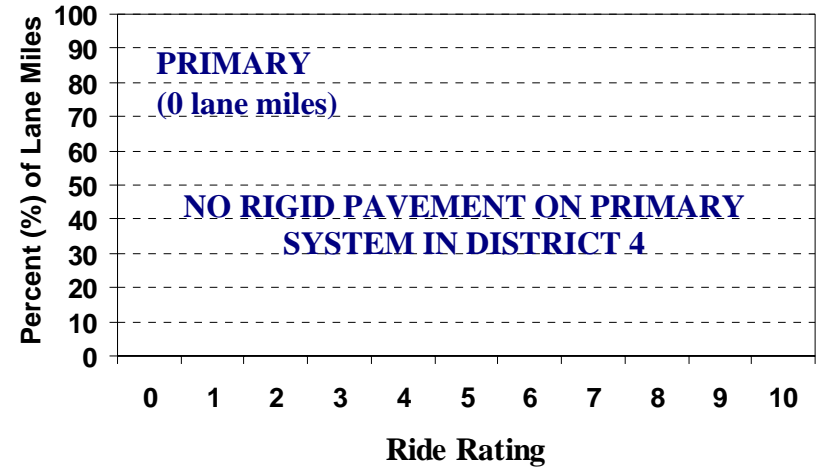
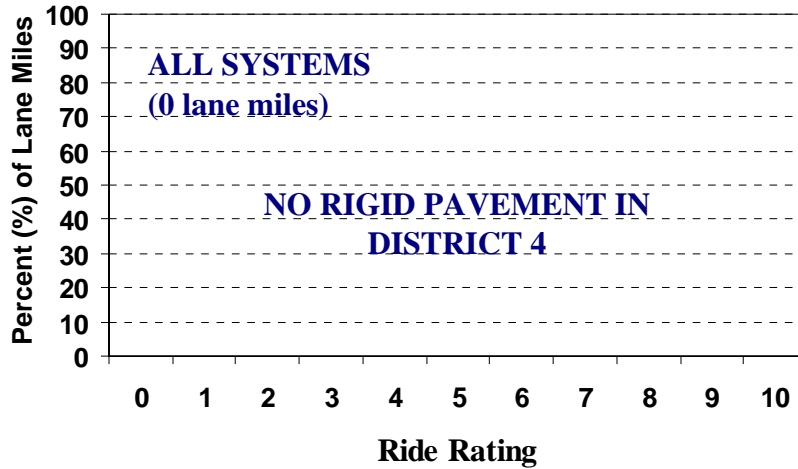
25



Note: No Rigid Pavement on Turnpike System

# 2005 Ride Rating Distribution by System

## District 4

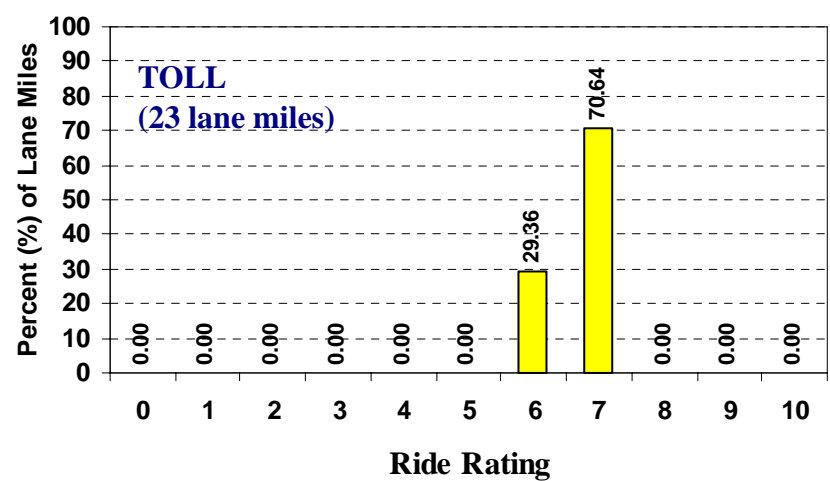
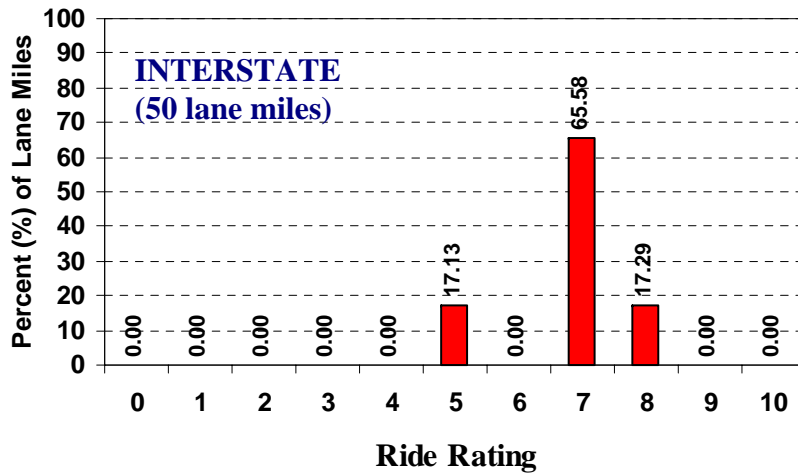
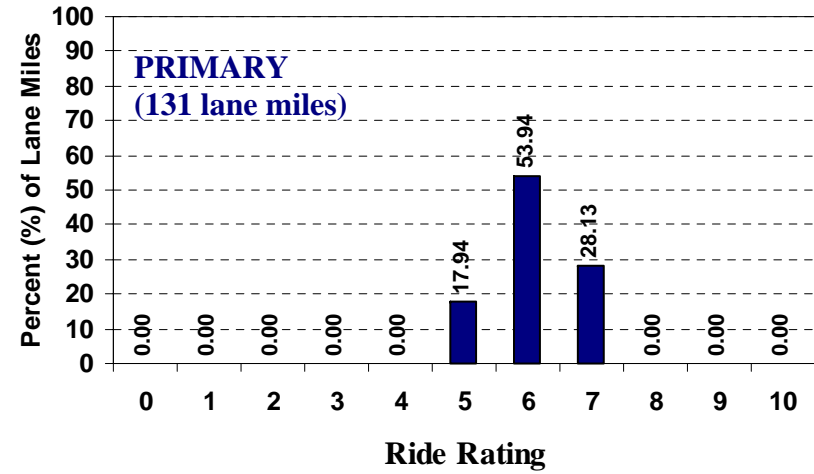
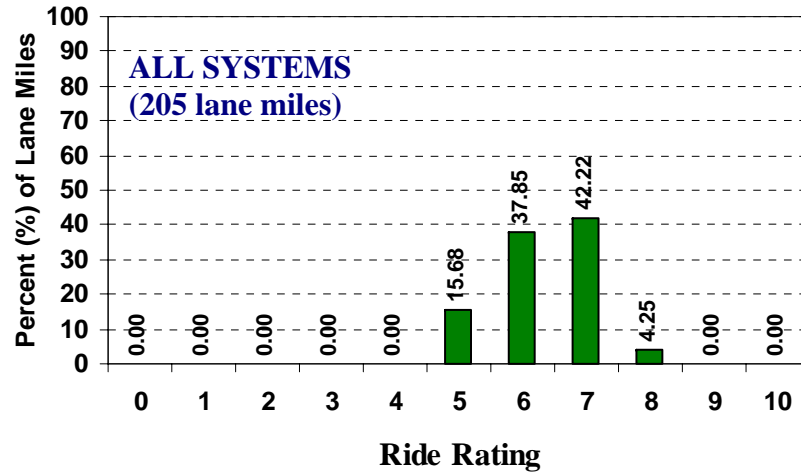


