

# ***STATE OF FLORIDA***



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**1998**  
**FLEXIBLE PAVEMENT**  
**CONDITION SURVEY**  
**FACTS & FIGURES**  
**FL/DOT/SMO/98-421**

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**April 1998**  
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## Executive Summary

Since 1985, the Pavement Evaluation Section of the State Materials Office has been charged with the responsibility for the Department's Annual Pavement Condition Survey. The Survey is conducted on 100% of the State-maintained Highway System. Since the mileage of flexible pavements represents approximately 96% of the entire System, the facts and figures contained in this report are for flexible pavements only.

The purpose of the Survey is to provide the Department with a means for determining the present condition of the State Roadway System and for comparing present and past conditions in order to predict deterioration rates. In addition, the Survey can be used to predict rehabilitation funding needs and to provide justification for annual rehabilitation and distribution of budgets.

The worst lane in each direction is tested, and pavement sections are determined by construction limits or uniform conditions. Ride rating and Rut rating data are collected with four road profilers, while Cracking is subjective and collected visually. Cracking is rated by severity levels and quantities for both the wheel path area and the remaining area of the lane. It requires approximately 25 weeks of travel each year to complete the Survey.

After the Survey is completed, the data collected are reviewed by the Pavement Evaluation Section of the State Materials Office and then are sent to the Central Pavement Management Office for additional review and editing. After this, the Central Program Development Office becomes responsible for reporting the condition of the State-maintained Highway System for Pavement Management purposes.

Since 1992, it is observed that Crack and Ride values have remained constant for the past five years. However, the average Rut depth value has improved. In addition, the Crack, Rut and Ride ratings from this year and the year before proved to be highly consistent. When comparing Crack ratings from this year to the previous year, 91% of the ratings were within  $\pm 1$  rating point. Approximately 99% of the Rut and Ride ratings were within  $\pm 1$  rating point.

- L Note: The information contained and presented in this report is based on the Pavement Condition Survey, and are not the Department's final figures.

# SECTION I

## Introduction

The Pavement Evaluation Section of the State Materials Office is responsible for the Department's Annual Pavement Condition Survey. The Survey is conducted on 100% of the State-maintained Highway System. Since the mileage of flexible pavements represents approximately 96% of the entire System, the facts and figures contained in this report are for flexible pavements only.

The Survey is completed each year by a highly trained and experienced engineering staff, and requires about 25 weeks of travel each year to complete. Although the number of survey engineers has decreased, the number of miles surveyed since 1986 has increased by 17% (refer to chart on page 5). The purpose of the Survey is to provide the Department with a means to:

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

The Crack, Rut, and Ride deficiencies are surveyed to evaluate the condition of the pavements. For each deficiency the pavement sections are rated on a zero to ten scale, where ten indicates a section in excellent condition. Currently, any section with a rating of six or less would become eligible for rehabilitation.

Cracking is measured visually and is a subjective survey which is performed either from the roadway or from the shoulder. Rut and Ride are measured using an automated vehicle-mounted instrument called a Profiler that measures the longitudinal profile of the roadway. This state-of-the-art equipment has to be well maintained and routinely calibrated to ensure maximum accuracy of the data collected. For detailed information about the Pavement Condition Surveys, please refer to the Rigid and the Flexible Condition Survey Handbooks.

After the Survey is completed, the data collected are reviewed by the Pavement Evaluation Section of the State Materials Office and then sent out to the Central Pavement

Management Office for additional review and editing. After this, the Central Program Development Office becomes responsible for reporting the condition of the State-maintained Highway System for Pavement Management Purposes.

## Observations

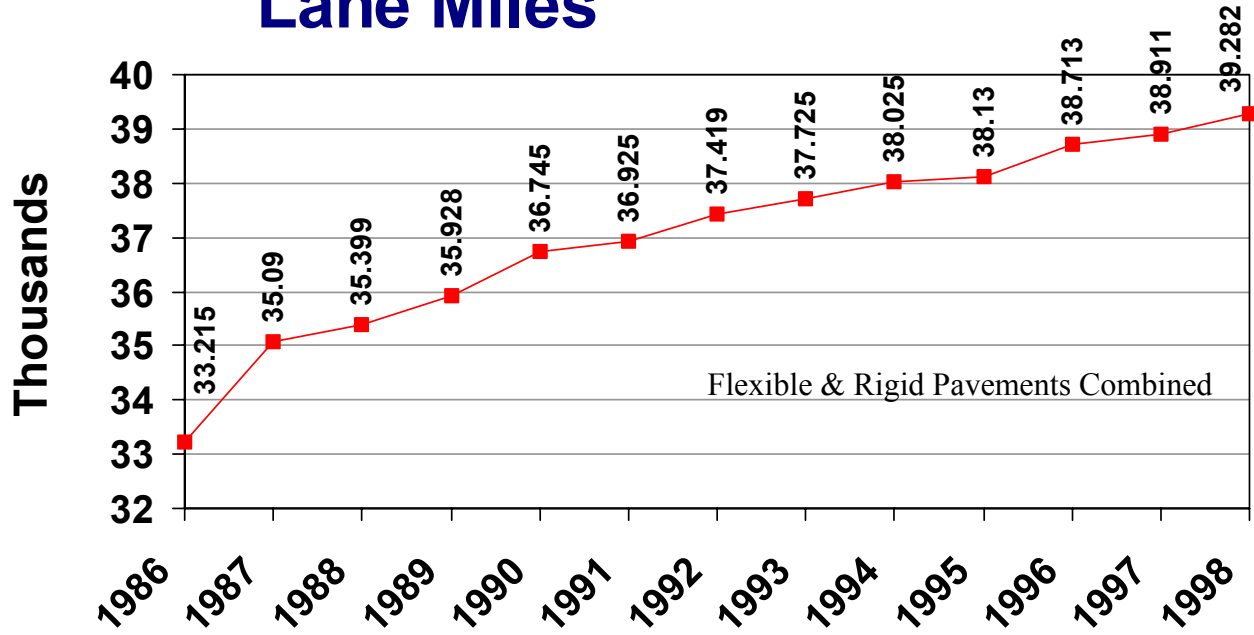
- ! Crack ratings have remained stable for the past seven years.
- ! Rut depth values for the State-maintained System have improved.
- ! Ride values for the State-maintained System have remained constant.
- ! 91.2% of this year's Crack ratings were within  $\pm 1$  point as compared to the previous year's.(\*)
- ! 98.6% of this year's Rut ratings were within  $\pm 1$  point as compared to the previous year's.(\*)
- ! 99.7% of this year's Ride ratings were within  $\pm 1$  point as compared to the previous year's.(\*)

(\* ) Sections under pavement rehabilitation were excluded.

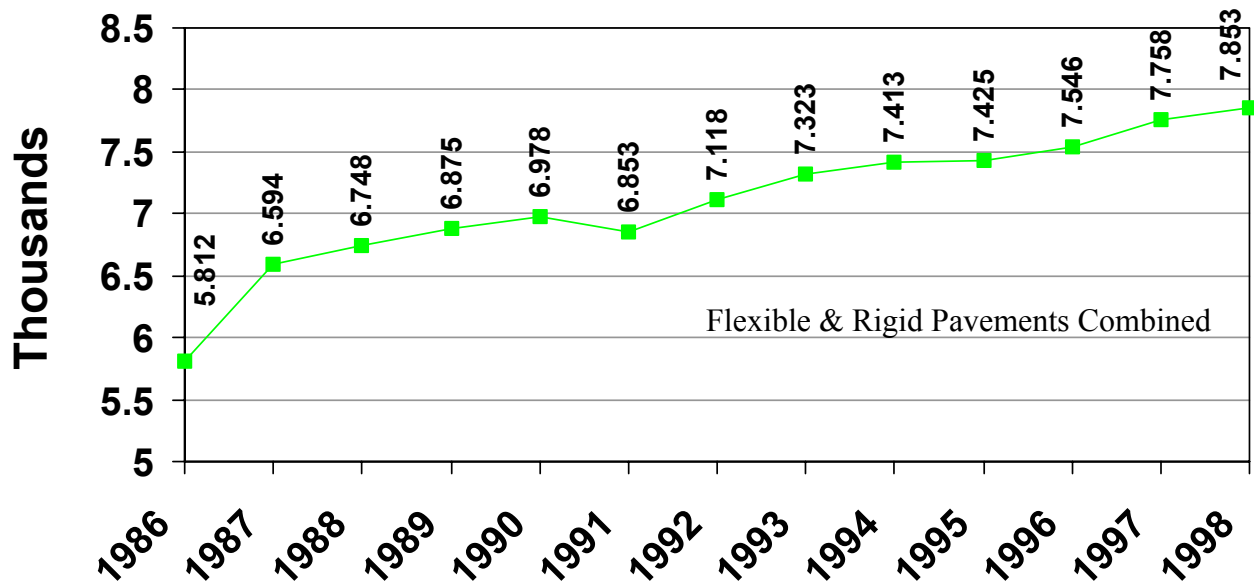
## General Methodology

- ! For multi-lane roadways: The worst lane in each direction is tested (normally that is the outermost traffic lane).
  - ! For two-lane roadways: The worst lane is tested (normally the same lane that was tested the previous year).
  - ! Pavement sections are determined by construction limits or uniform conditions.
  - ! Ride rating and Rut rating data are collected with four road profilers.
  - ! Crack rating is subjective and collected visually (performed from windshield or shoulder).
  - ! Cracking is rated by severity levels and quantities for both the wheel path area and outside remaining area of the roadway.
- L Note: The information contained and presented in this report is based on the Pavement Condition Survey, and are not the Department's final figures.

## Lane Miles



## Rated Sections

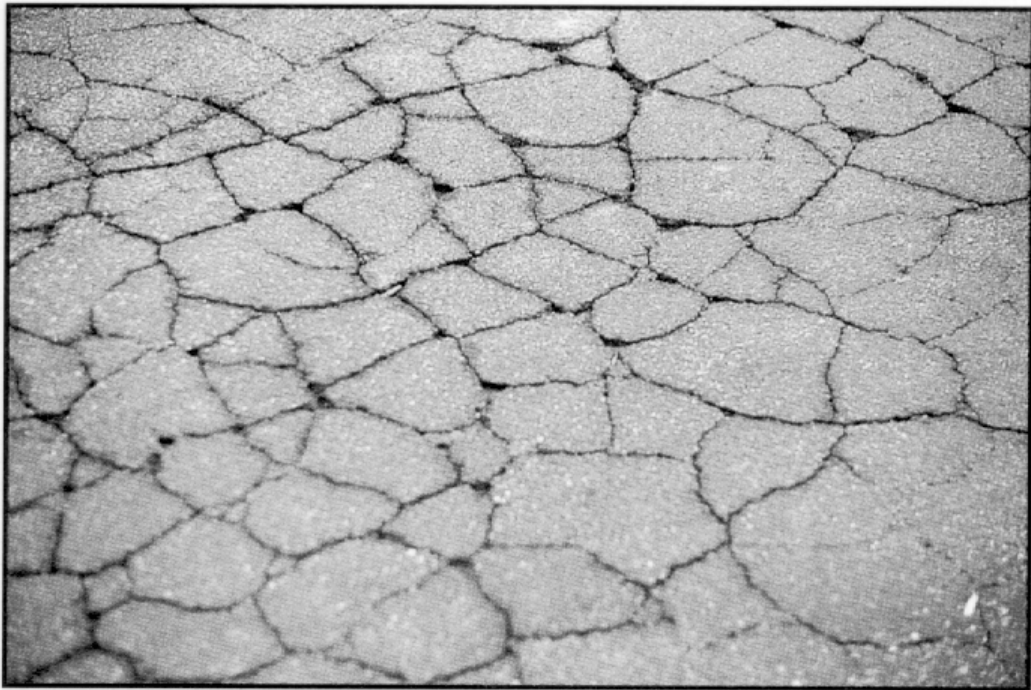


## **SECTION II**

### **CRACK RATING**

**BY**

**SYSTEM AND DISTRICT**





## SECTION II

### Crack Rating by System and District

#### Crack Rating Criteria

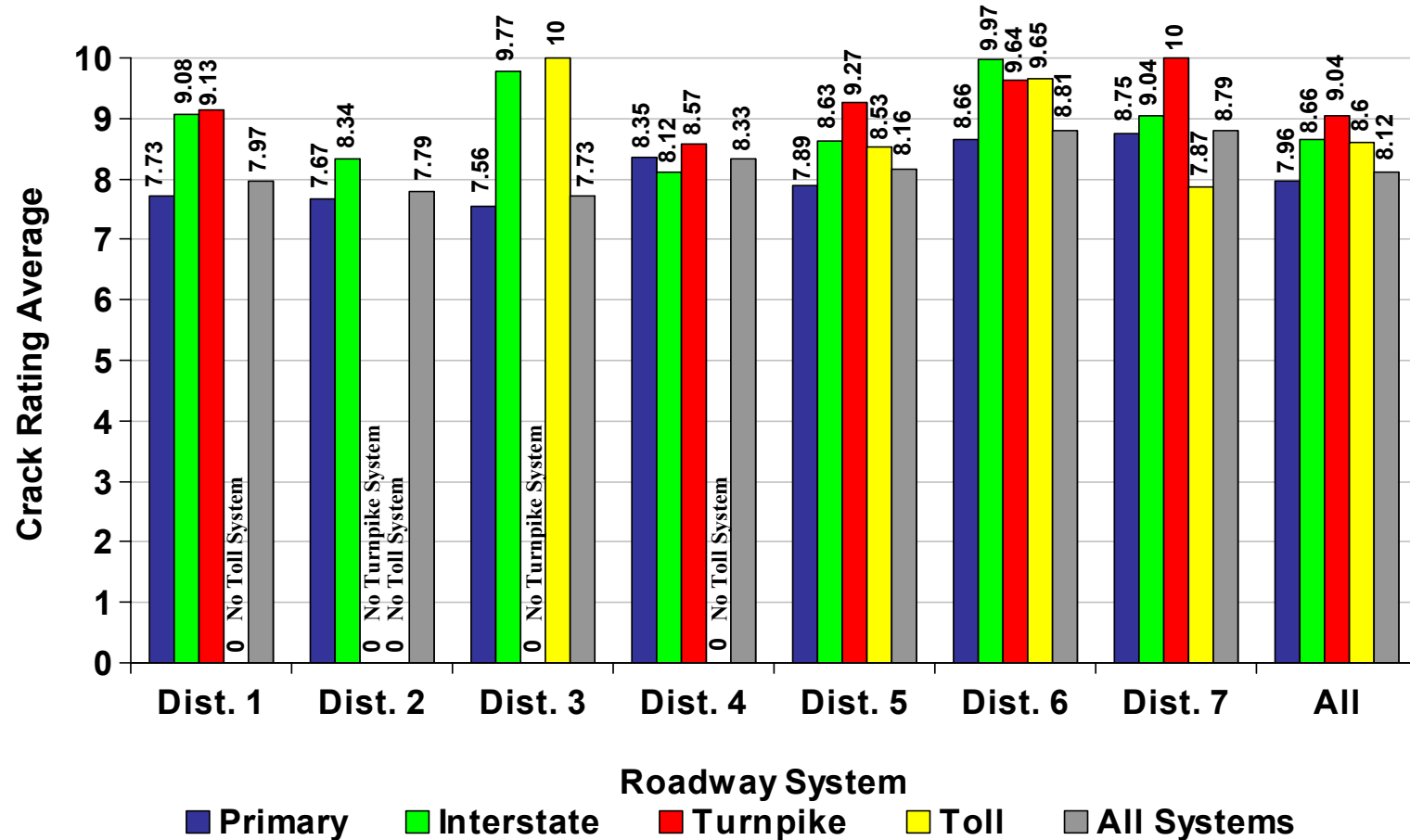
- ! Cracking is estimated as percentages of areas within the wheel paths (CW) and outside of the wheel paths (CO). These percentages are estimated separately for each of the two areas.
- ! Three types of cracking are rated depending upon severity levels.
- ! Only the predominate type of cracking is used to determine the deduct values. However, the percentages of all types of cracking are used to calculate the percentage of pavement cracked.
- ! Cracking Deficiency is rated on a zero to ten scale, where ten is best. Currently, a rating of seven or less makes a section of the Interstate, Turnpike, or Toll Systems eligible for rehabilitation, while a rating of six or less applies to the Primary System.
- ! The Cracking Deficiency Rating is subtracted from a perfect score of 10.