Note: No Rigid Pavement on Turnpike System



# 2005 Ride Rating Distribution by System

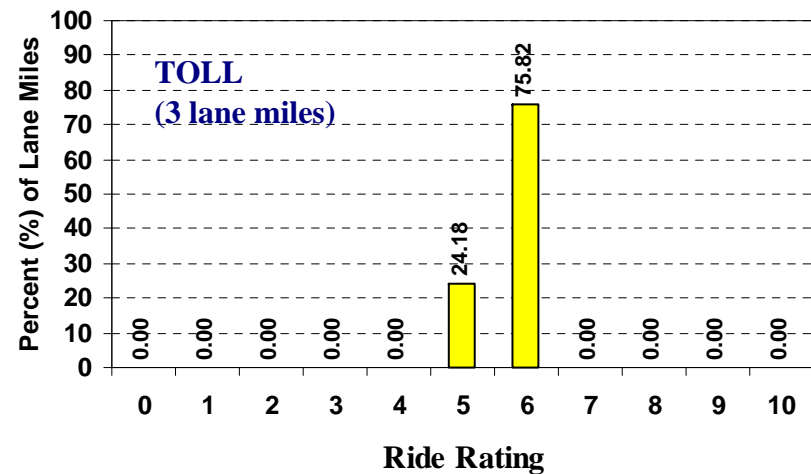
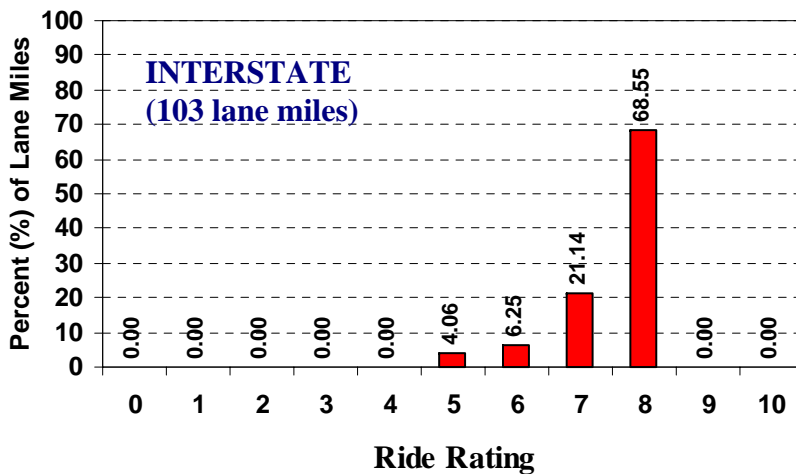
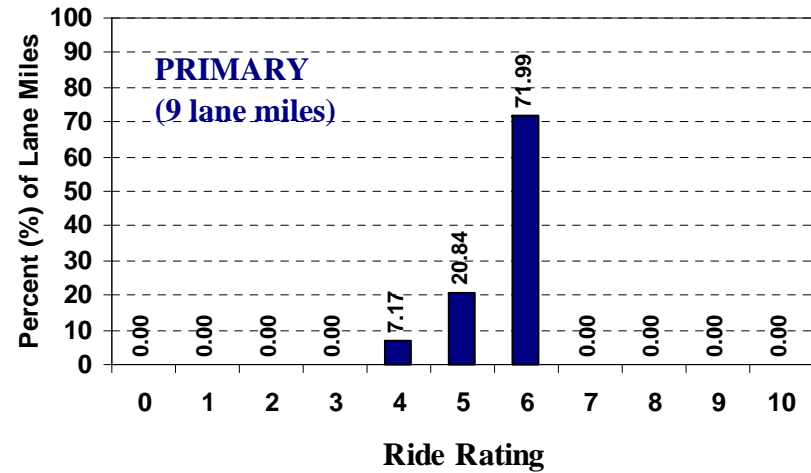
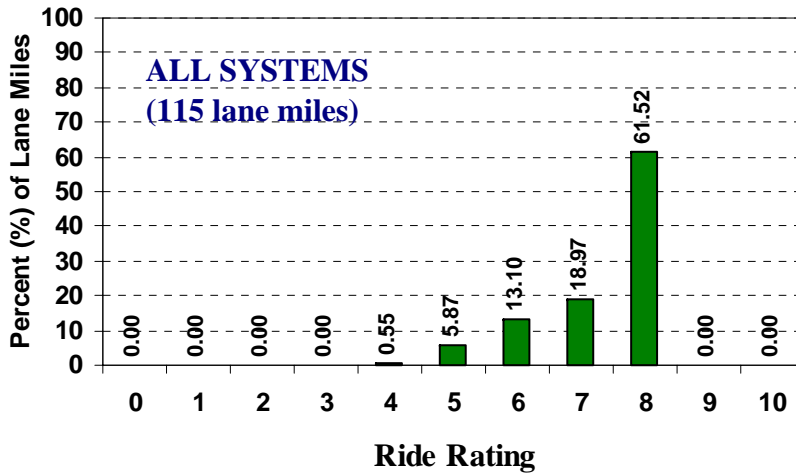
## District 5



Note: No Rigid Pavement on Turnpike System

# 2005 Ride Rating Distribution by System

## District 6

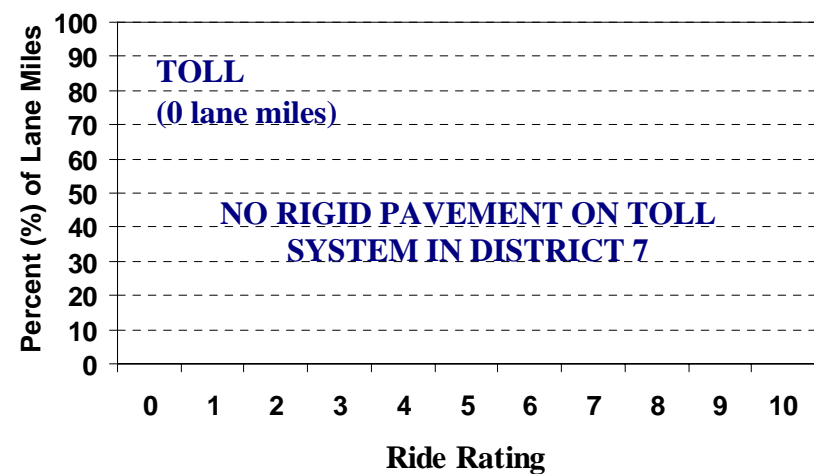
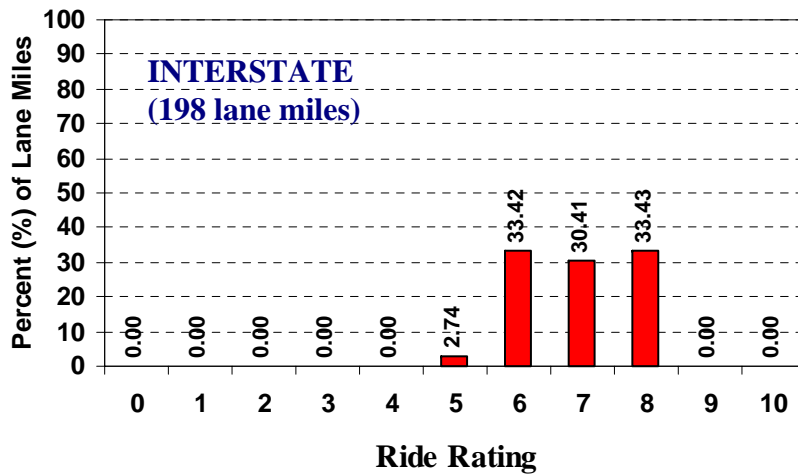
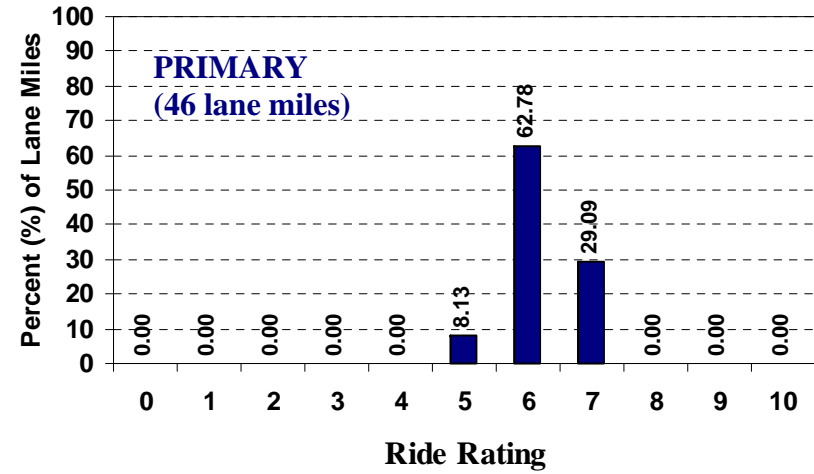
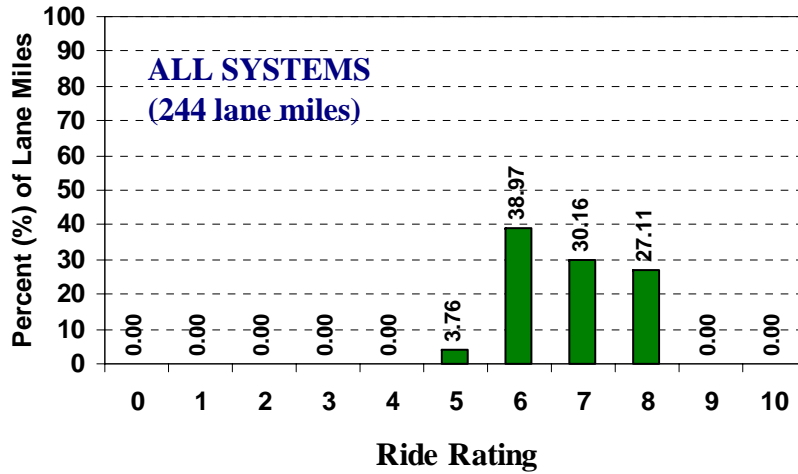