$$\text{Cracking Deficiency Rating} = 10 - (CW+CO)$$

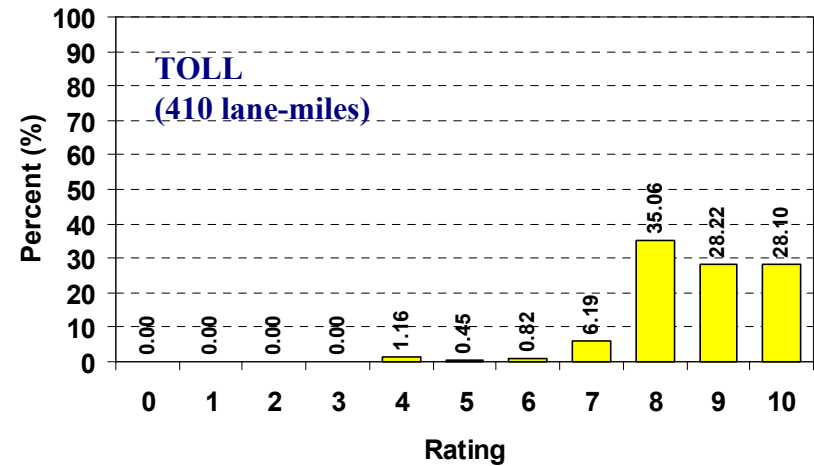
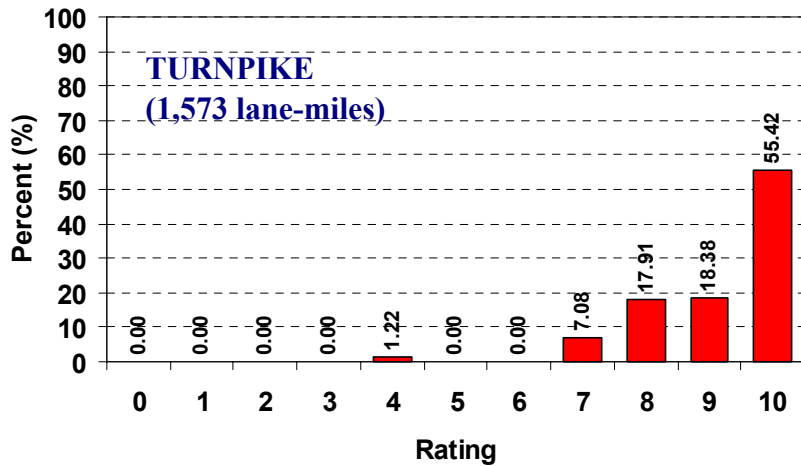
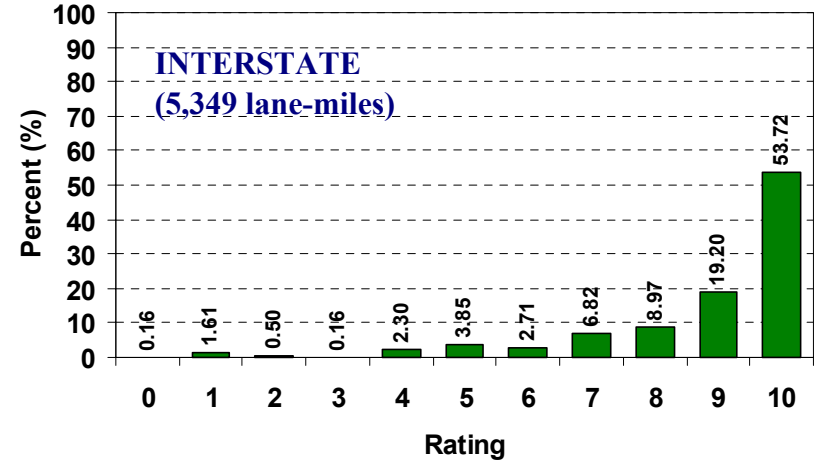
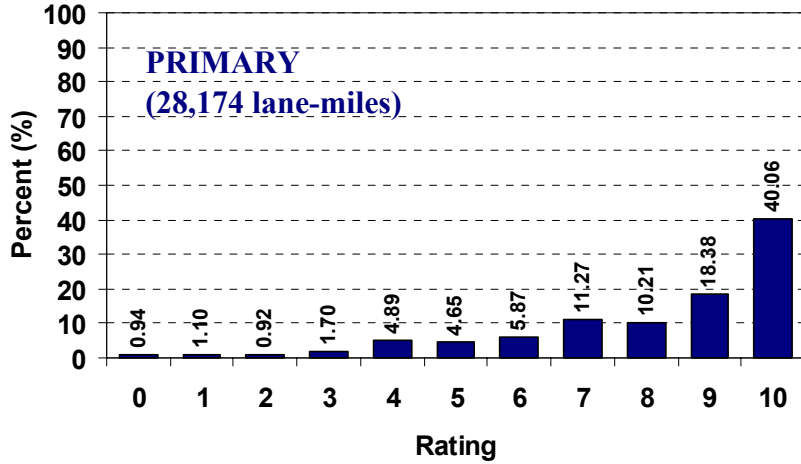
Where: CW and CO are numerical factors for Cracking within to the wheel paths (CW) and outside of the wheel paths (CO). These factors are based on the severity and extent of the type of cracking.

# Crack Ratings by System and District

## 1998 Flexible Pavement Condition Survey



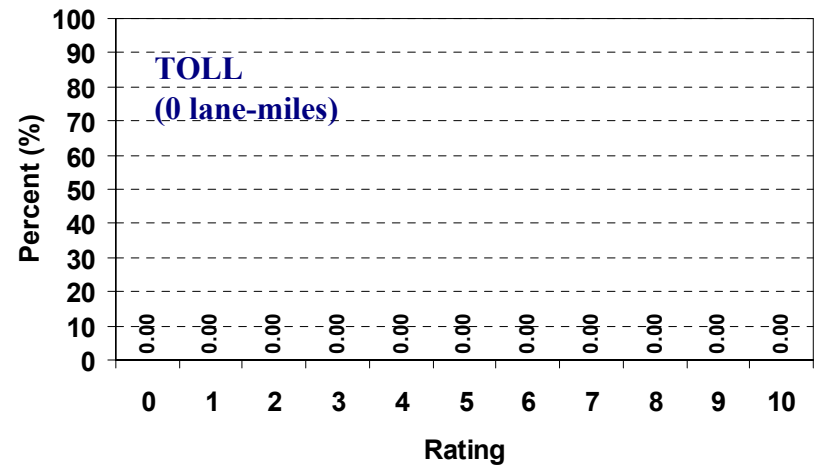
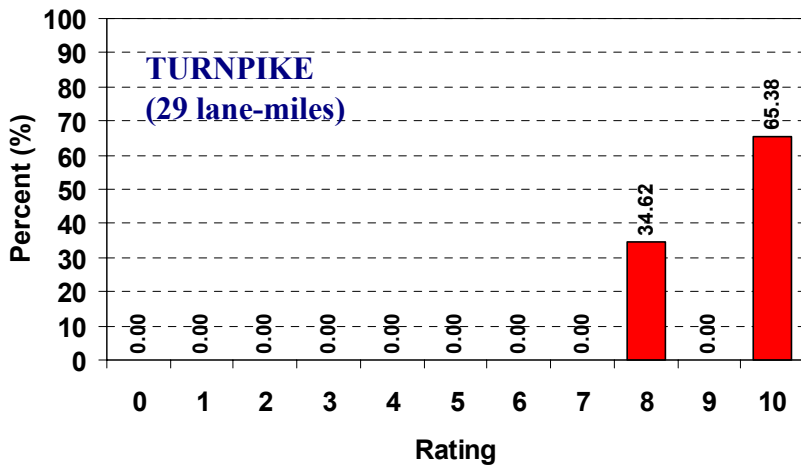
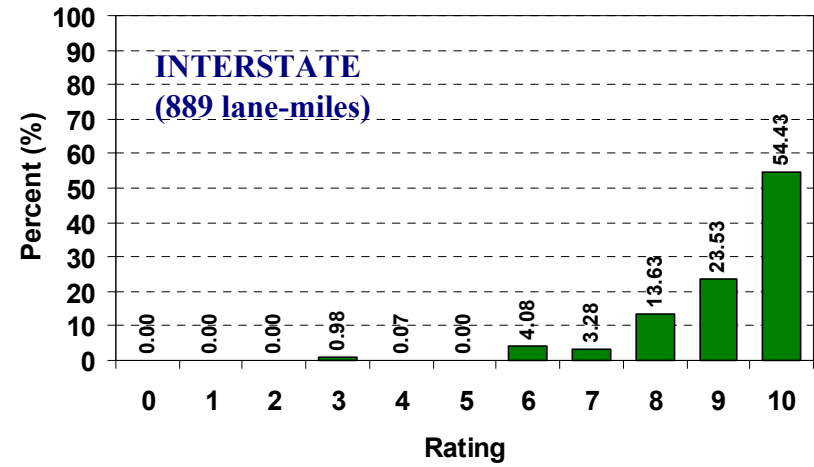
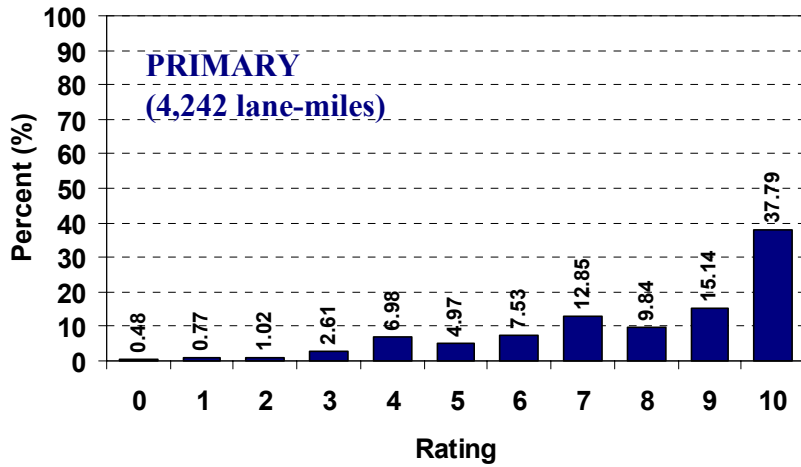
# Crack Distribution by System Statewide



1998 Data

# Crack Distribution by System

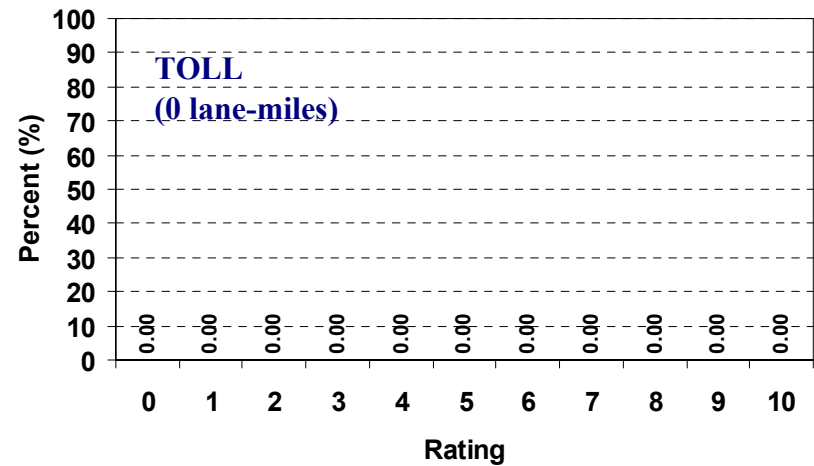
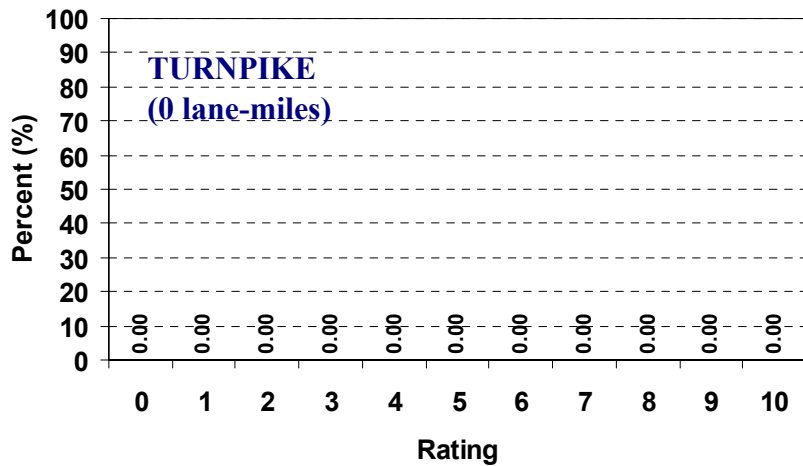
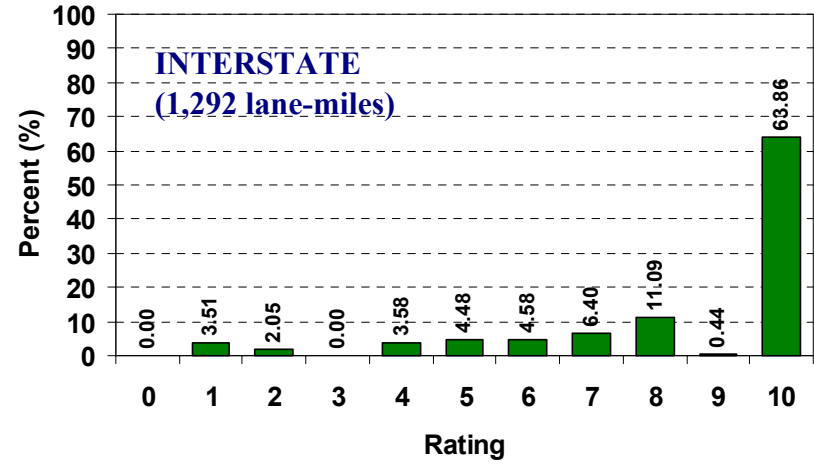
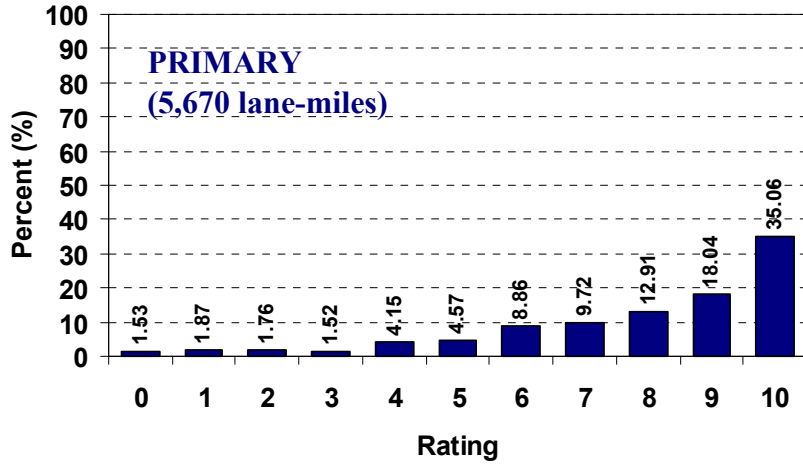
## District 1



1998 Data

# Crack Distribution by System

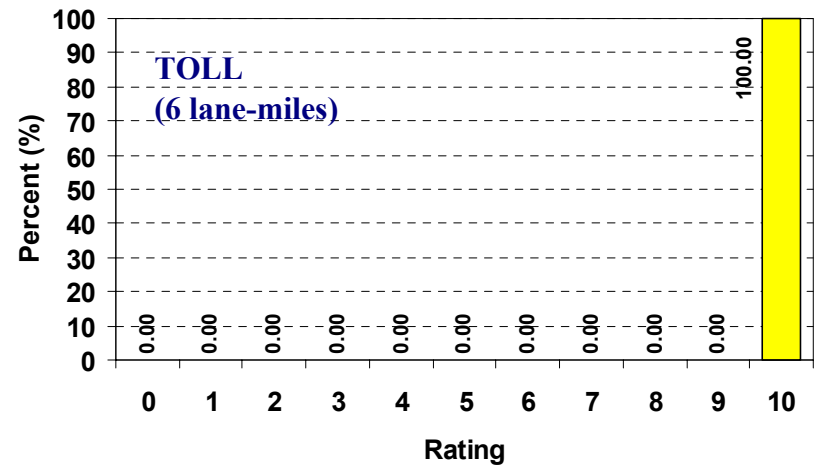
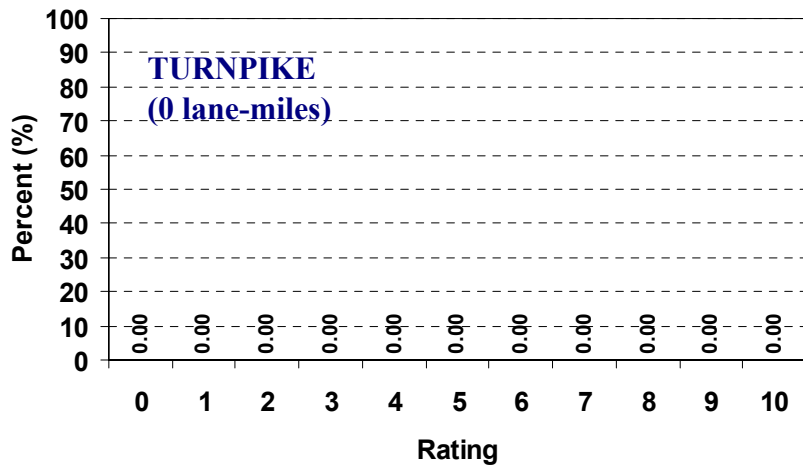
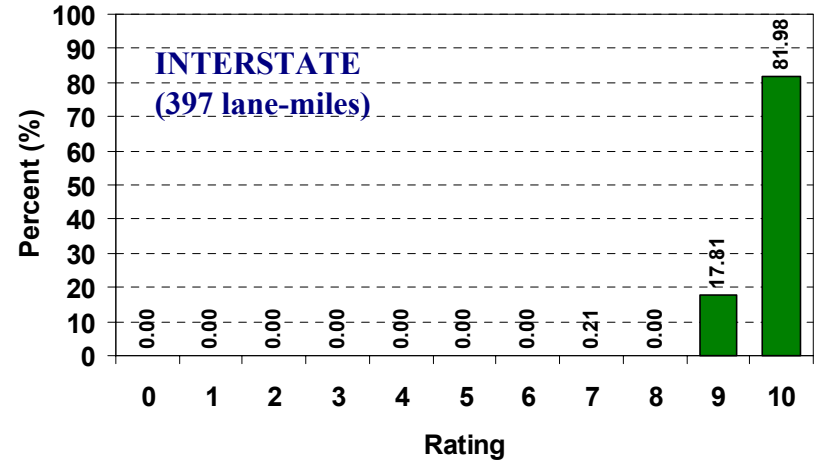
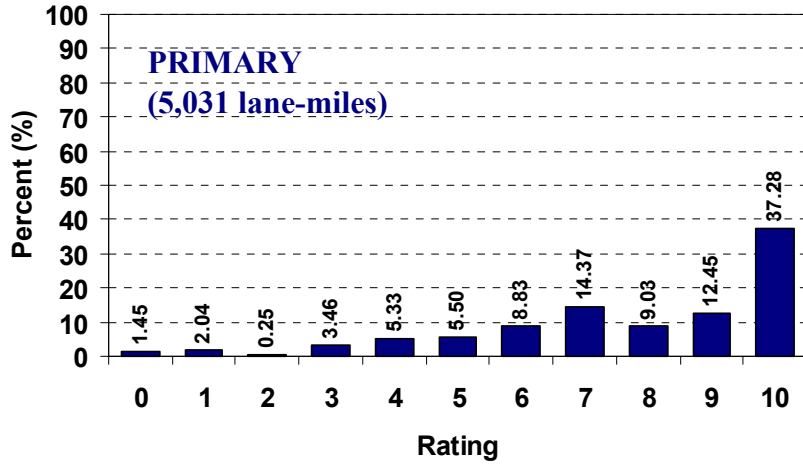
## District 2