Note: No Rigid Pavement on Turnpike System

# 2005 Ride Rating Distribution by System

## District 7

29



Note: No Rigid Pavement on Turnpike System



**SECTION IV**

**HISTORICAL**

**DISTRESS RATINGS**

**BY**

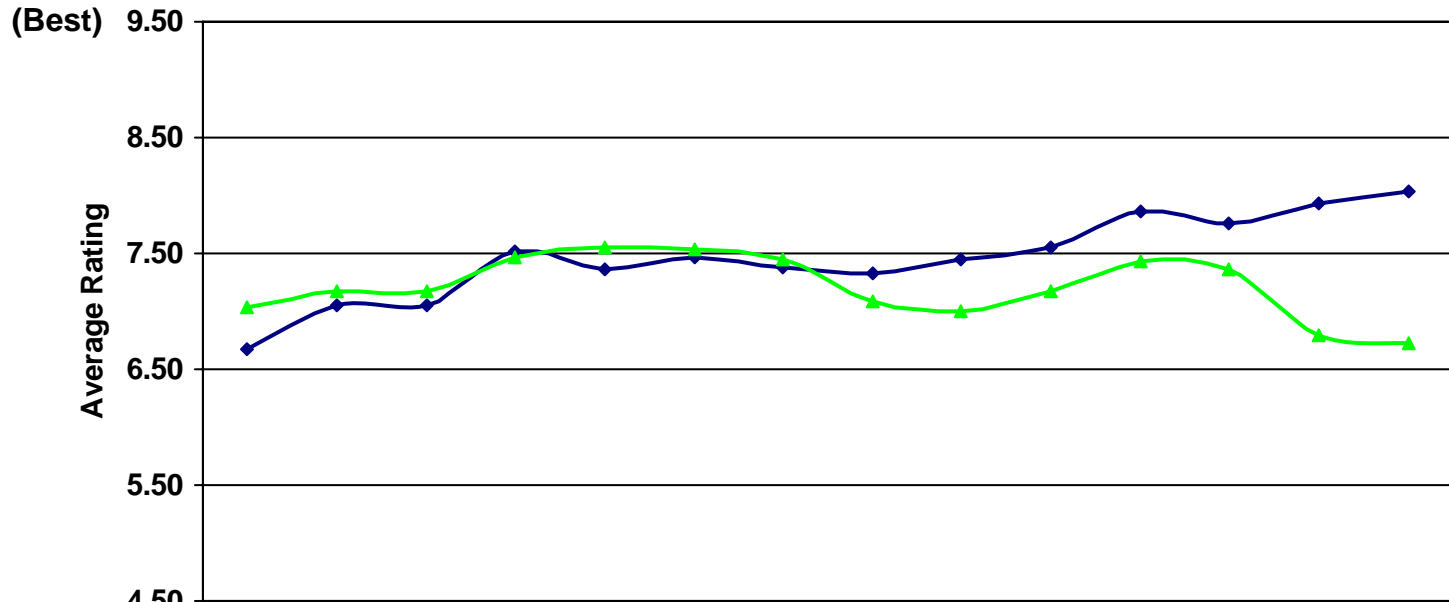
**DISTRICT**

**(1992-2005)**



# Historical Distress Ratings

## Statewide (All Systems)

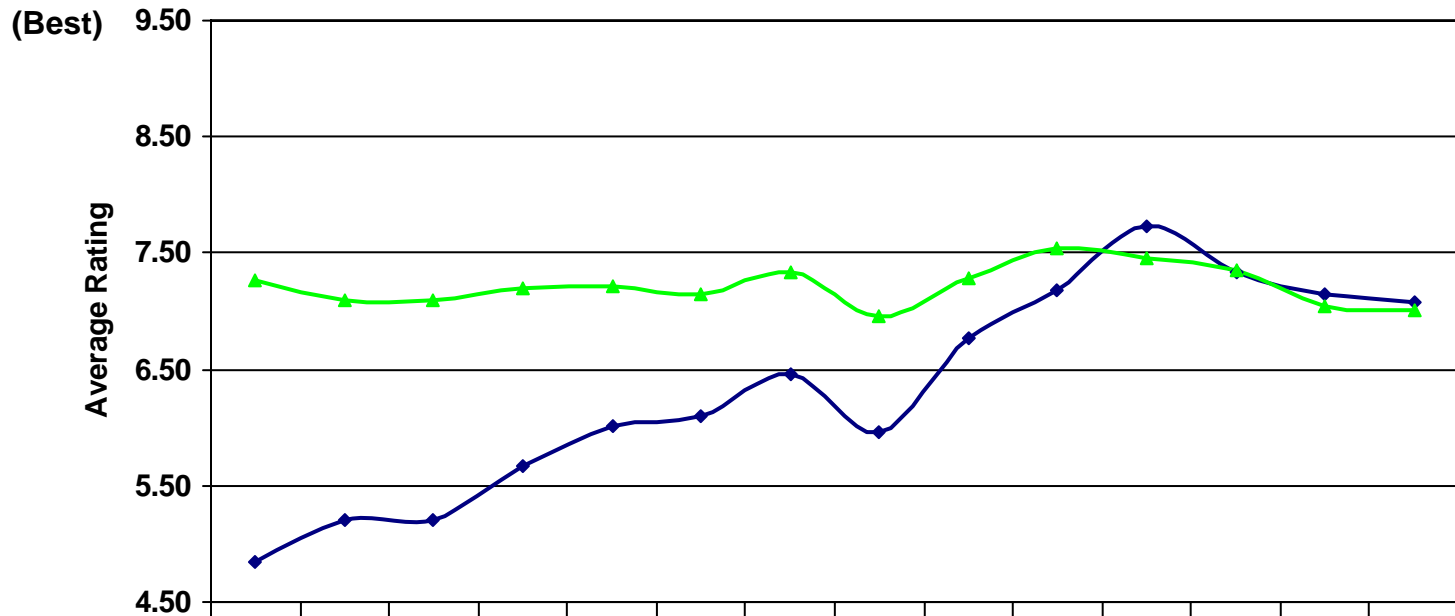


	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	6.67	7.06	7.05	7.51	7.36	7.47	7.38	7.32	7.44	7.56	7.86	7.76	7.93	8.03
▲ Ride Rating (1)	7.03	7.18	7.18	7.46	7.55	7.54	7.44	7.08	7.00	7.17	7.43	7.36	6.79	6.73
Lane Miles Rated	1984	1632	1632	1657	1572	1434	1442	1416	1373	1205	896	903	863	867

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# Historical Distress Ratings