1998 Data

# Crack Distribution by System

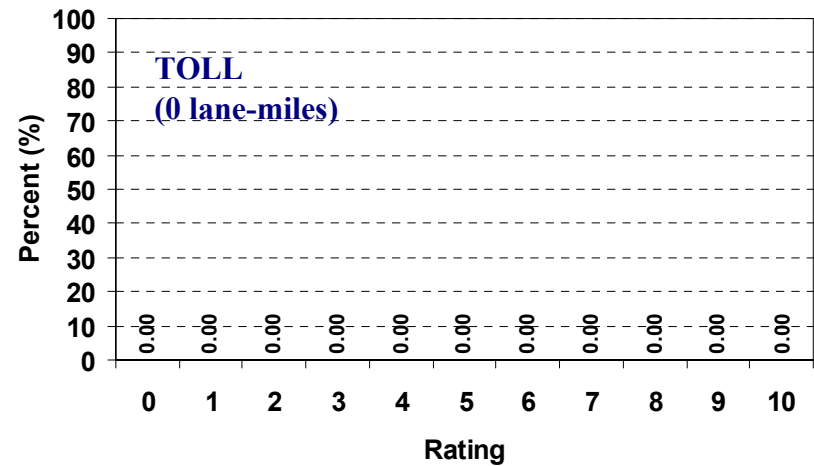
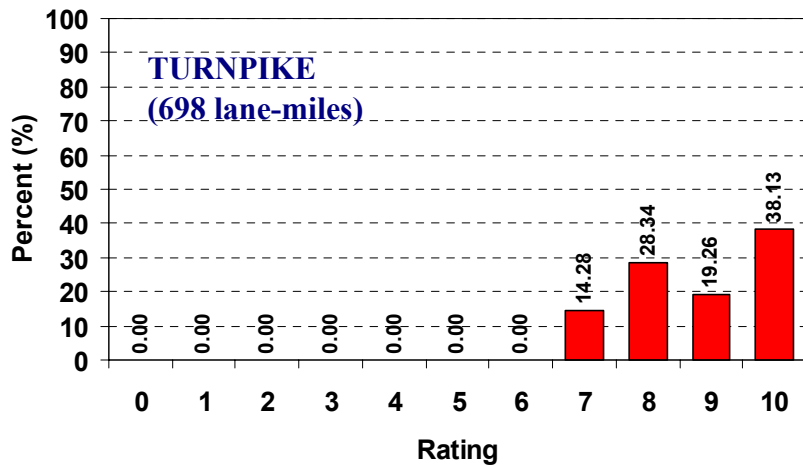
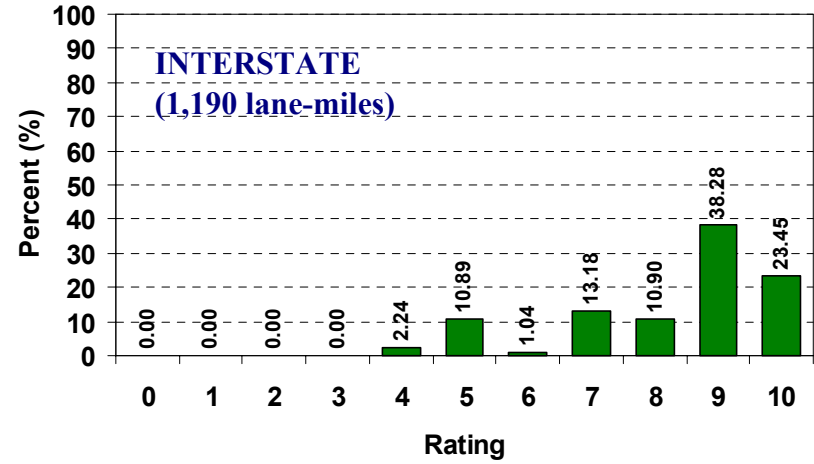
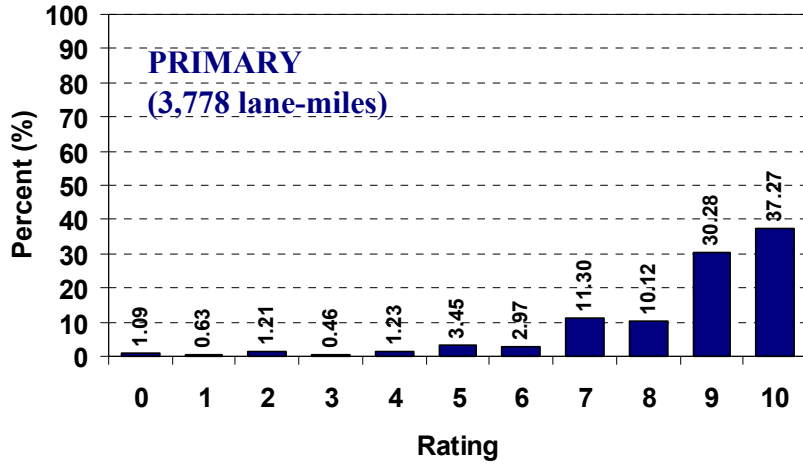
## District 3



1998 Data

# Crack Distribution by System

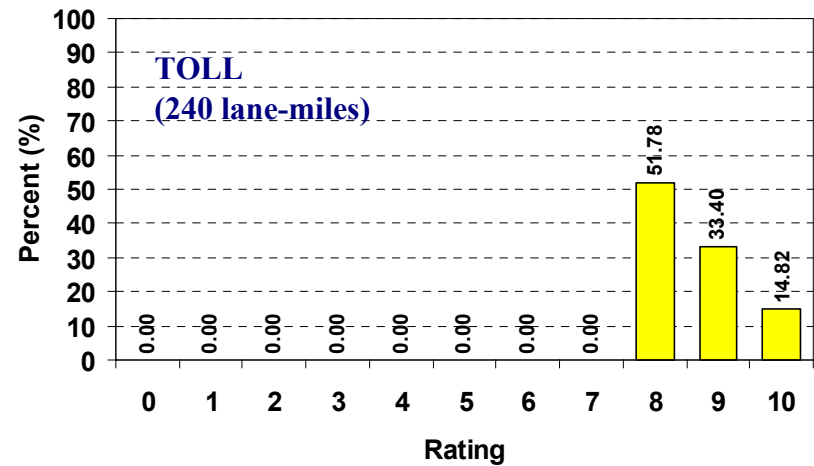
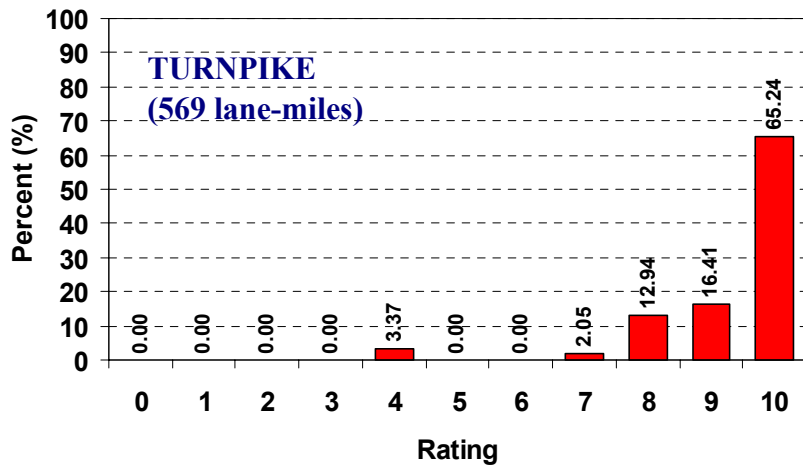
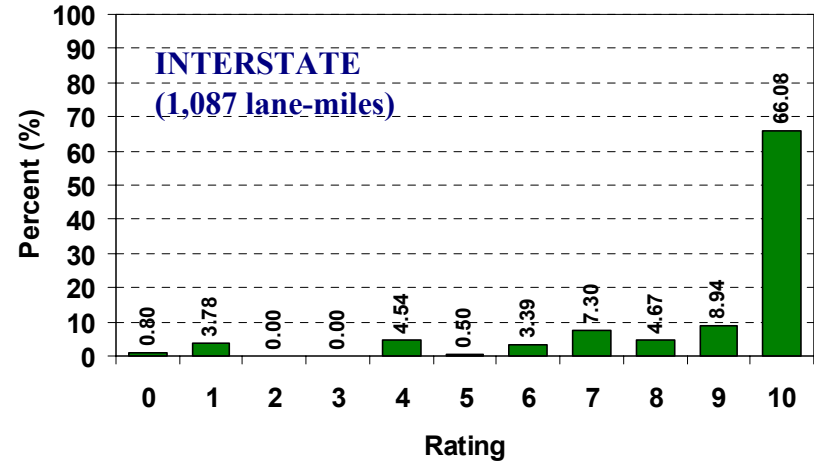
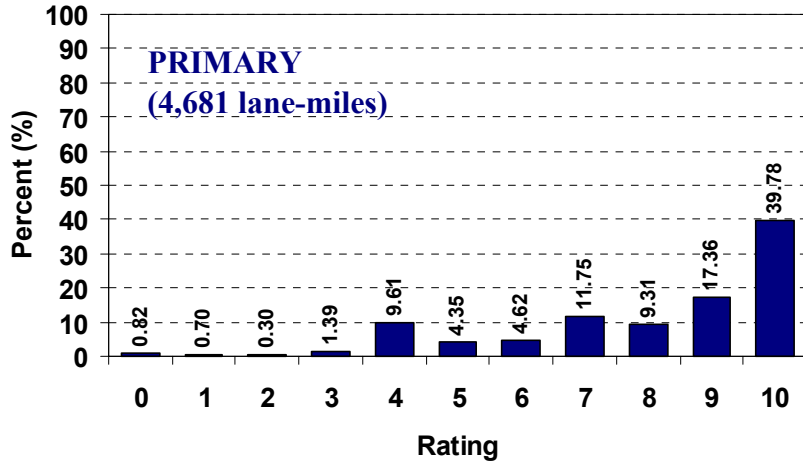
## District 4



1998 Data

# Crack Distribution by System

## District 5



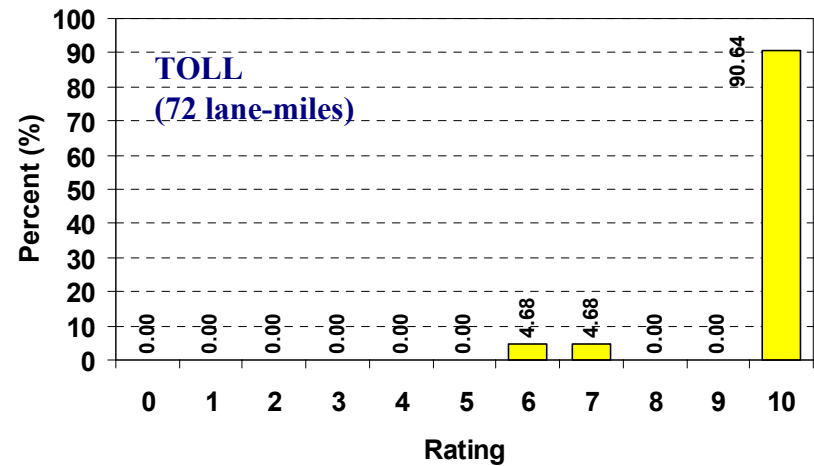
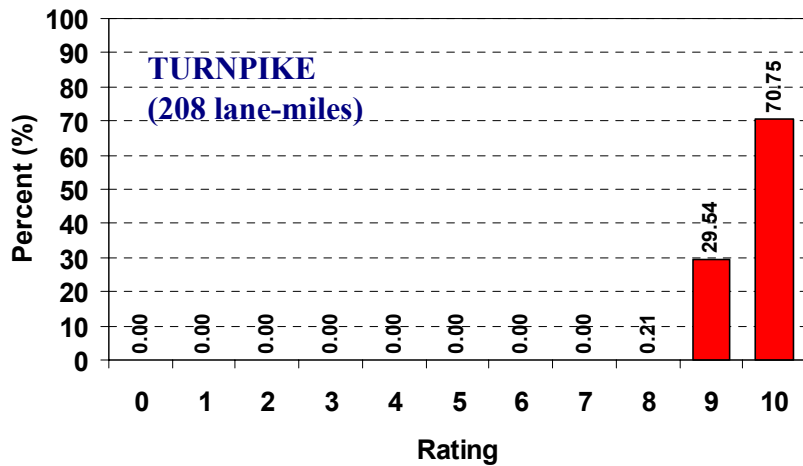
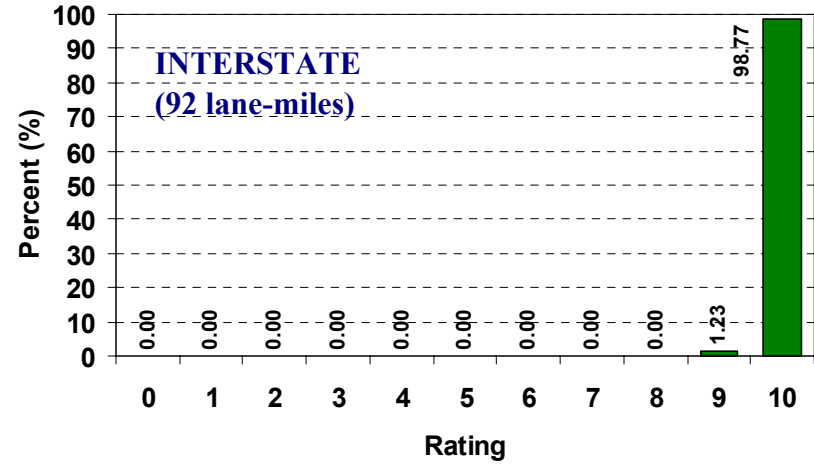
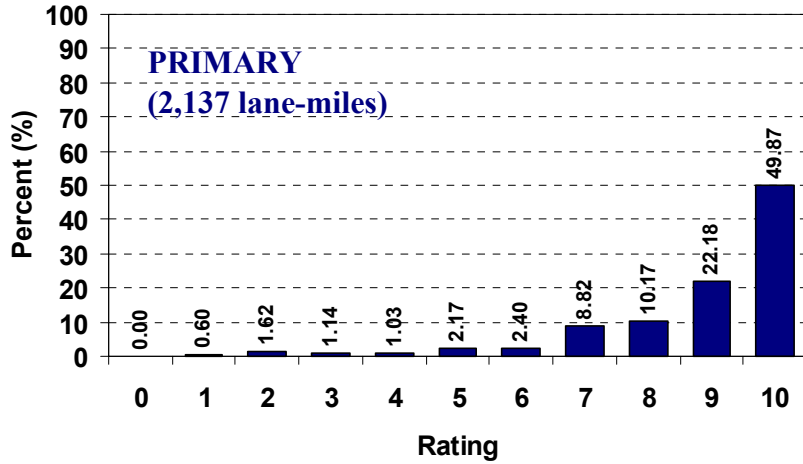
1998 Data



# Crack Distribution by System

## District 6

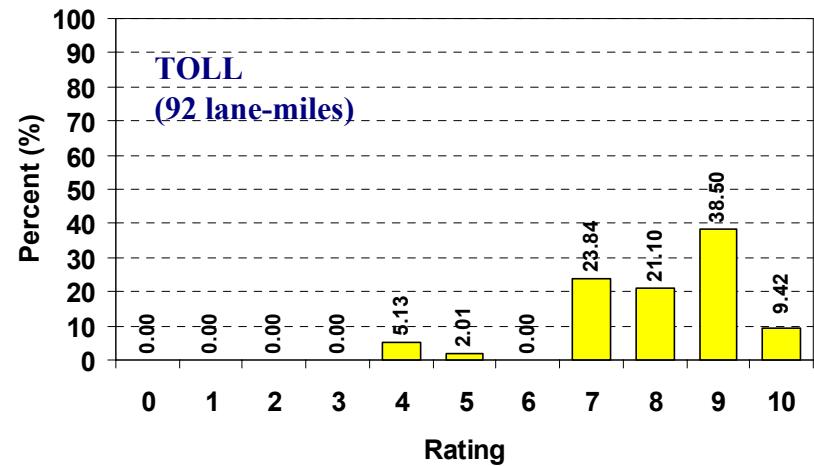
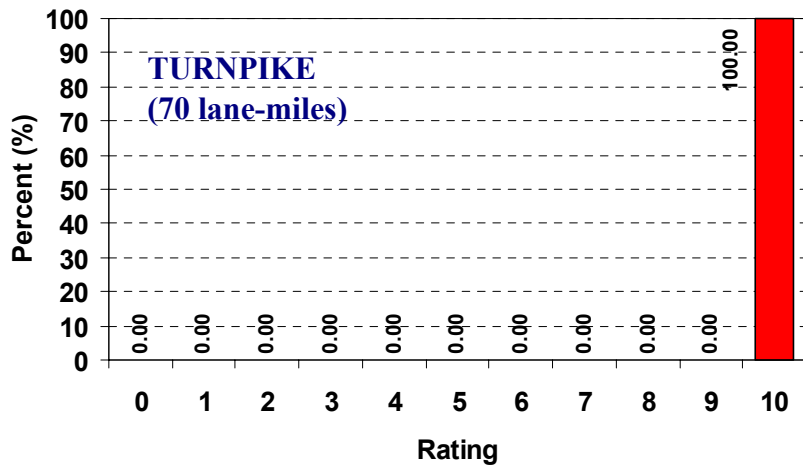
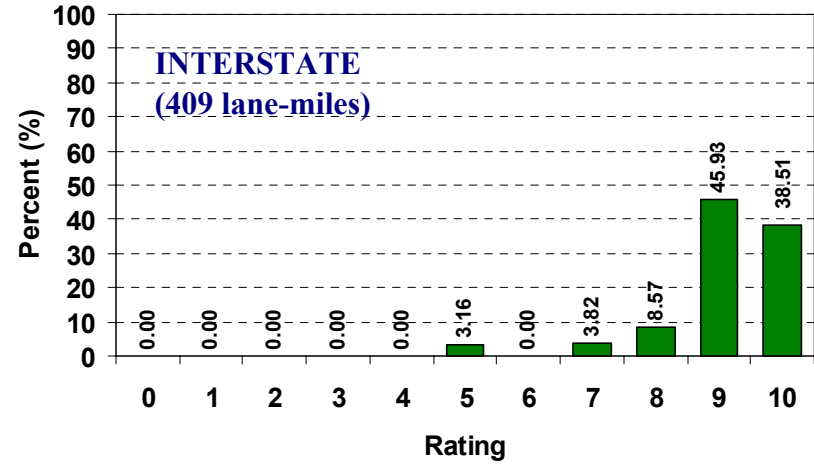
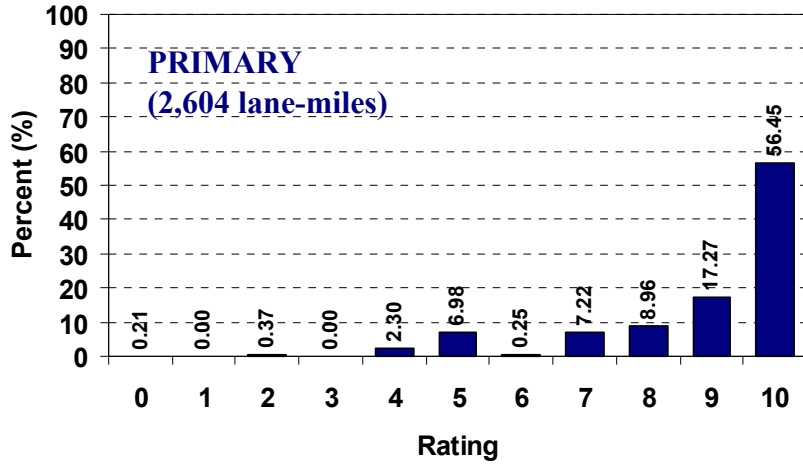
51



1998 Data

# Crack Distribution by System

## District 7



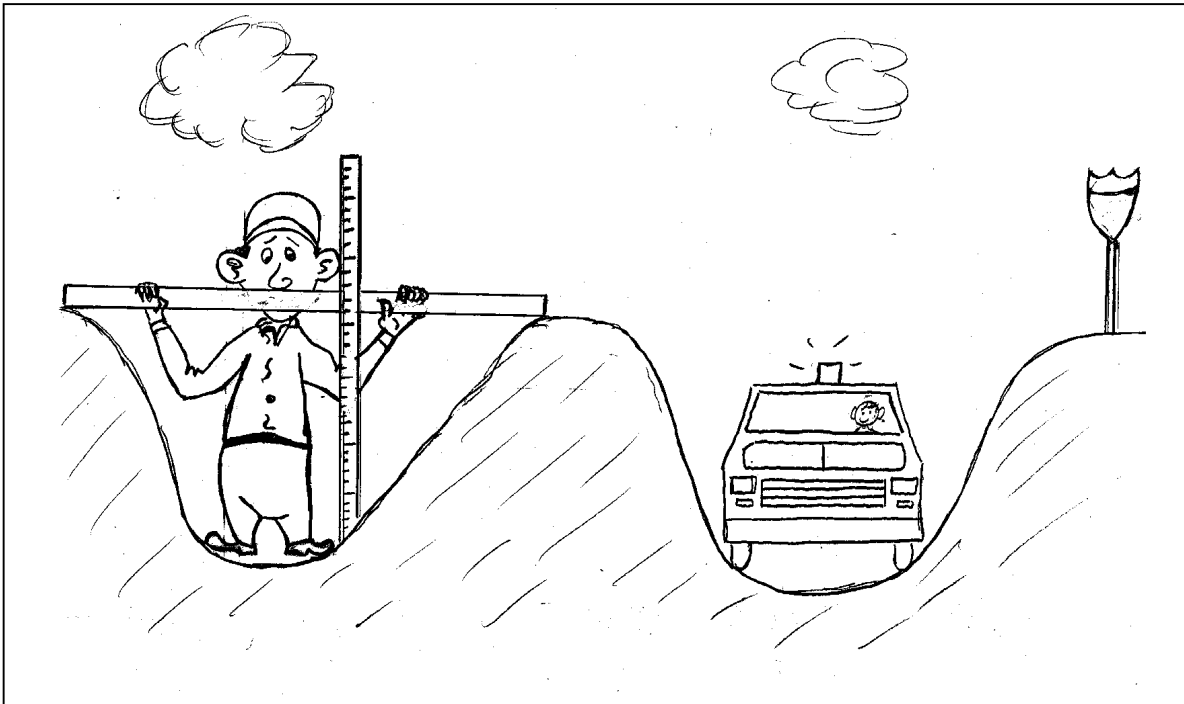
1998 Data

# SECTION III

## RUT RATING

BY

SYSTEM AND DISTRICT



# SECTION III

## Rut Rating by System and District

### Rut Rating Criteria

- ! A Rut is a contiguous longitudinal depression deviating from a surface plane defined by transverse cross slope and longitudinal profile. This depression normally occurs in the wheel path.
- ! The difference in elevations between the wheel path and the center of the travel lane is the Rut Depth.
- ! Rut Depth is measured simultaneously with the Ride values using a profiler. See Fig III-1 on next page.
- ! The profiler measures Rut Depth approximately every foot when traveling at 55 mph.
- ! The average Rut Depth for both wheel paths is recorded and then converted to a one point deduct for every 1/8 inch of average Rut Depth.
- ! Rut Depth is rated on a zero to ten scale, where ten is best. A ten would indicate no rutting while a six would indicate ½ inch of rutting. Currently, a rating of seven or less makes a section of the Interstate, Turnpike, or Toll Systems eligible for rehabilitation, while a rating of six or less applies to the Primary System.
- ! The Rut Depth for each measurement is calculated using the following equation:

$$\text{RUT DEPTH} = \frac{(h_1 - h_2) + (h_3 - h_2)}{2}$$

Where:  $h_1$ ,  $h_2$ , and  $h_3$  are the respective distances between the right, center and left sensors, and the roadway surface right below each.

# ROAD PROFILER

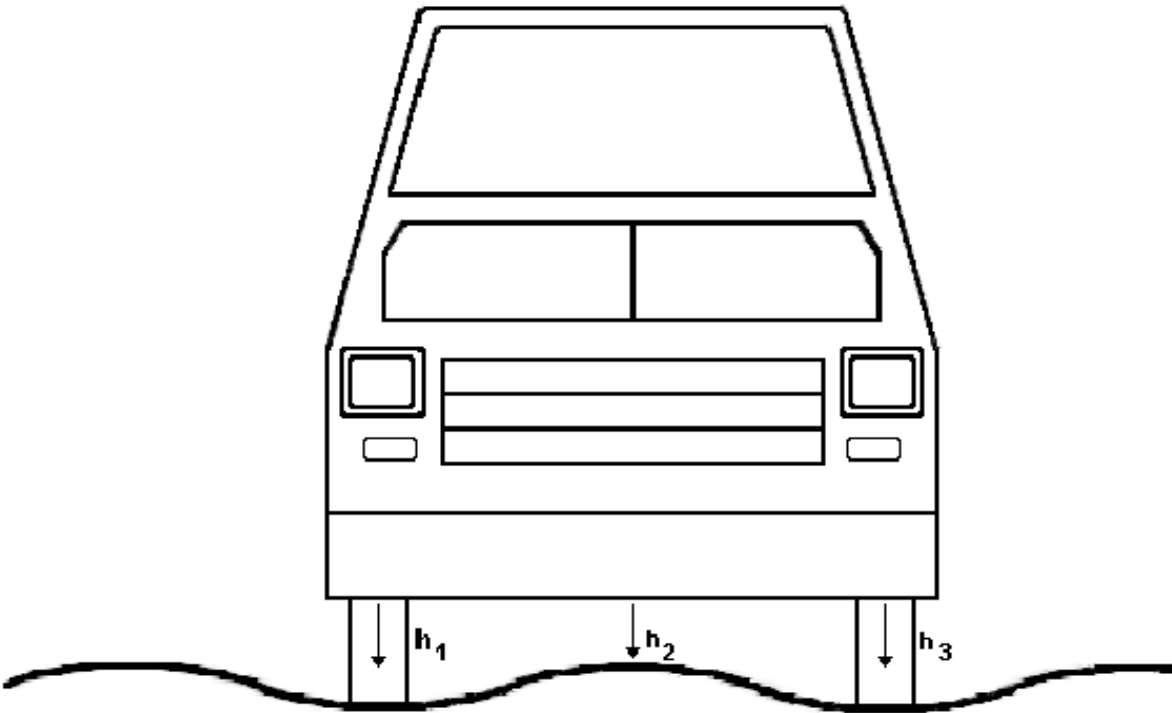


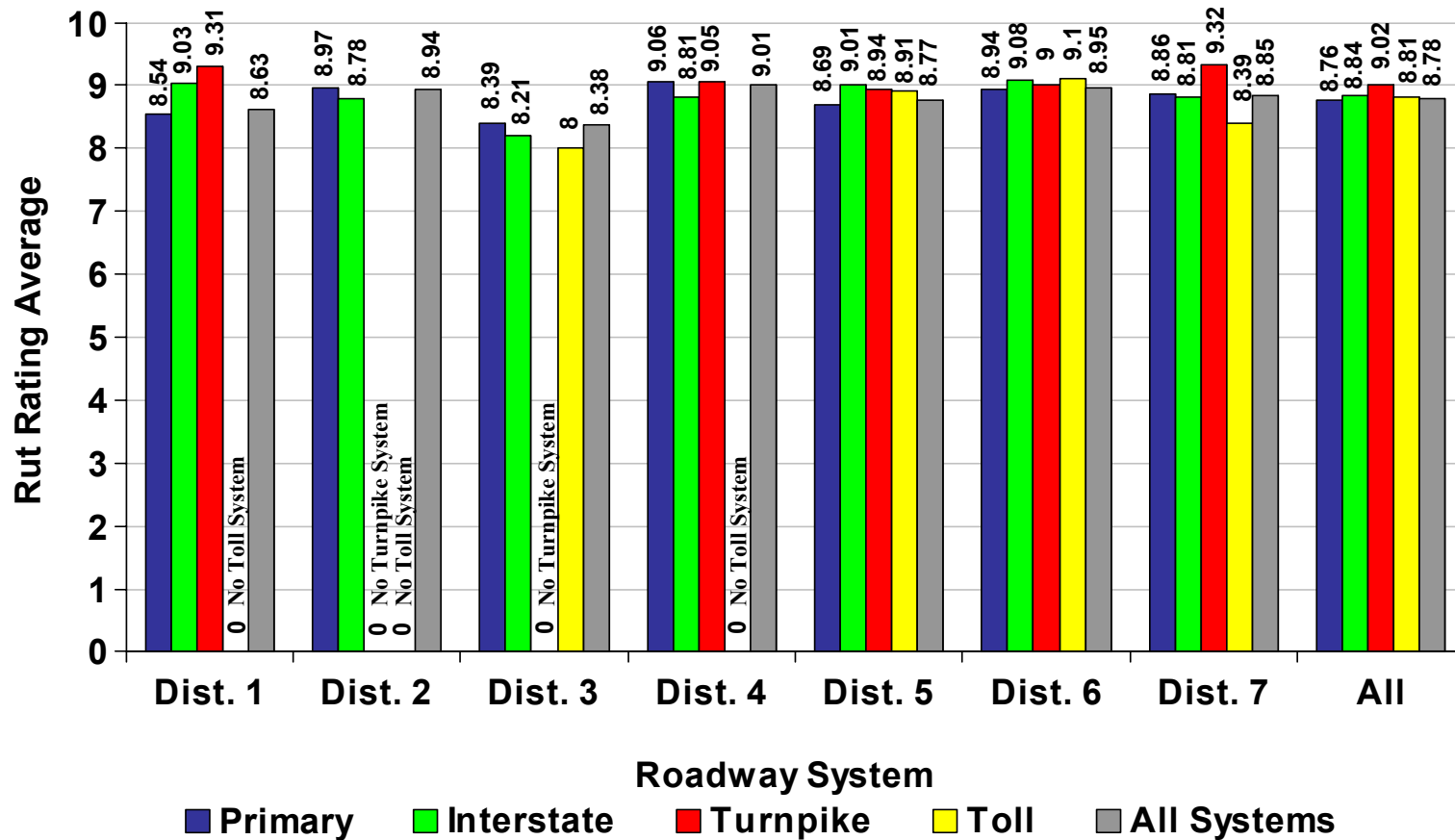
Figure III-1

$$\text{RUT DEPTH} = \frac{(h_1 - h_2) + (h_3 - h_2)}{2}$$

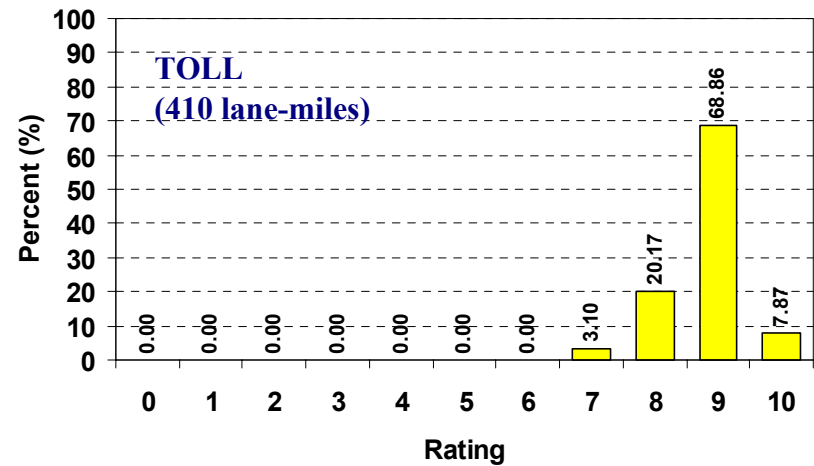
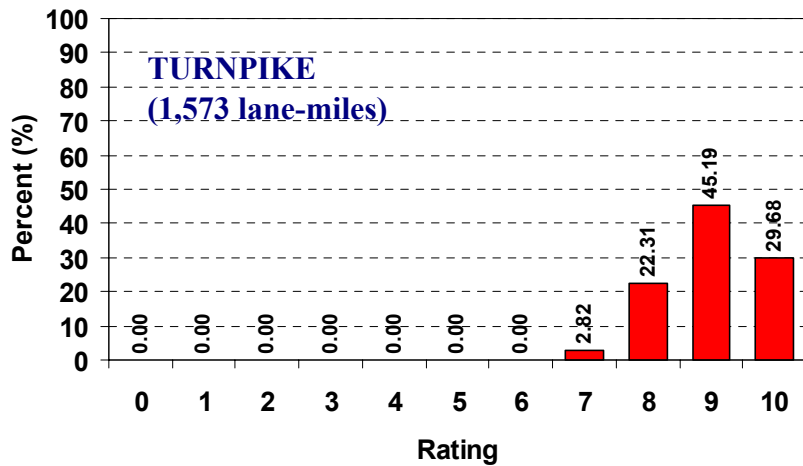
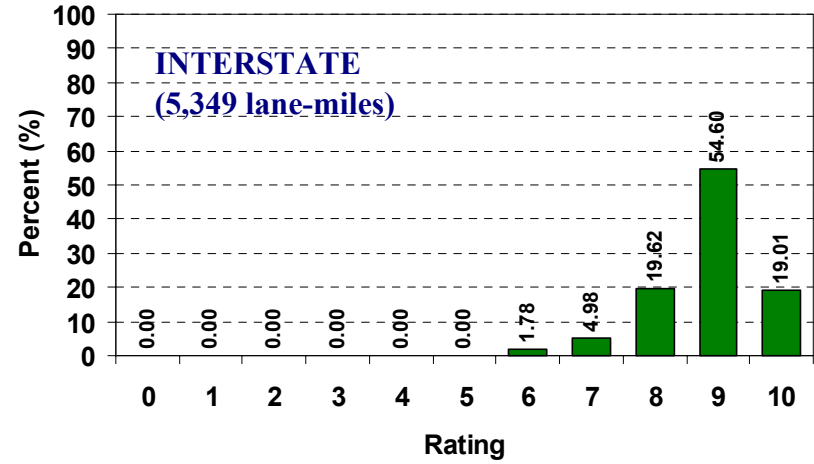
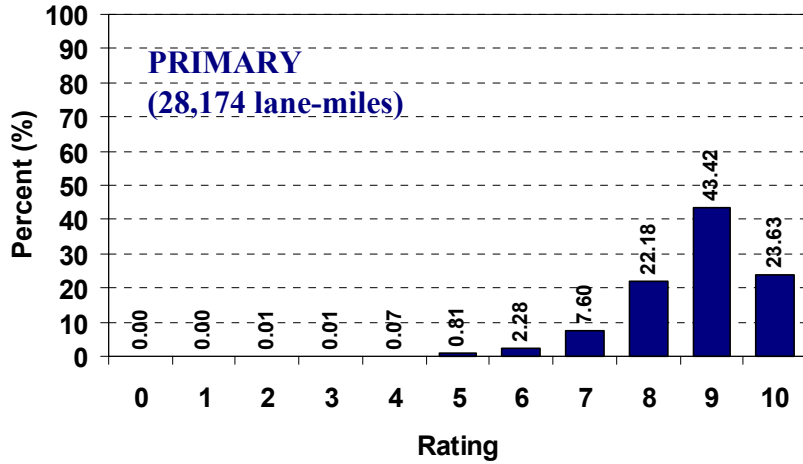
The Road Profiler has three sensors (to measure rutting), combined with two accelerometers (to measure ride), and a data acquisition system (computer) that monitors the pavement's longitudinal and transversal profiles while in motion.