## District 1 (All Systems)

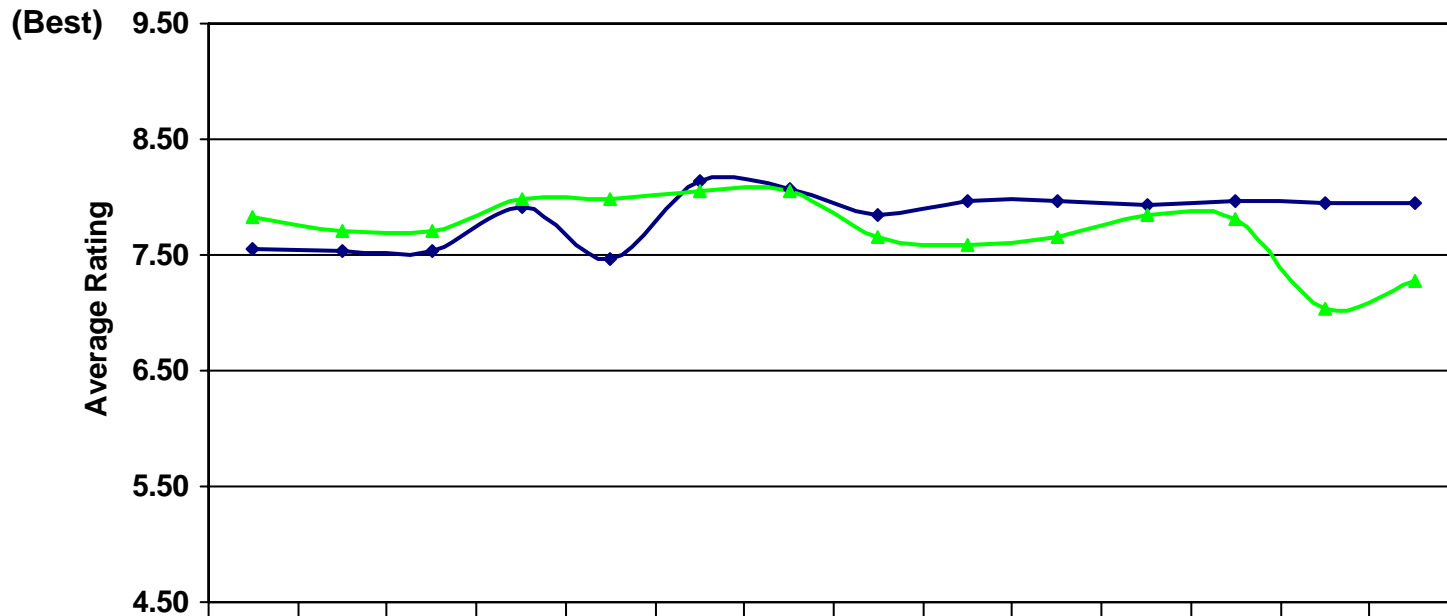


	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	4.85	5.21	5.21	5.66	6.01	6.10	6.46	5.96	6.76	7.18	7.73	7.33	7.15	7.08
▲ Ride Rating (1)	7.27	7.09	7.09	7.19	7.21	7.15	7.33	6.95	7.29	7.54	7.46	7.36	7.04	7.01
Lane Miles Rated	234	198	198	153	153	92	70	59	76	76	76	76	53	51

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# Historical Distress Ratings

## District 2 (All Systems)



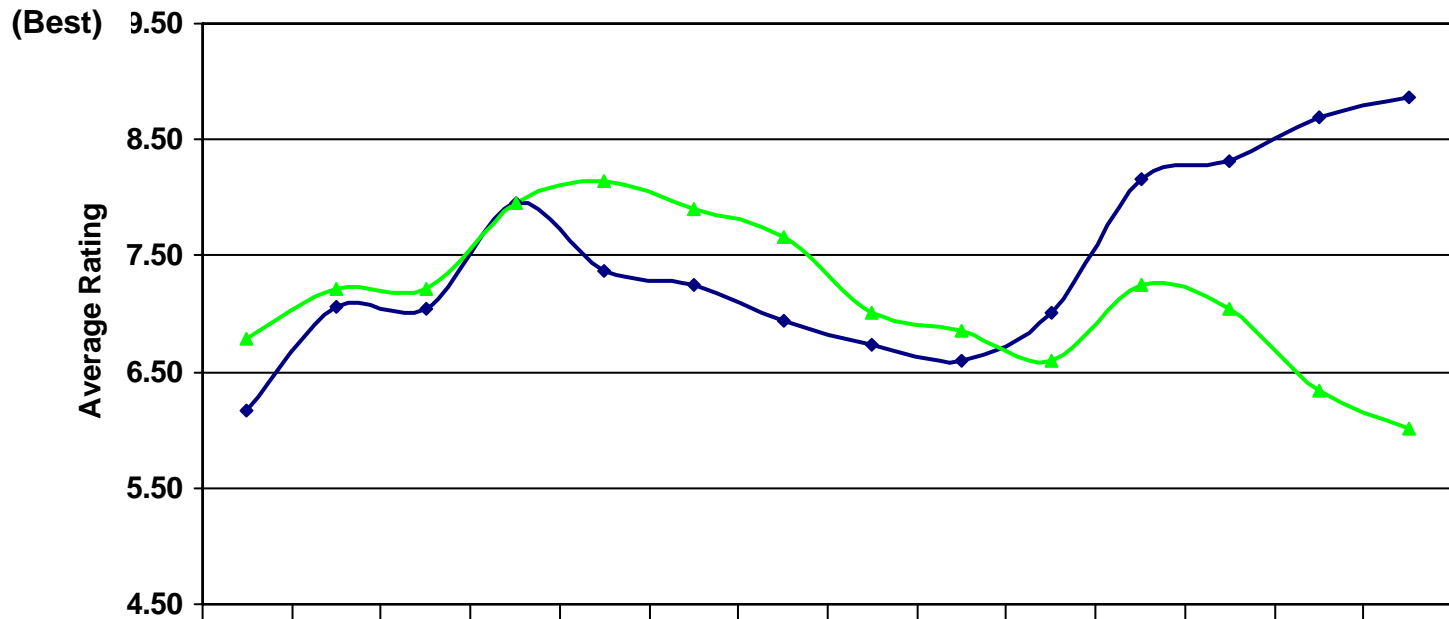
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	7.56	7.53	7.53	7.92	7.46	8.14	8.07	7.84	7.96	7.96	7.93	7.96	7.95	7.95
▲ Ride Rating (1)	7.83	7.70	7.70	7.98	7.98	8.05	8.06	7.66	7.58	7.65	7.84	7.81	7.04	7.27
Lane Miles Rated	213	214	214	200	202	152	147	208	228	216	237	234	235	233

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)



# Historical Distress Ratings

## District 3 (All Systems)

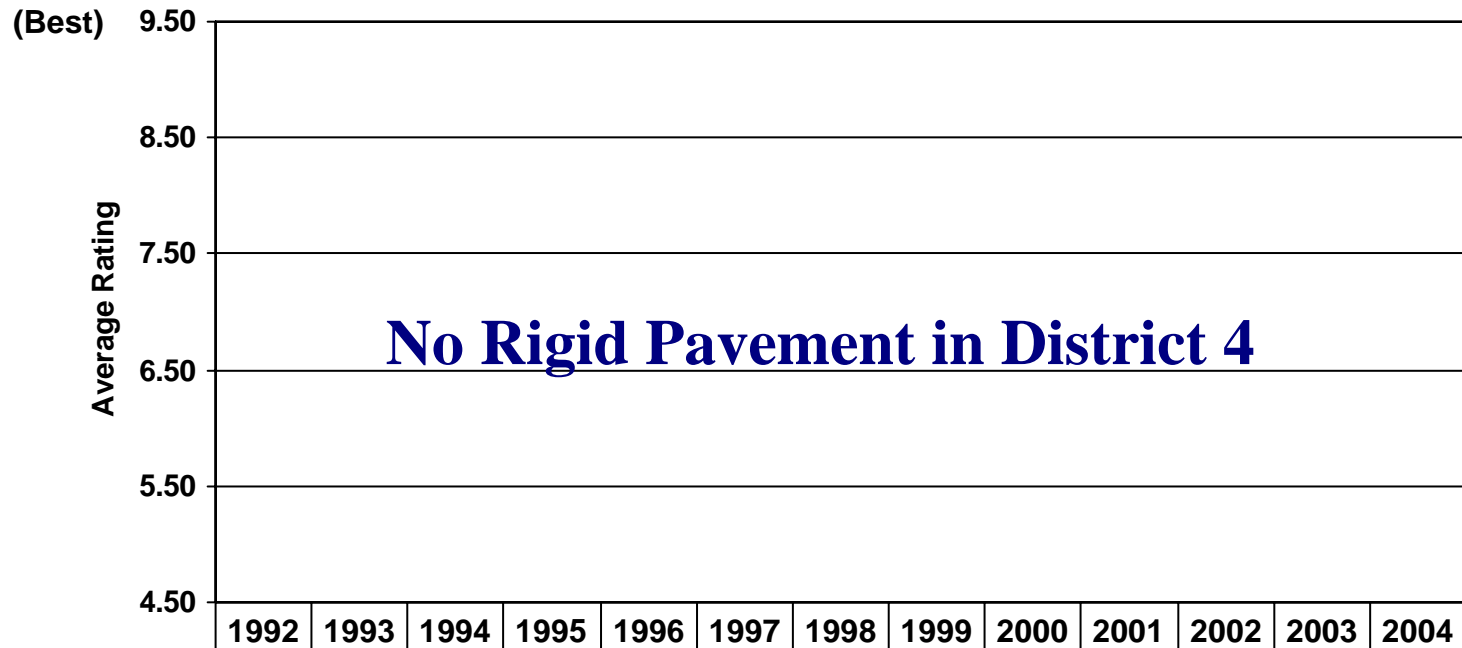


	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	6.17	7.06	7.04	7.95	7.37	7.25	6.94	6.74	6.60	7.01	8.16	8.32	8.69	8.87
▲ Ride Rating (1)	6.78	7.21	7.21	7.95	8.14	7.91	7.67	7.01	6.85	6.59	7.25	7.05	6.33	6.02
Lane Miles Rated	828	524	524	585	520	571	570	516	443	335	38	29	31	15

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# Historical Distress Ratings