# Rut Ratings by System and District

## 1998 Flexible Pavement Condition Survey



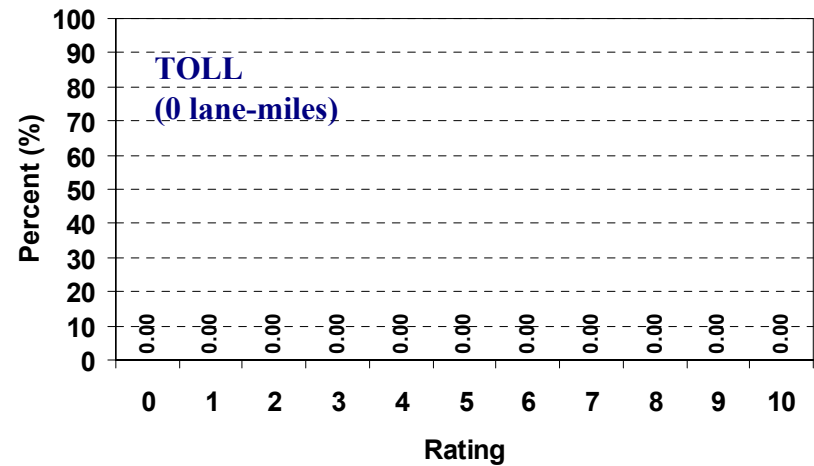
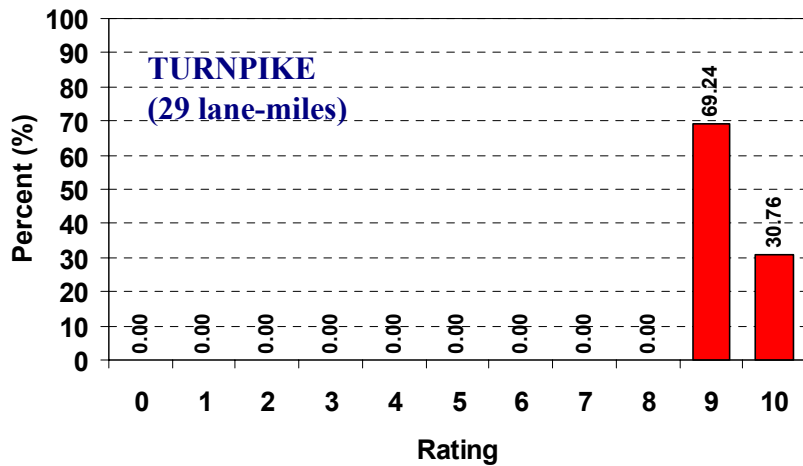
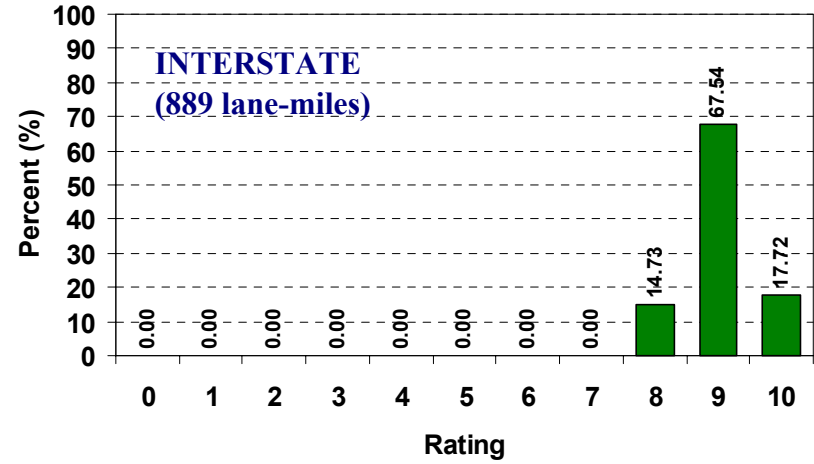
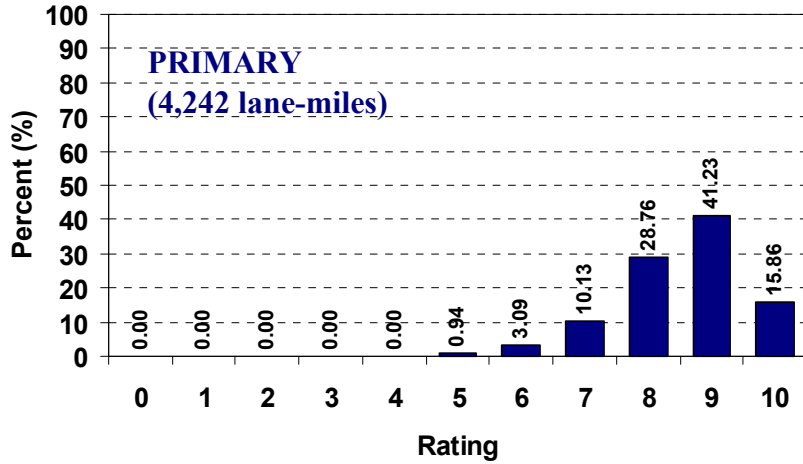
# Rut Distribution by System Statewide



1998 Data

# Rut Distribution by System

## District 1

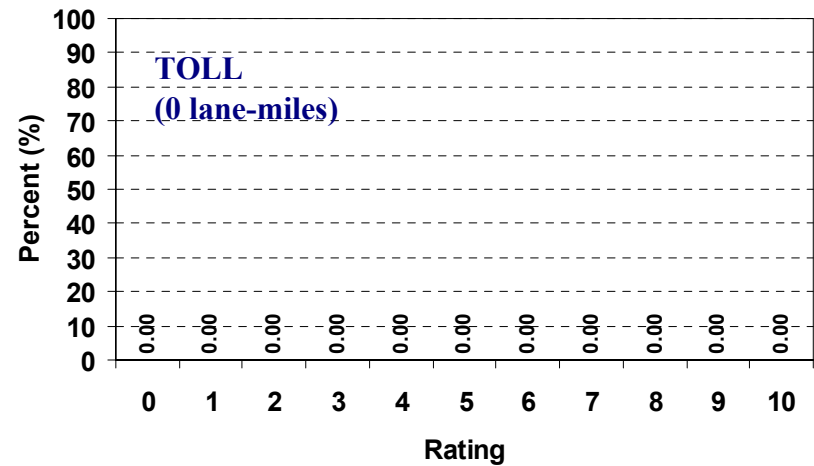
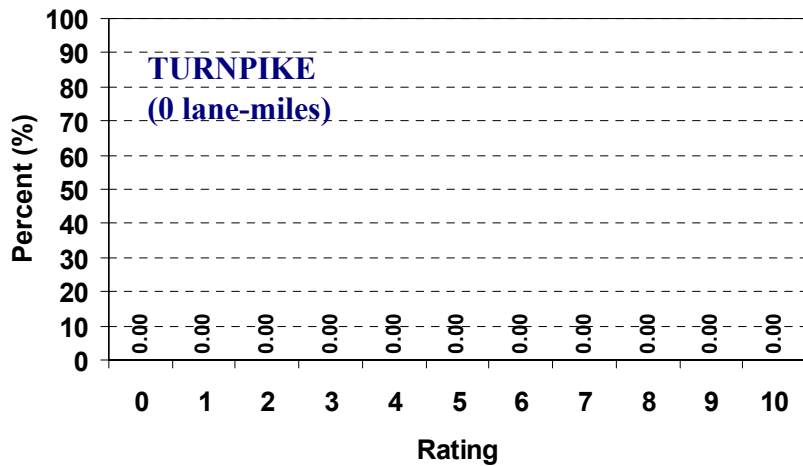
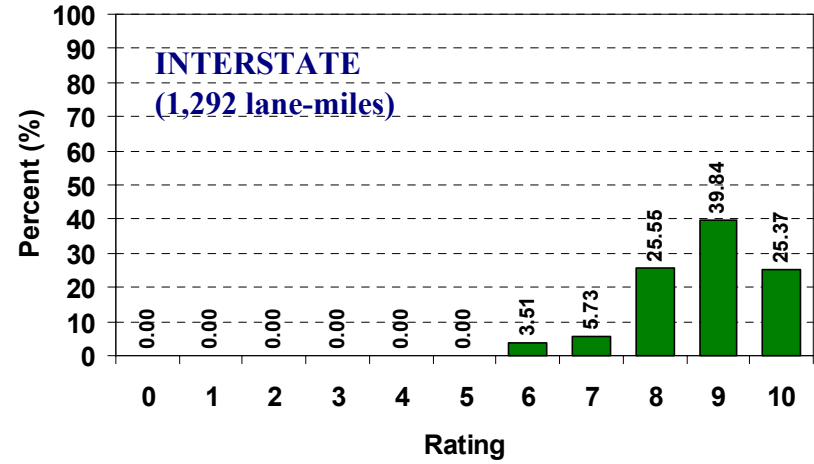
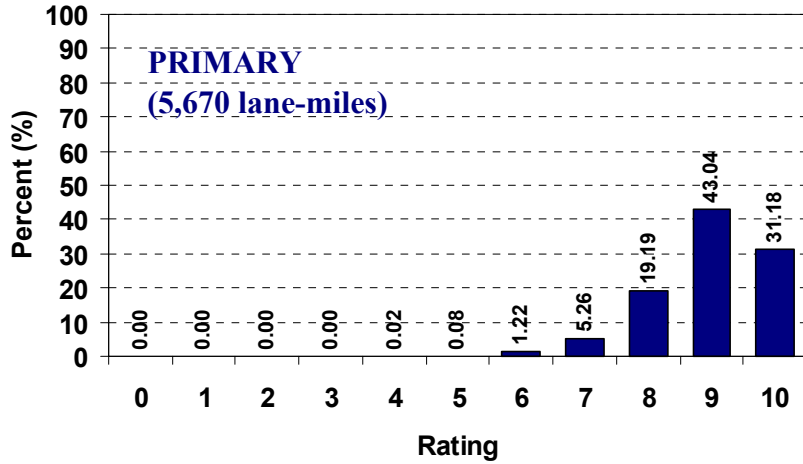


1998 Data



# Rut Distribution by System

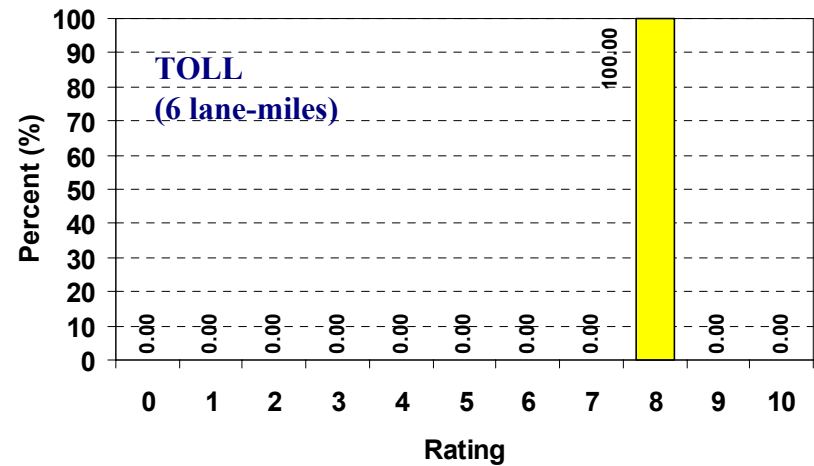
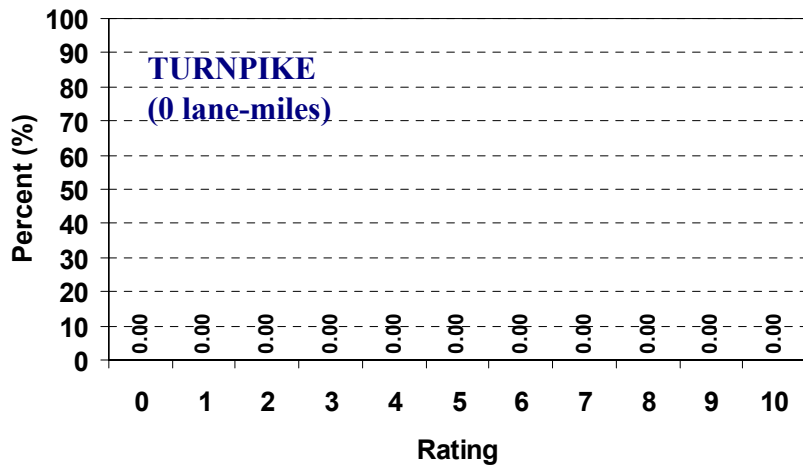
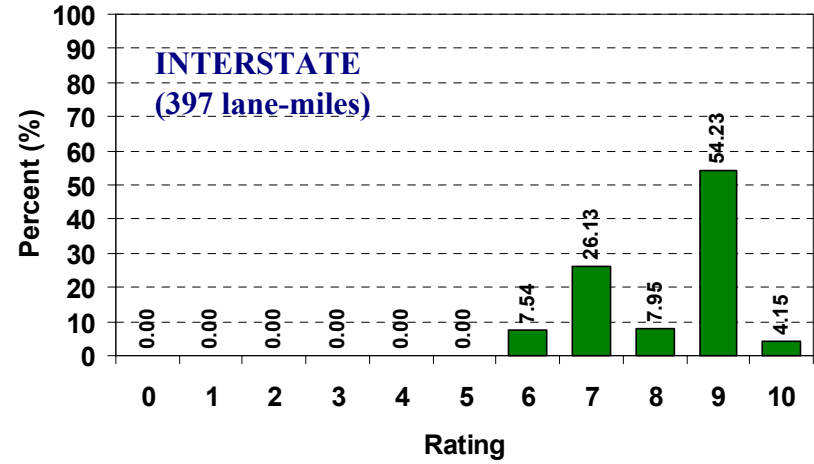
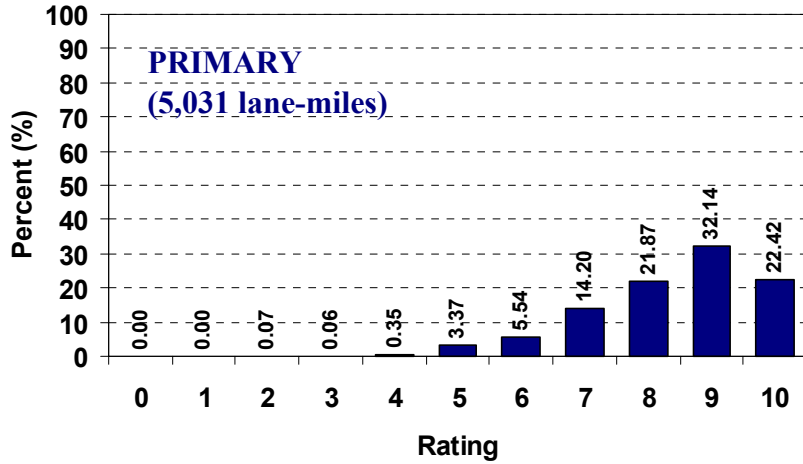
## District 2



1998 Data

# Rut Distribution by System

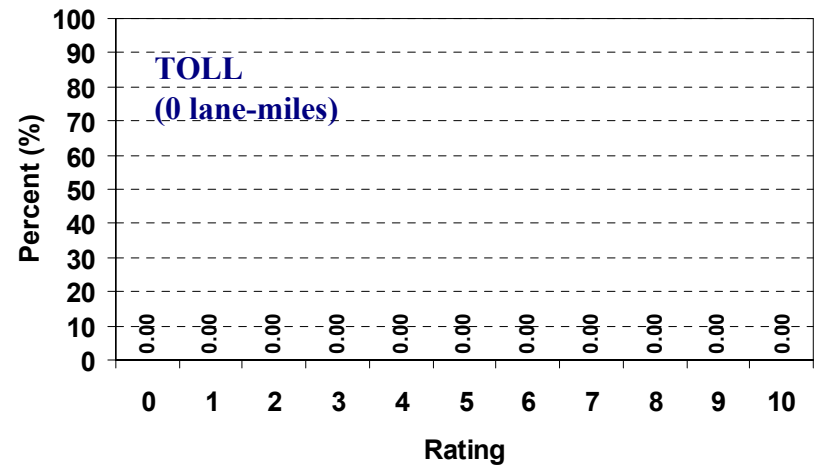
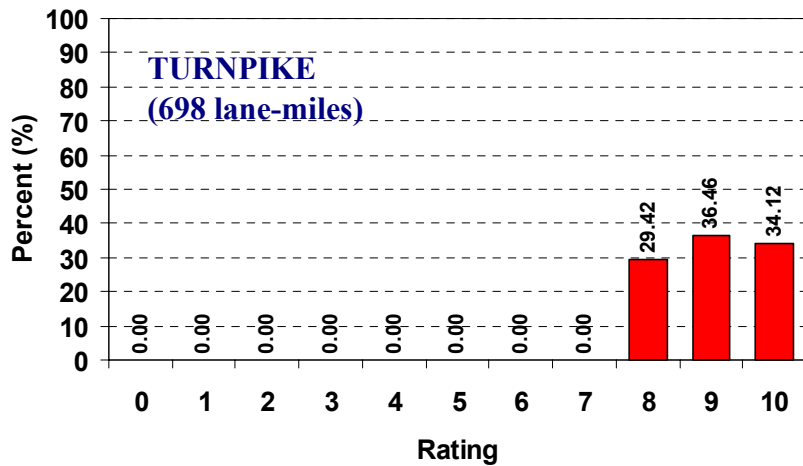
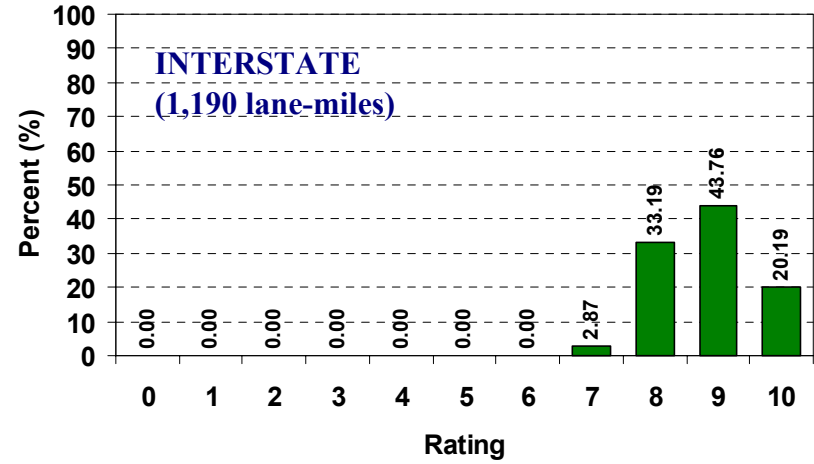
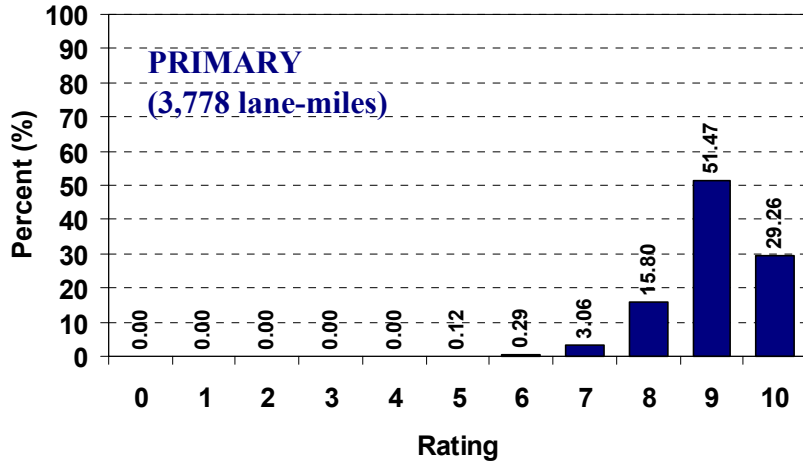
## District 3



1998 Data

# Rut Distribution by System

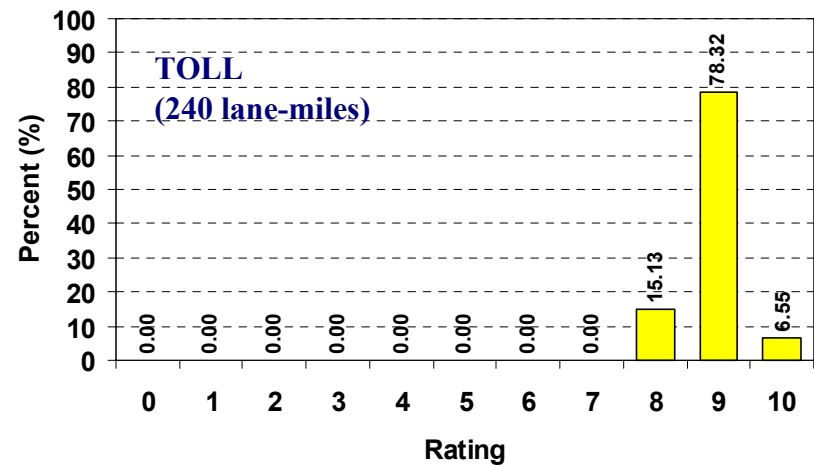
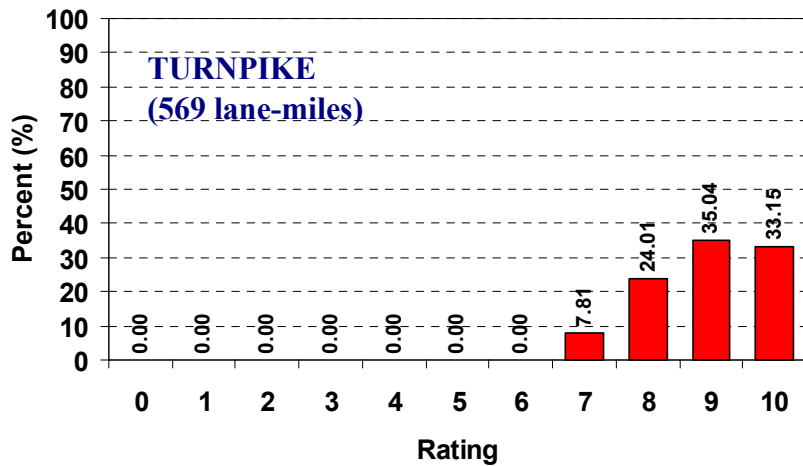
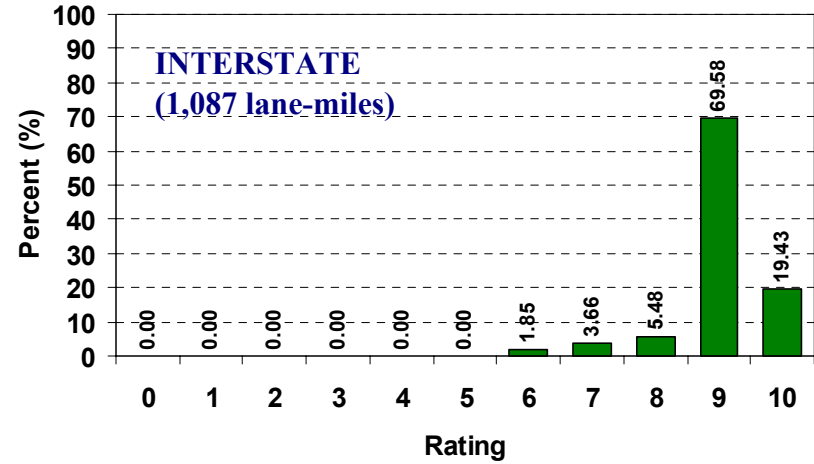
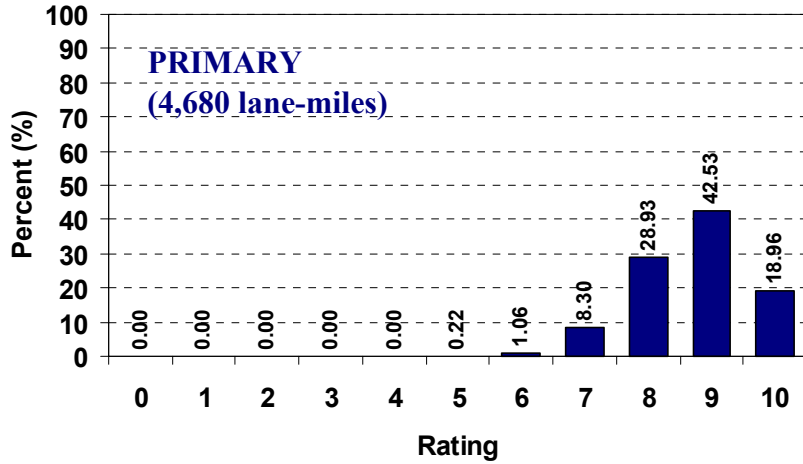
## District 4



1998 Data

# Rut Distribution by System

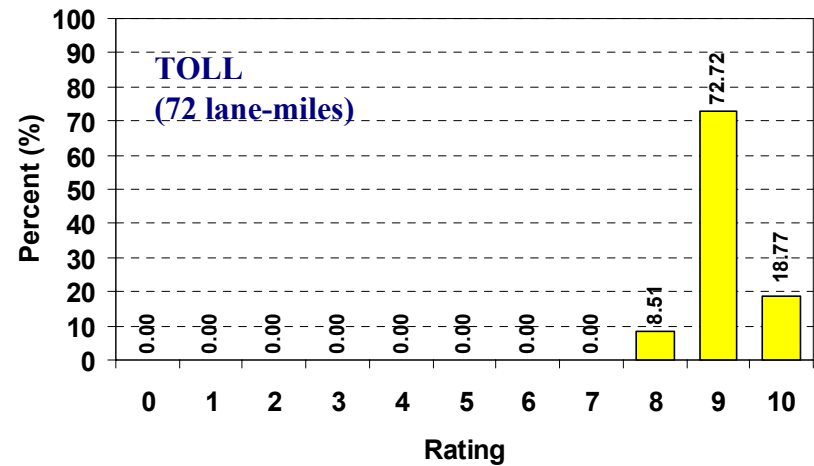
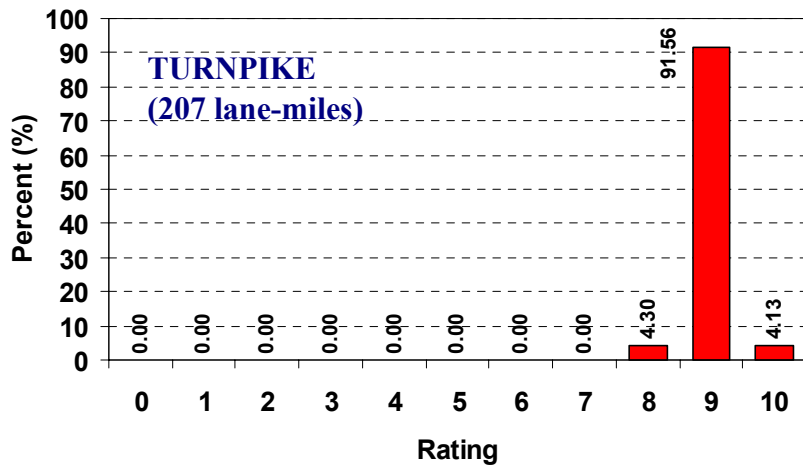
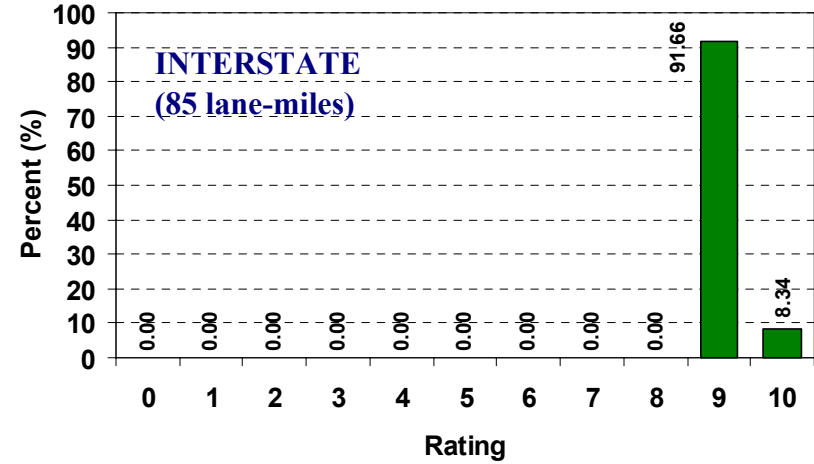
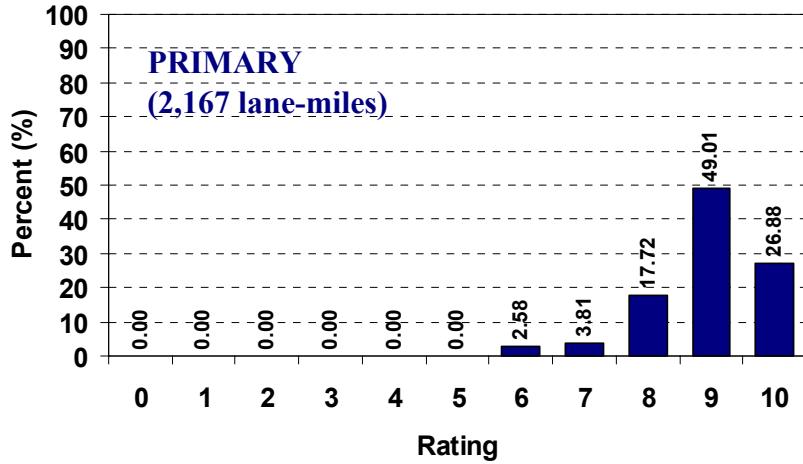
## District 5



1998 Data

# Rut Distribution by System

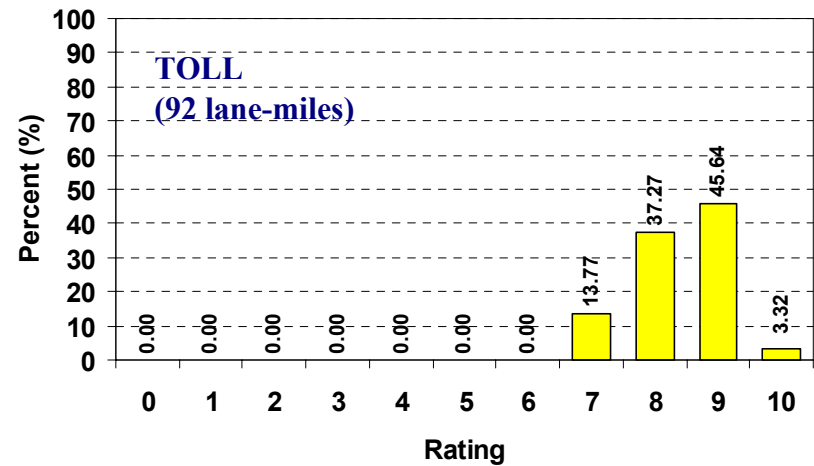
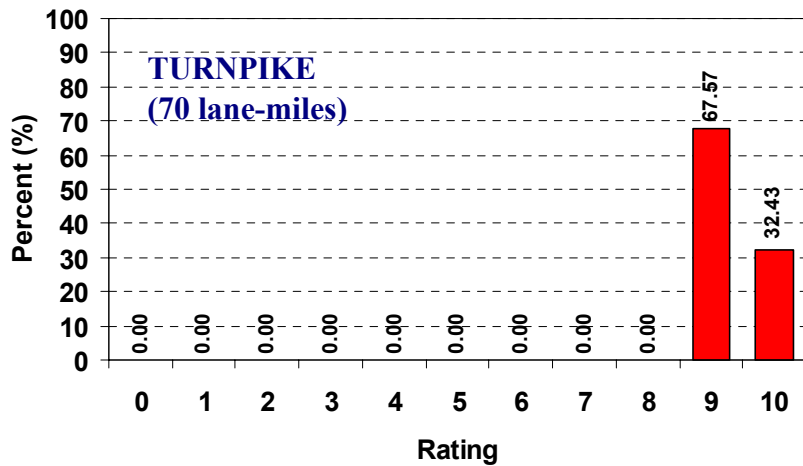
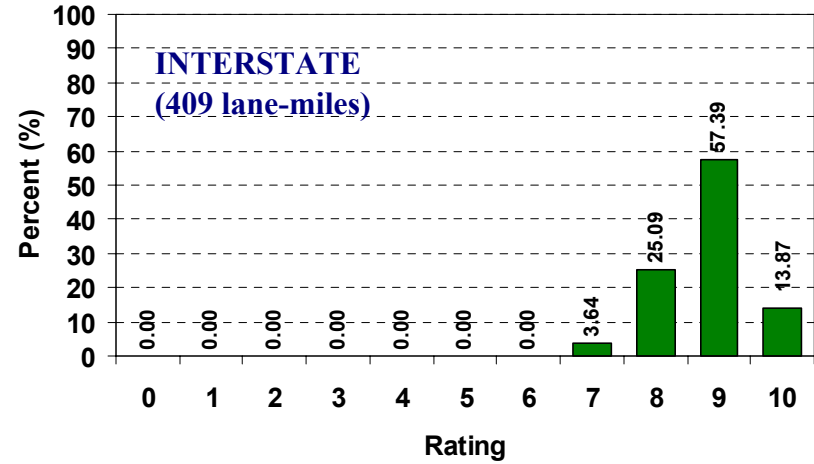
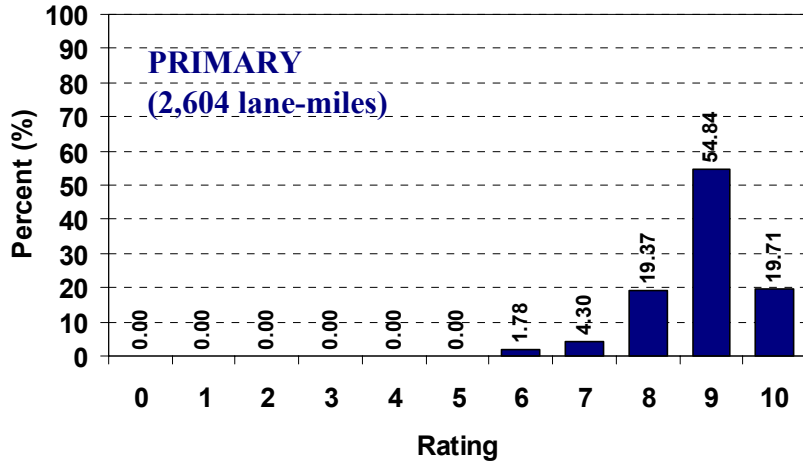
## District 6