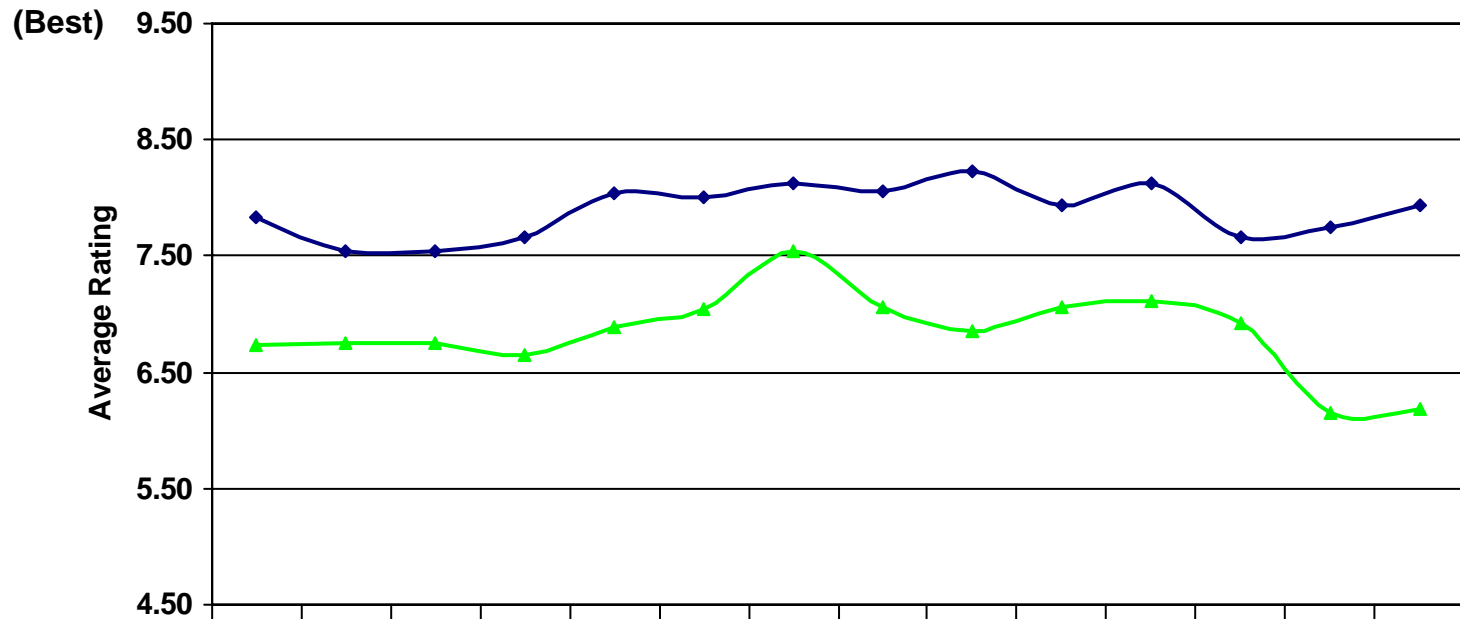
## District 4 (All Systems)



◆ Defect Rating													
▲ Ride Rating													
Lane Miles Rated													

# Historical Distress Ratings

## District 5 (All Systems)

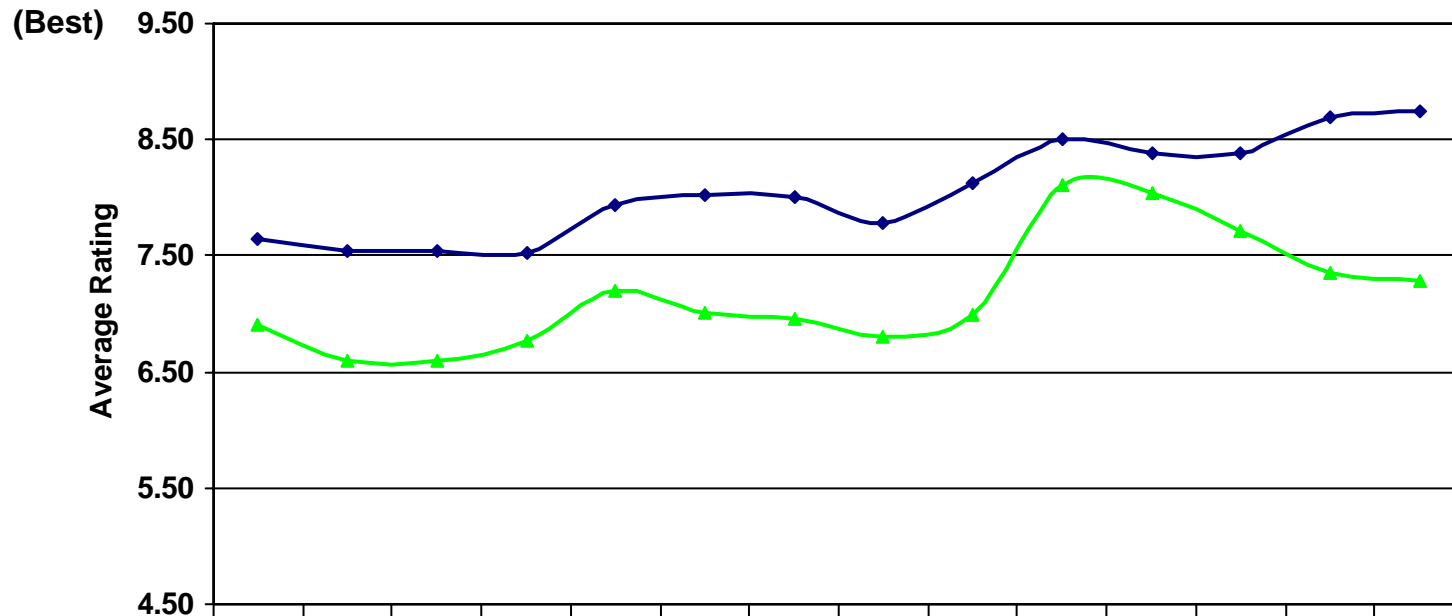


	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	7.83	7.54	7.54	7.66	8.04	8.00	8.13	8.05	8.22	7.94	8.12	7.67	7.75	7.94
▲ Ride Rating (1)	6.73	6.75	6.75	6.65	6.88	7.05	7.54	7.06	6.86	7.06	7.11	6.92	6.15	6.19
Lane Miles Rated	224	212	212	213	194	188	195	197	202	202	194	196	179	205

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# Historical Distress Ratings

## District 6 (All Systems)

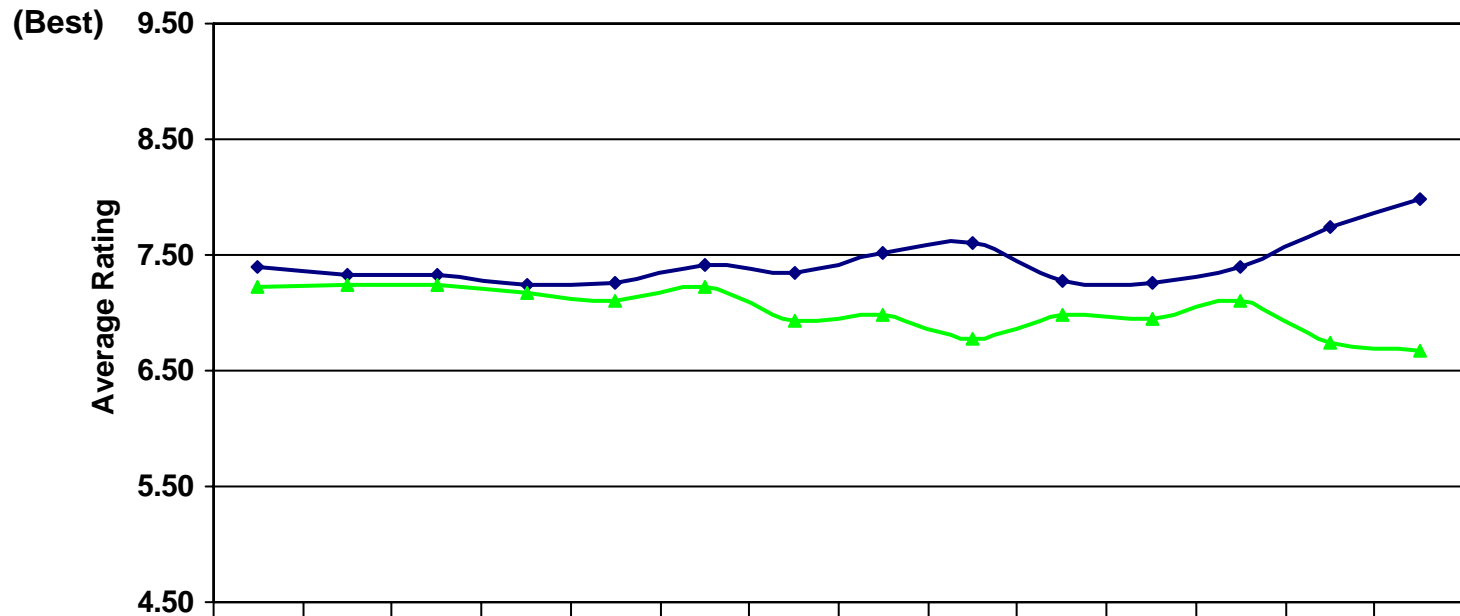


	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	7.65	7.54	7.54	7.53	7.93	8.02	8.01	7.78	8.13	8.51	8.38	8.39	8.69	8.74
▲ Ride Rating (1)	6.90	6.59	6.59	6.77	7.19	7.01	6.95	6.80	7.00	8.11	8.04	7.72	7.36	7.29
Lane Miles Rated	142	142	142	143	140	136	135	155	146	131	129	127	116	116

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# Historical Distress Ratings

## District 7 (All Systems)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ 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	7.75	7.98
▲ Ride Rating (1)	7.22	7.24	7.24	7.18	7.11	7.22	6.93	6.98	6.77	6.99	6.95	7.11	6.75	6.67
Lane Miles Rated	343	342	342	363	363	296	326	281	280	246	223	242	248	247

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)



**SECTION V**

**HISTORICAL**

**DISTRESS RATINGS**

**BY**

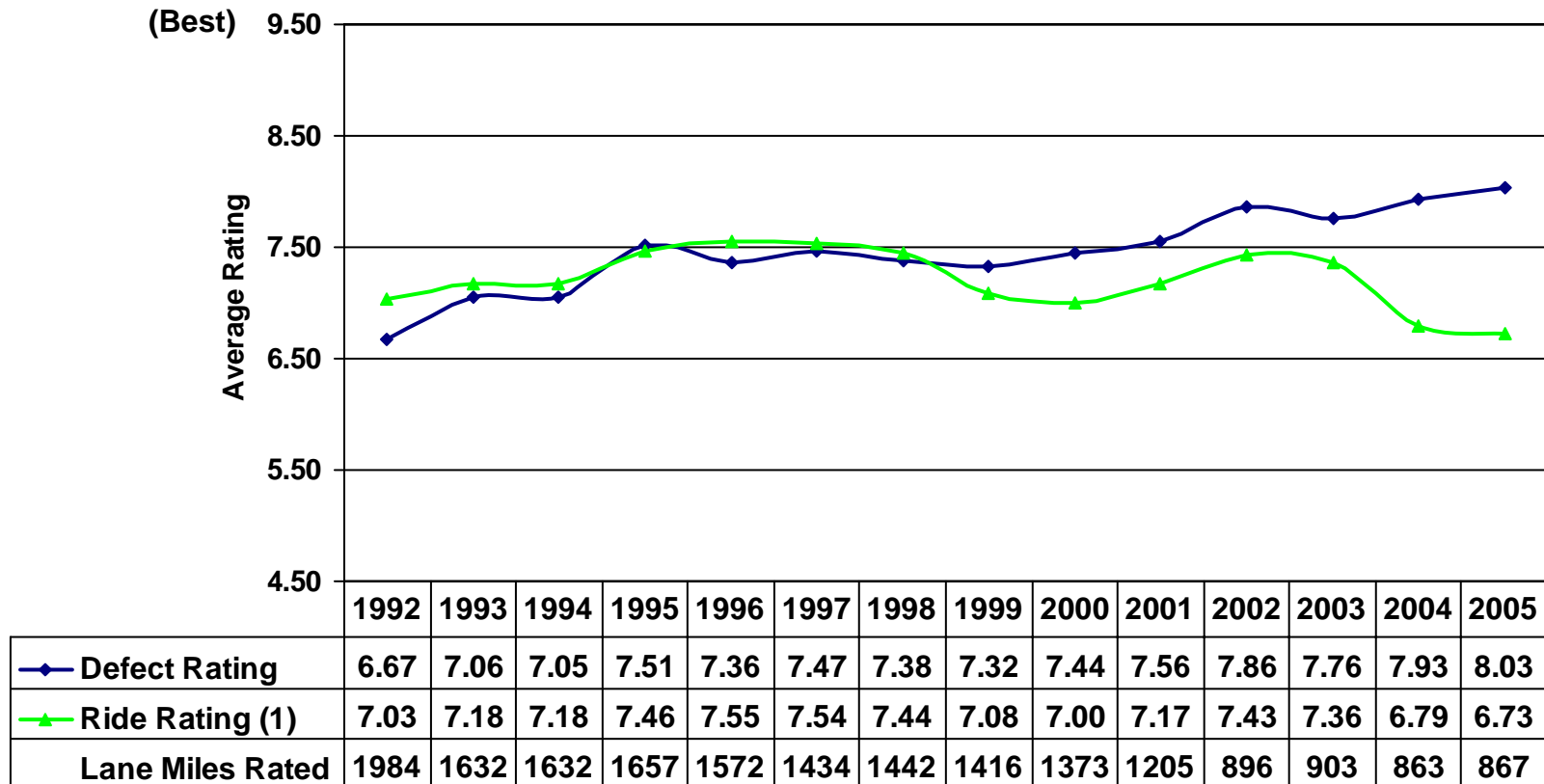
**SYSTEM**

**(1992-2005)**



# Historical Distress Ratings

## All Systems (All Districts)

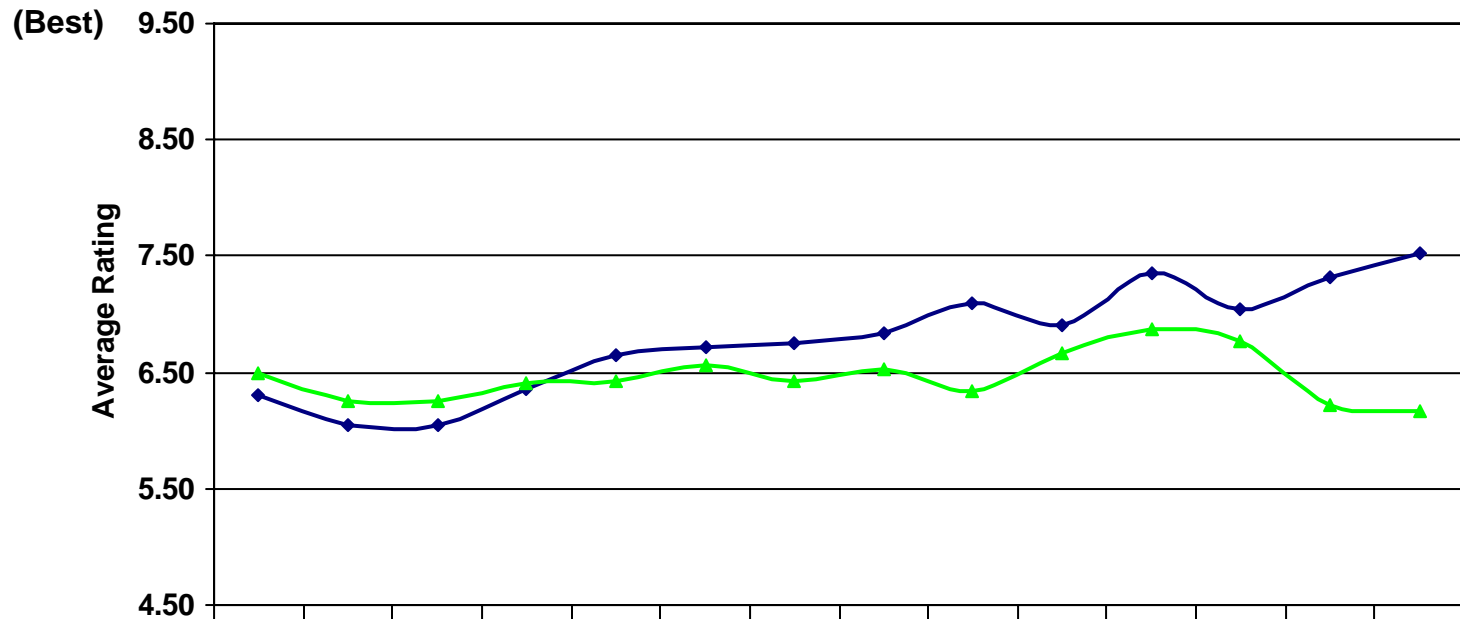


(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)