1998 Data

# Rut Distribution by System

## District 7



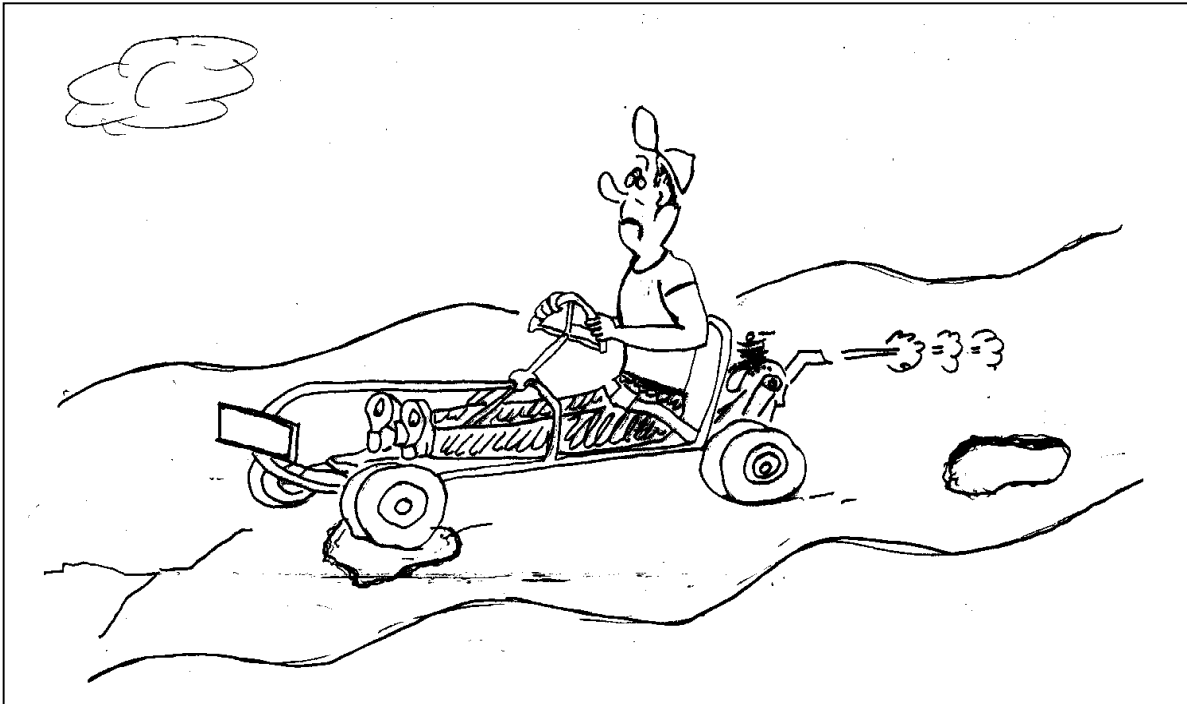
1998 Data

# SECTION IV

## RIDE RATING

BY

SYSTEM AND DISTRICT



# SECTION IV

## Ride Rating by System and District

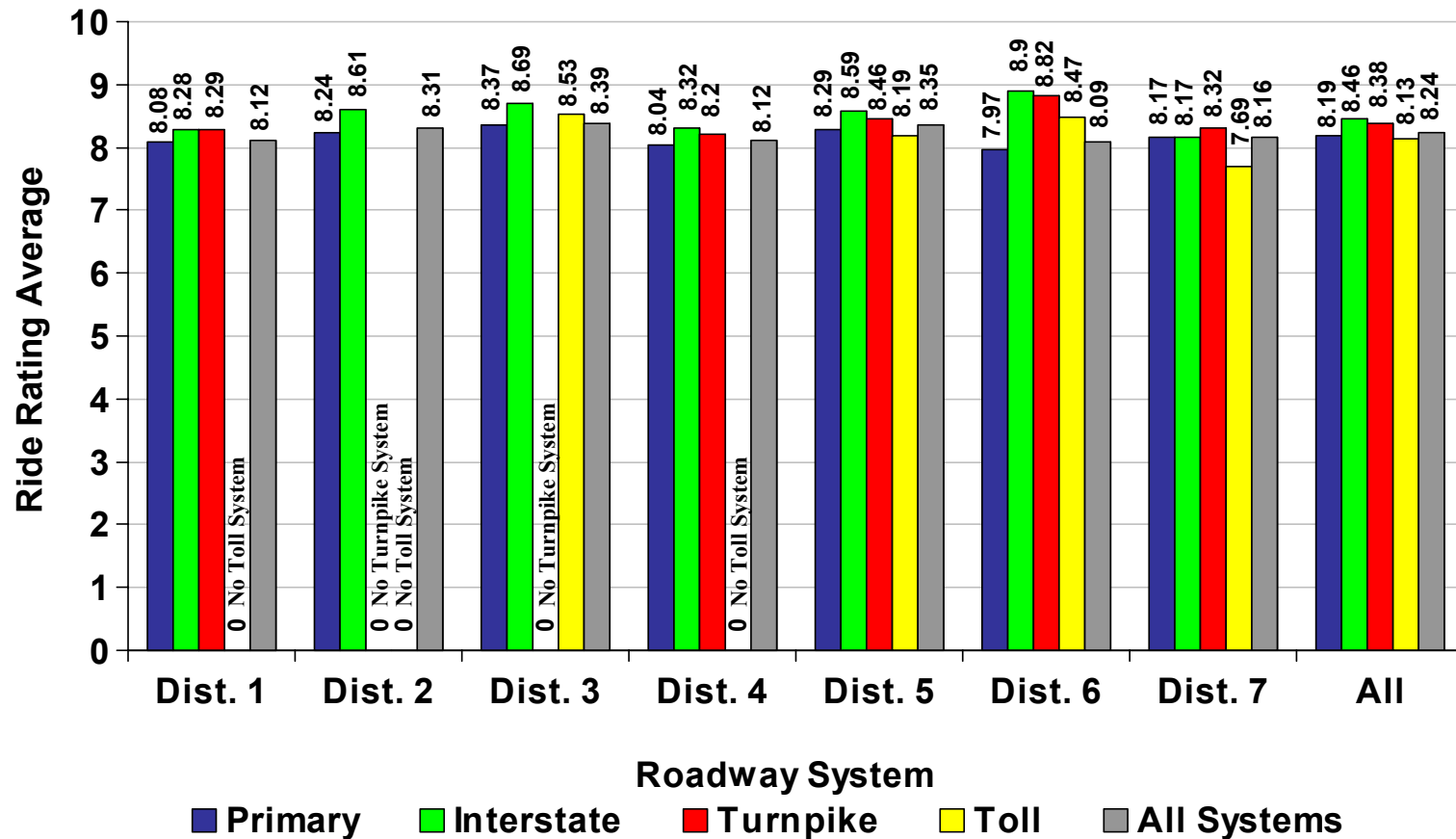
### Ride Rating Criteria

- ! Ride Ratings measure the rideability of a pavement section. It is an indication of the smoothness, or lack of roughness, of the wearing surface.
- ! Ride Ratings are calculated from correlations between the International Roughness Index (IRI) from the Ultrasonic Profiler and Present Serviceability Index (PSI) from the CHLOE Profilometer.
- ! The PSI values from zero to five, as defined by AASHTO, are multiplied by two to obtain the Ride Rating values.
- ! Rideability is greatly affected, among other things, by the following factors:
  - ✓ Original Pavement Profile
  - ✓ Profiles from intersecting roads
  - ✓ Utility patches and covers
  - ✓ Surface and structural deterioration
- ! Ride deficiency is rated on a zero to ten scale, where ten is best. A ten would indicate a very smooth surface. Currently, a rating of seven or less makes a section of the Interstate, Turnpike, or Toll Systems eligible for rehabilitation, while a rating of six or less applies to the Primary System.
- ! The Ride deficiency Rating is subtracted from a perfect score of 10.

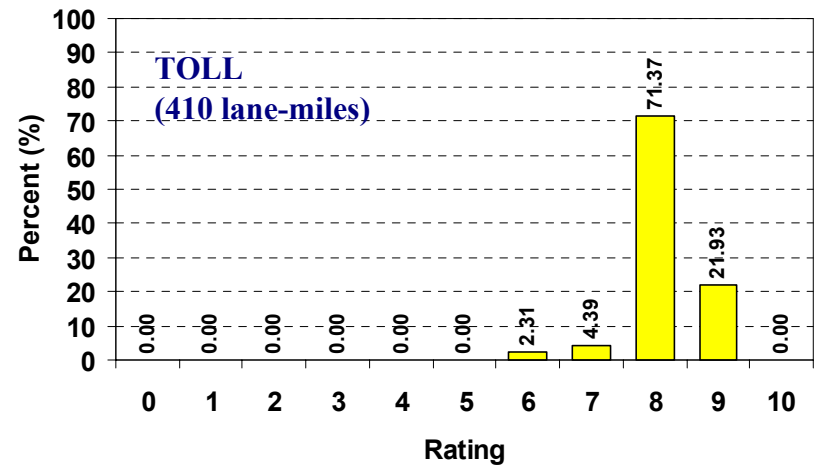
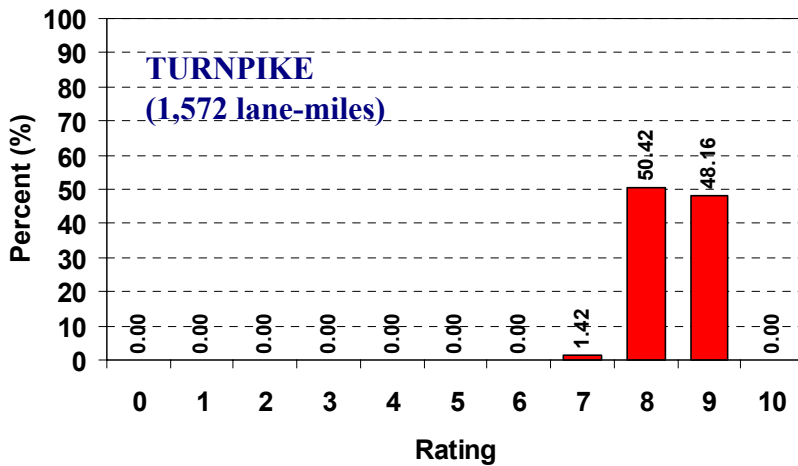
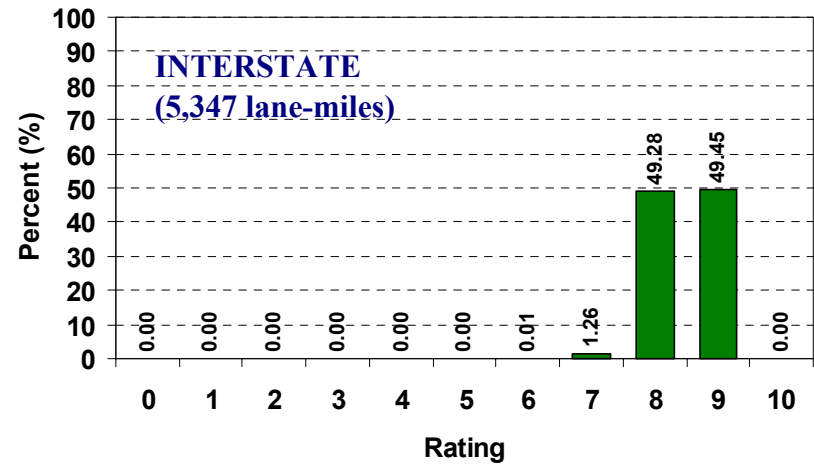
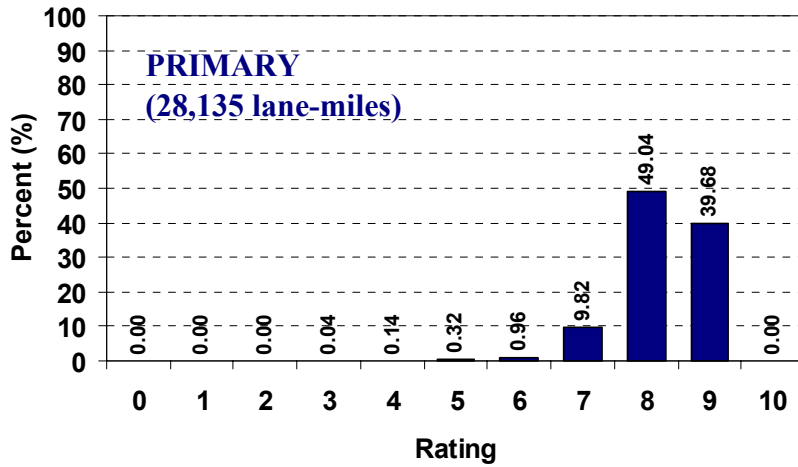


# Ride Ratings by System and District

## 1998 Flexible Pavement Condition Survey



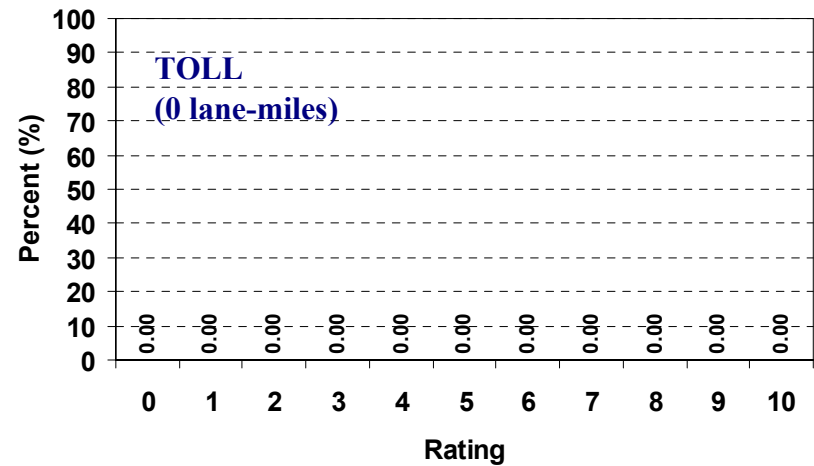
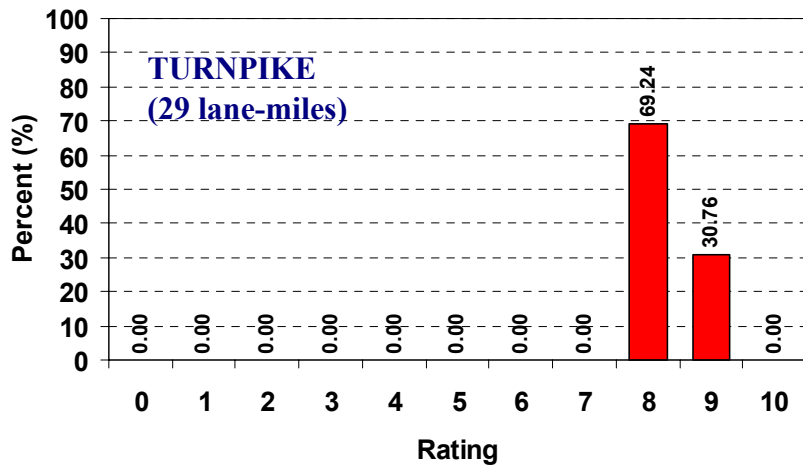
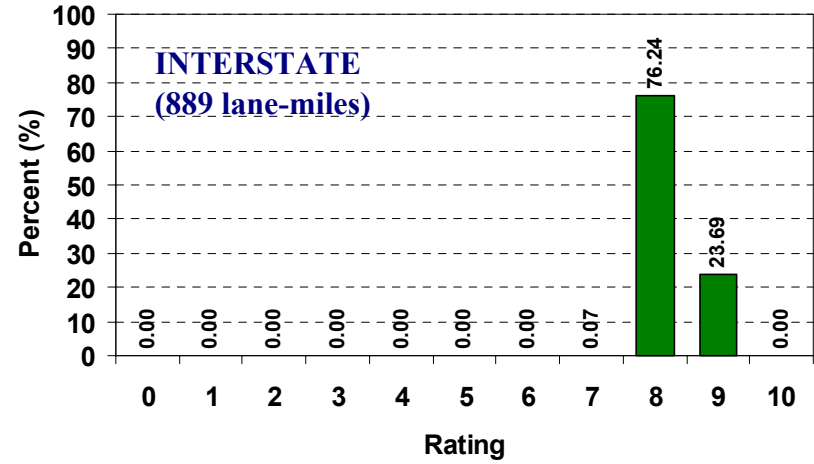
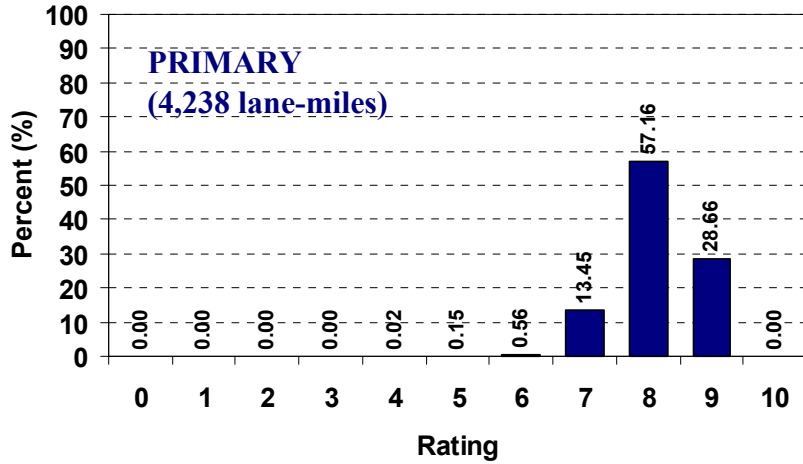
# Ride Distribution by System Statewide



1998 Data

# Ride Distribution by System

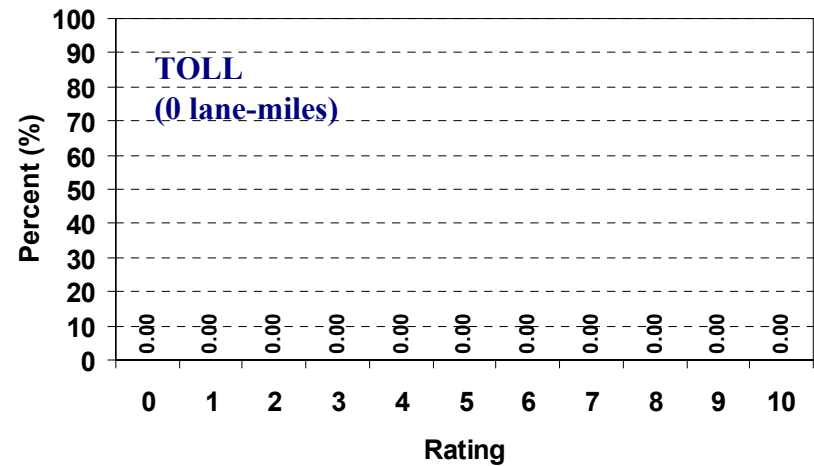
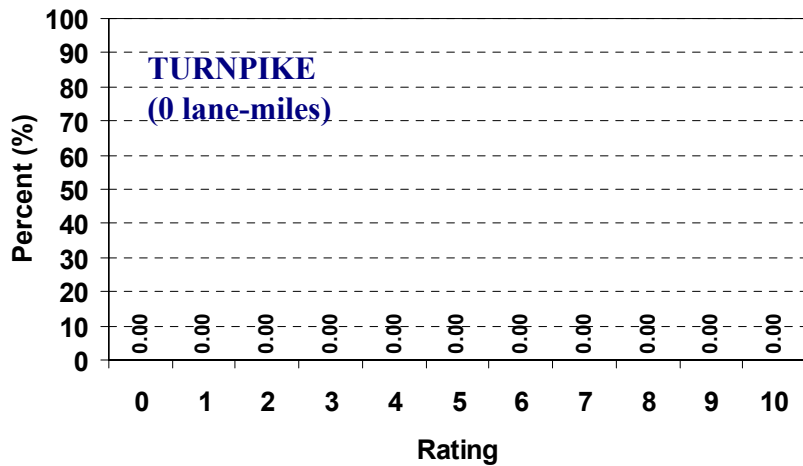
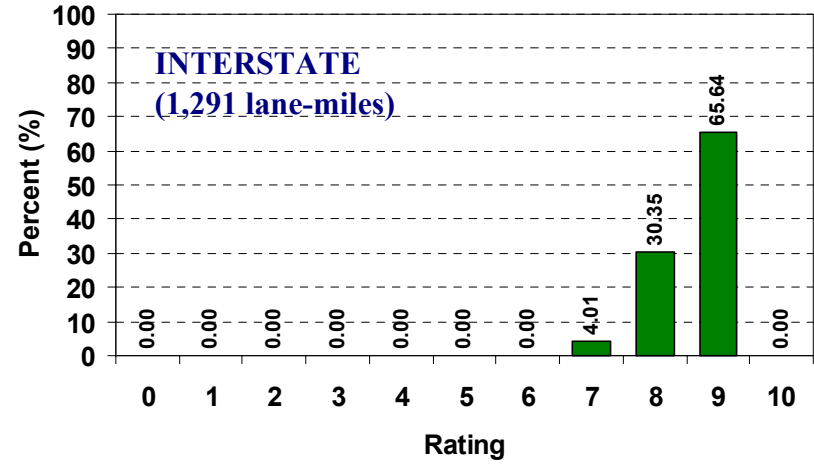
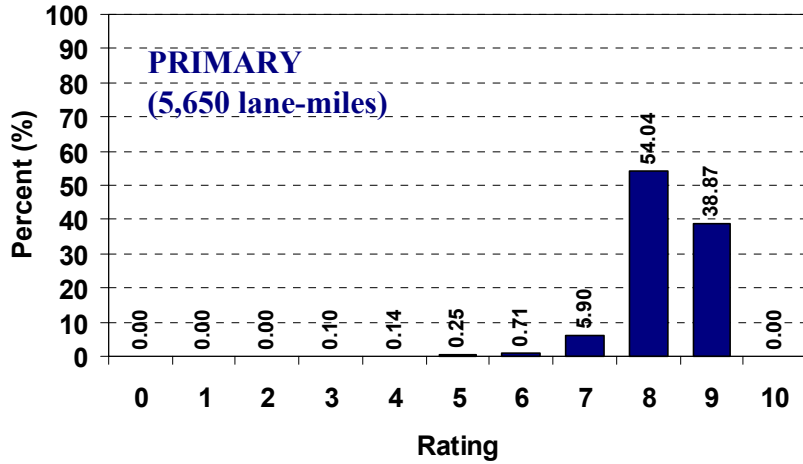
## District 1