# Historical Distress Ratings

## Primary System (All Districts)

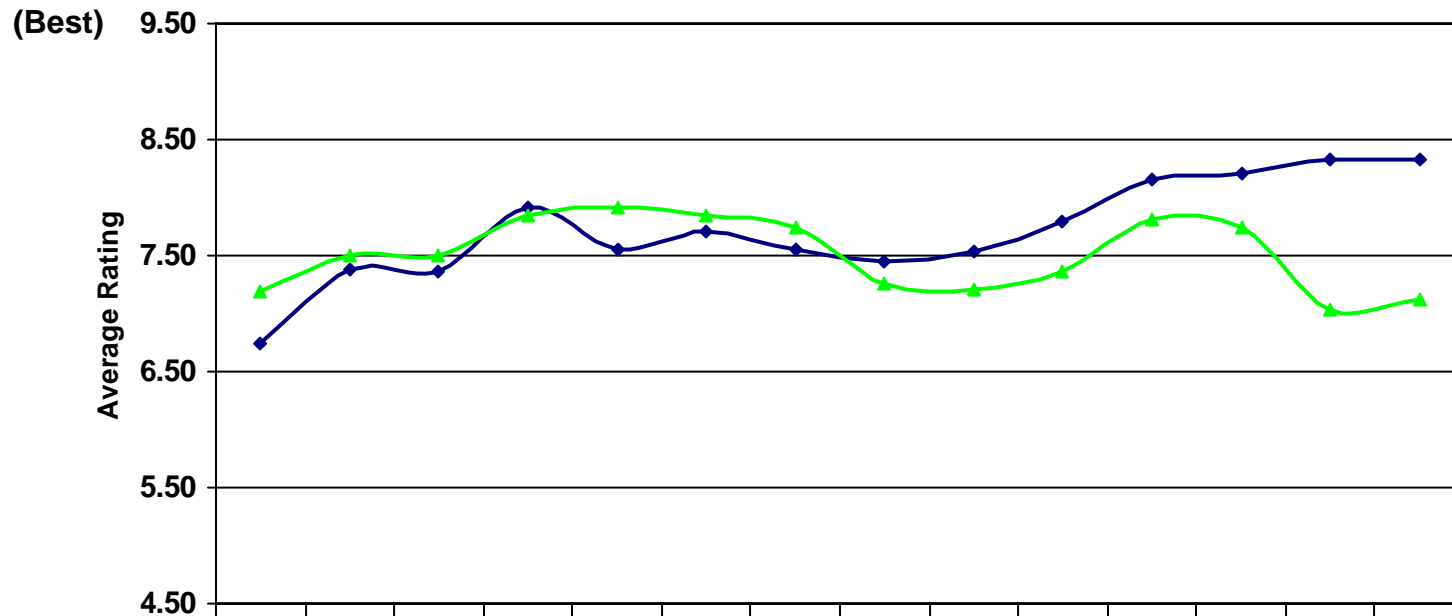


	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	6.30	6.05	6.05	6.35	6.64	6.71	6.75	6.84	7.10	6.90	7.36	7.04	7.31	7.52
▲ Ride Rating (1)	6.49	6.25	6.25	6.40	6.42	6.57	6.43	6.52	6.34	6.66	6.87	6.77	6.22	6.17
Lane Miles Rated	424	409	409	424	375	344	346	350	344	344	352	350	344	339

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# Historical Distress Ratings

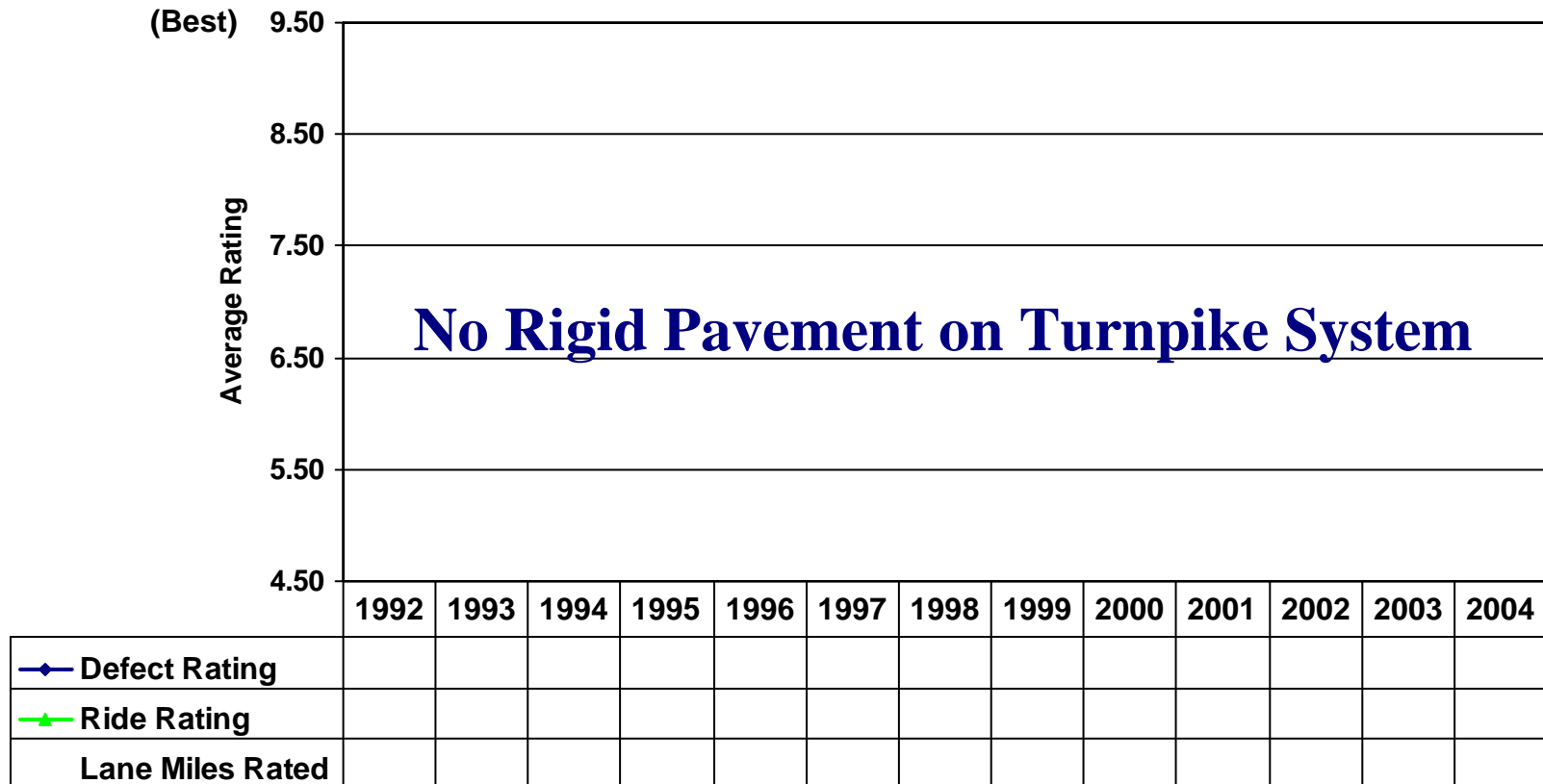
## Interstate System (All Districts)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ 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	8.32	8.33
▲ Ride Rating (1)	7.19	7.50	7.50	7.85	7.91	7.84	7.75	7.26	7.20	7.36	7.81	7.75	7.03	7.12
Lane Miles Rated	1541	1203	1203	1226	1167	1069	1065	1035	998	830	519	529	492	501

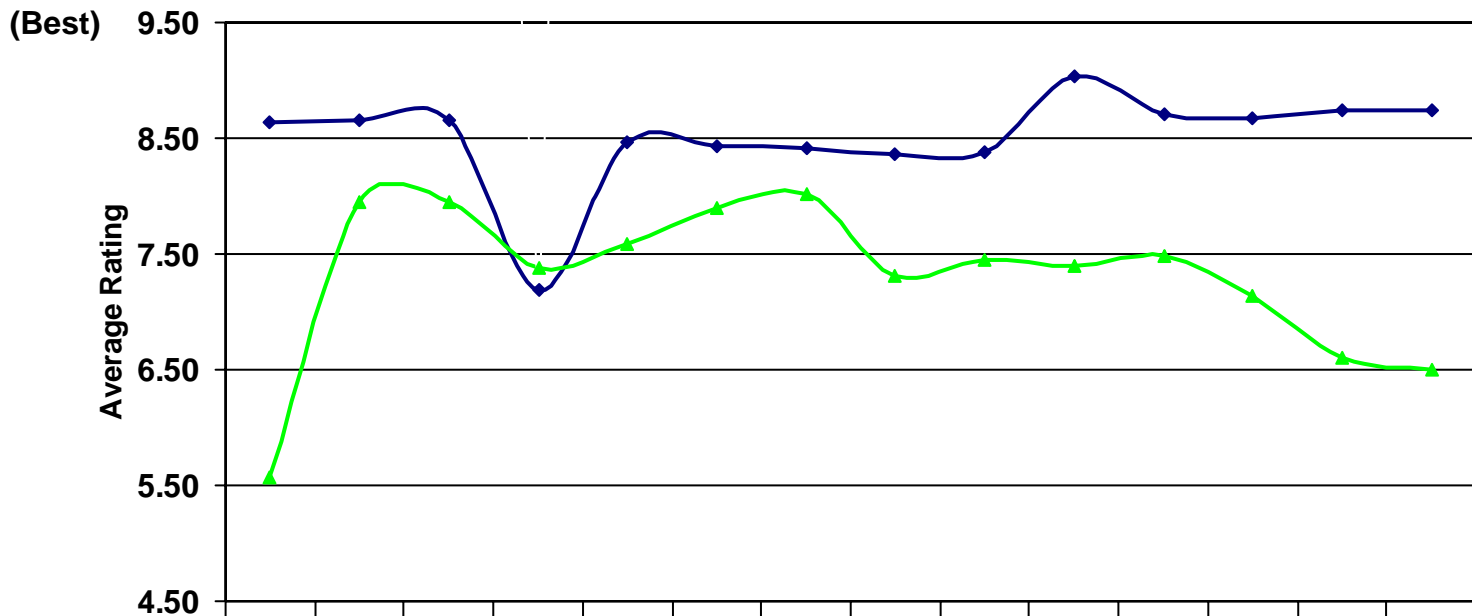
(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# Historical Distress Ratings Turnpike System (All Districts)



# Historical Distress Ratings

## Toll System (All Districts)



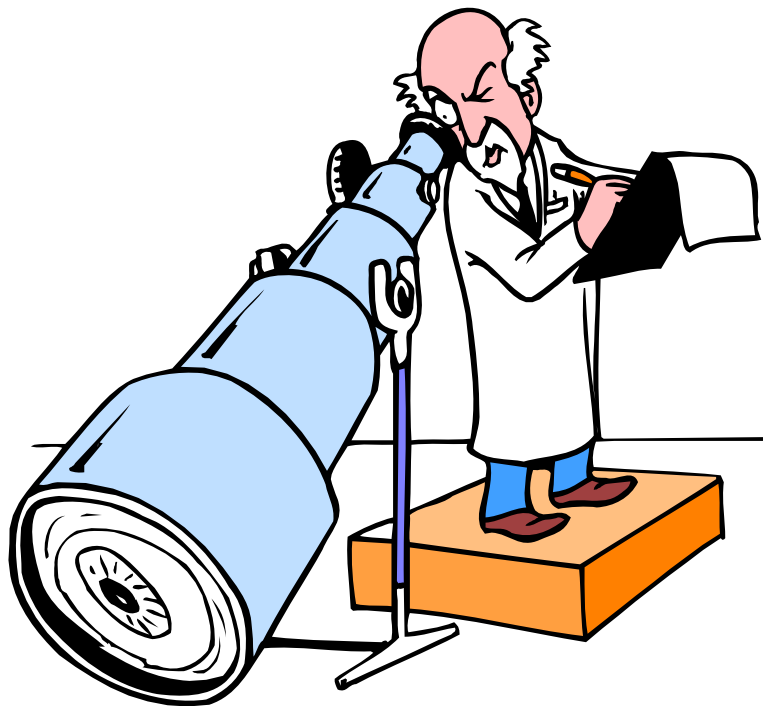
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
◆ Defect Rating	8.63	8.65	8.65	7.19	8.46	8.43	8.41	8.37	8.38	9.03	8.71	8.68	8.74	8.75
▲ Ride Rating (1)	5.57	7.95	7.95	7.38	7.58	7.90	8.02	7.31	7.45	7.40	7.48	7.13	6.60	6.50
Lane Miles Rated	20	20	20	7	31	21	31	31	31	31	25	25	27	27

(1) Please note that beginning with the 2004 PCS, the Ride Rating data was collected using a sampling rate of 6 inch intervals. (Refer to Item 2 under Observations, on page 4.)

# SECTION VI

## DEFECT AND RIDE RATING COMPARISON

2004 VS. 2005



# **SECTION VI**

## **Defect and Ride Rating Comparison**

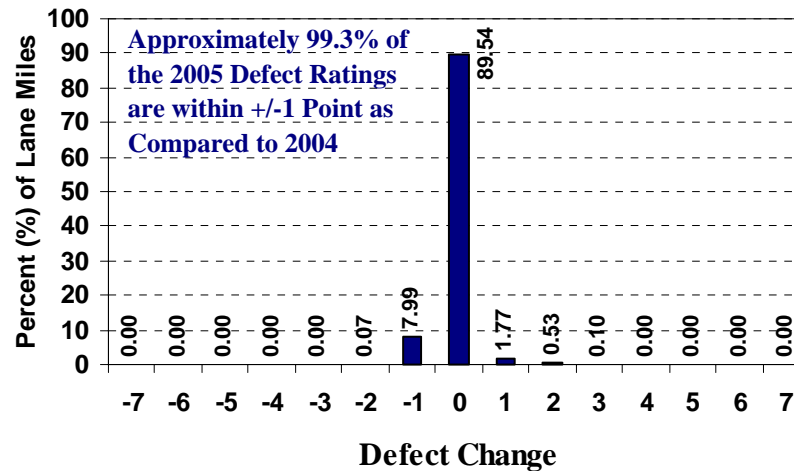
### **Rating Comparison Criteria**

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 improvements without new construction, such as intersection improvement, 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 and Ride Rating Comparison

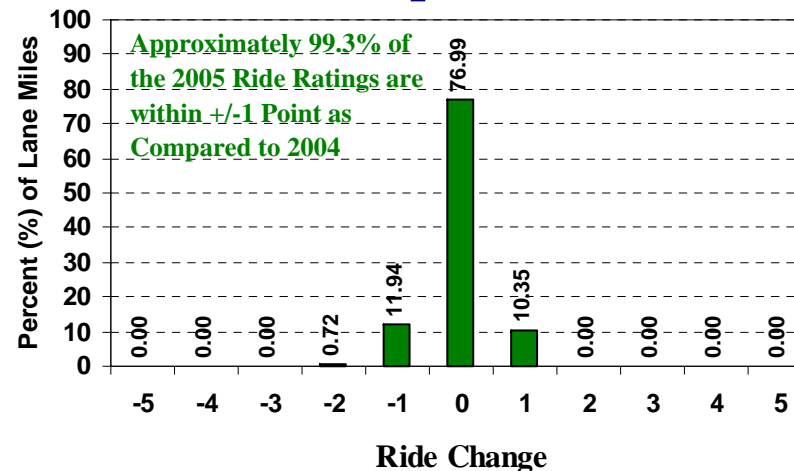
## Defect Rating Change (2005 compared to 2004)



NEGATIVE VALUES ARE INDICATIVE OF THE DETERIORATION IN THE PAVEMENT AND/OR THE VARIABILITY IN THE DATA COLLECTION PROCESS

POSITIVE VALUES ARE INDICATIVE OF THE VARIABILITY IN THE DATA COLLECTION PROCESS

## Ride Rating Change (2005 compared to 2004)



# 2005 Rigid Pavement Condition Survey

## Facts and Figures

### Customer Service Form

In an effort to continuously improve customer service, the Pavement Material Systems Division asks for your input by filling out and returning this survey form.

*(Optional)*

Your name: \_\_\_\_\_ Title: \_\_\_\_\_

Company/Office/Organization: \_\_\_\_\_

Address: \_\_\_\_\_ City/State/Zip: \_\_\_\_\_

Phone: (\_\_\_\_)\_\_\_\_\_ — SunCom: \_\_\_\_\_ e-mail: \_\_\_\_\_

*Please rate each of the following on the scale provided. **One** corresponds to **Very Poor**, and **Five** corresponds to **Excellent**.*

Usefulness of Content..... 1 2 3 4 5

Organization of Information ..... 1 2 3 4 5

Clarity of Graphical Illustrations ..... 1 2 3 4 5

Format of Tables ..... 1 2 3 4 5

Overall Value of this Report ..... 1 2 3 4 5

*Please provide an answer to the following questions. Attach an additional sheet(s) if needed.*

What was the most useful/informative part of this report? \_\_\_\_\_  
 \_\_\_\_\_

What was the least useful/informative part of this report? \_\_\_\_\_  
 \_\_\_\_\_

What changes do you recommend to improve this report? \_\_\_\_\_  
 \_\_\_\_\_

Detach and mail to:  
**State Materials Office**  
**Attn: Abdenour Nazef**  
**5007 NE 39<sup>th</sup> Ave.**  
**Gainesville, FL 32609**

Or send via email to: [abdenour.nazef@dot.state.fl.us](mailto:abdenour.nazef@dot.state.fl.us)