1998 Data

# Ride Distribution by System

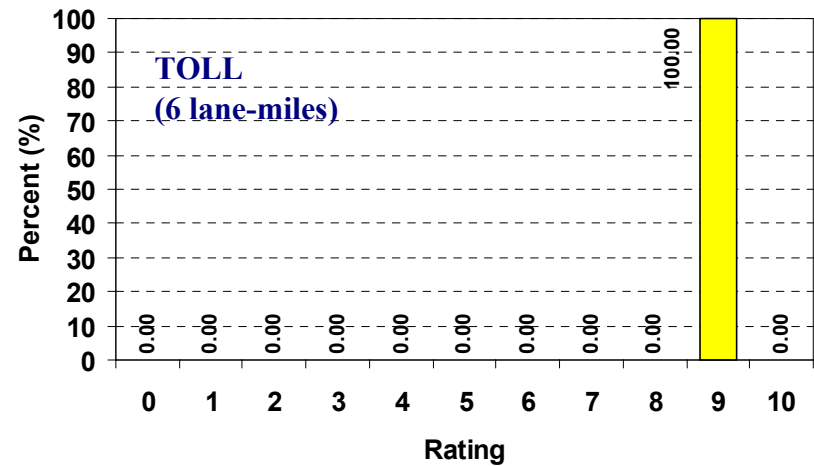
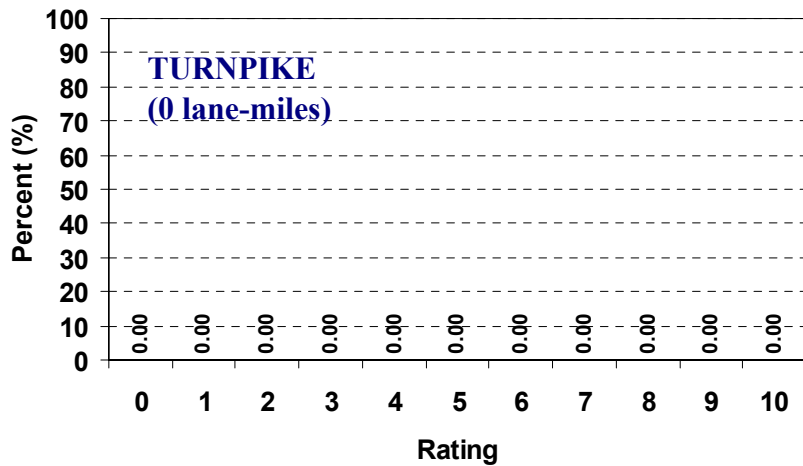
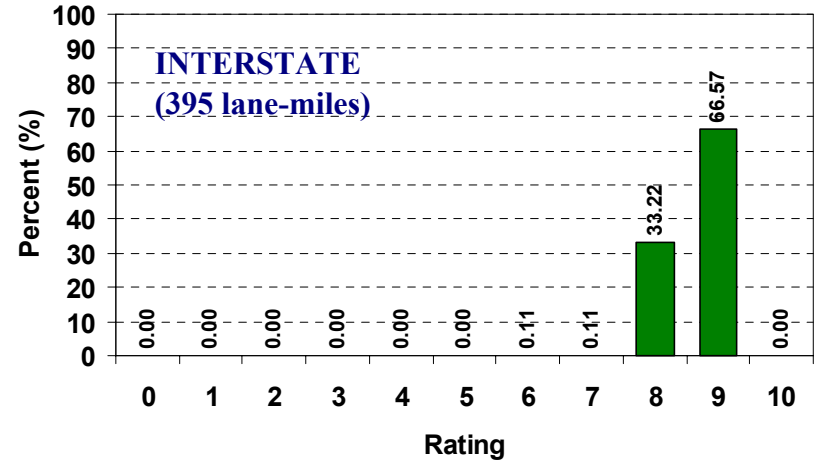
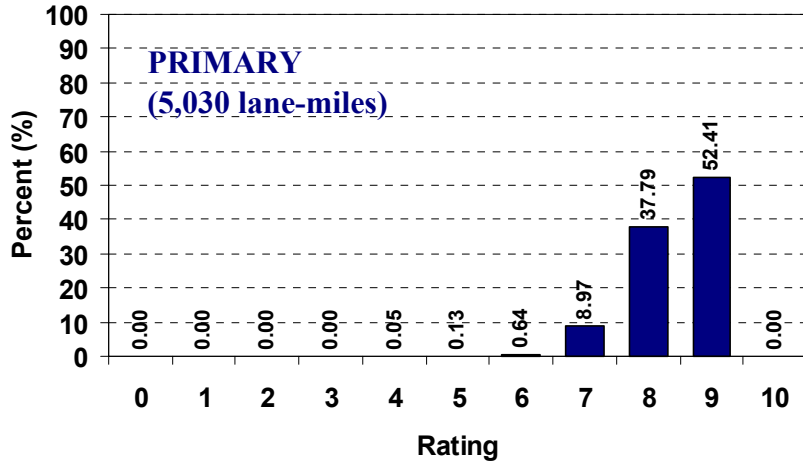
## District 2



1998 Data

# Ride Distribution by System

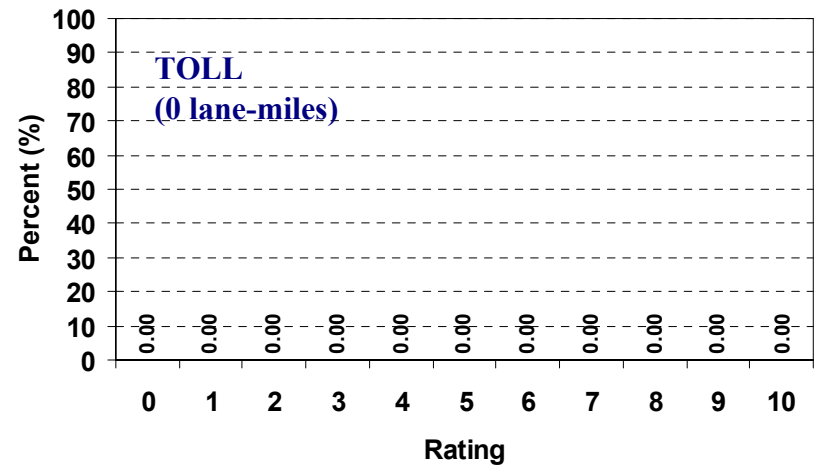
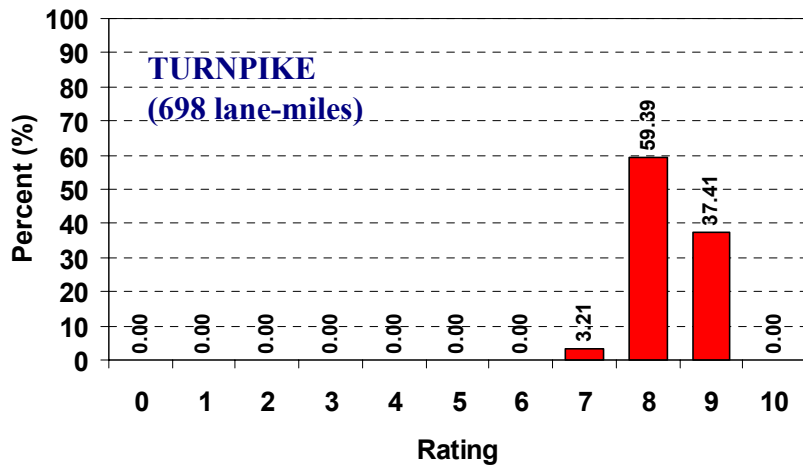
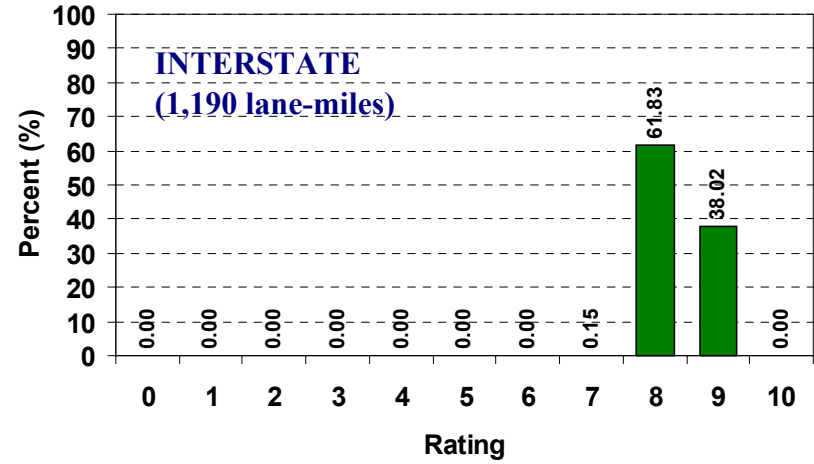
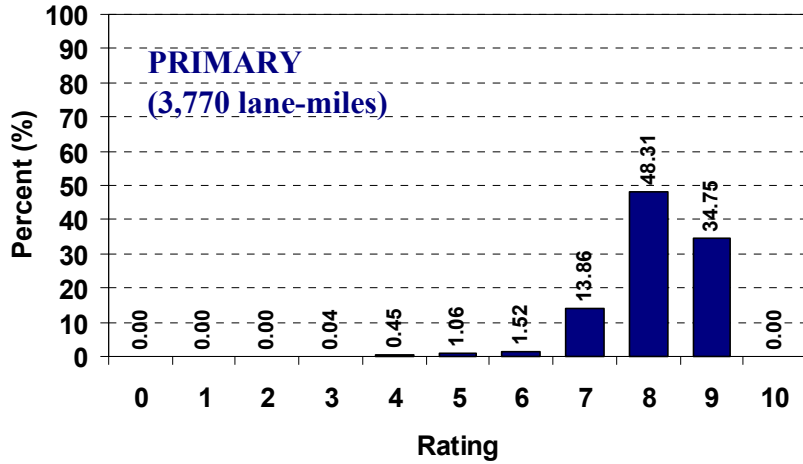
## District 3



1998 Data

# Ride Distribution by System

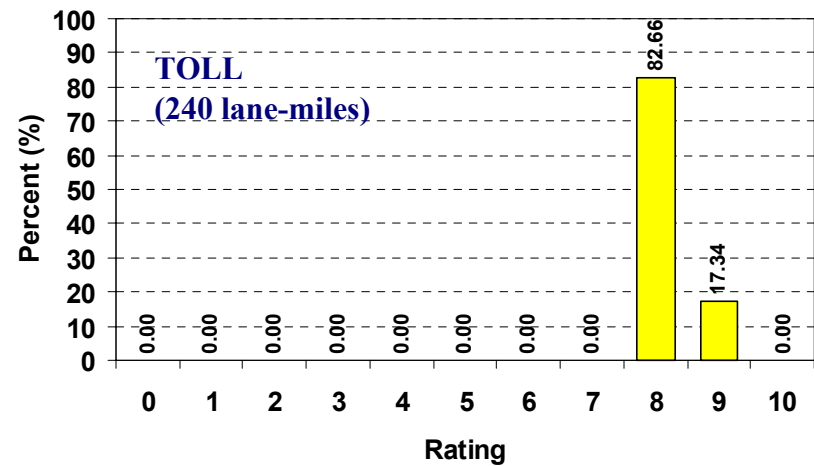
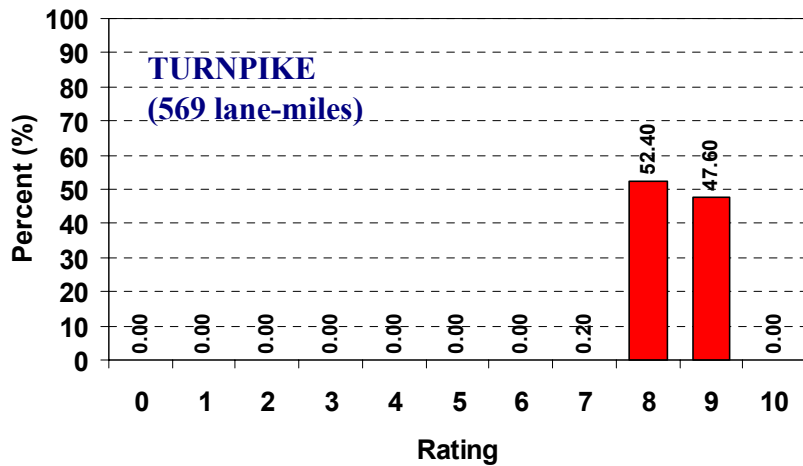
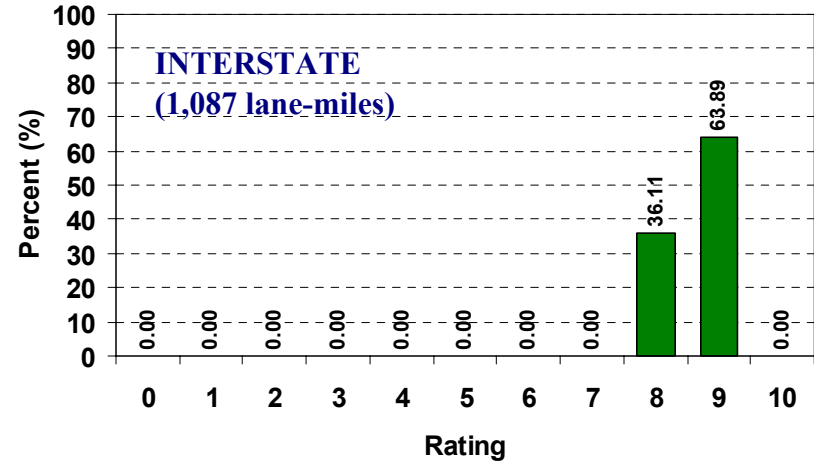
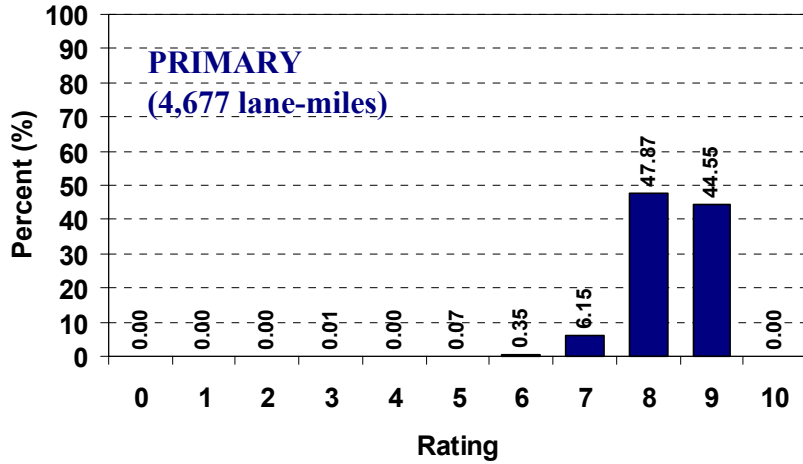
## District 4



1998 Data

# Ride Distribution by System

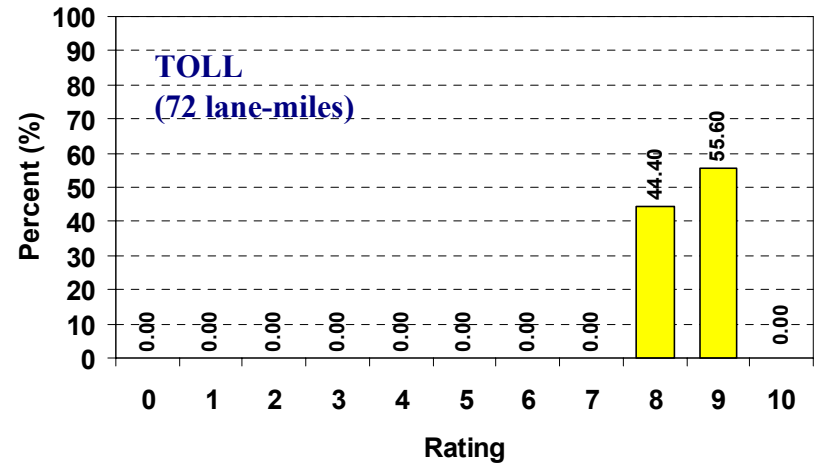
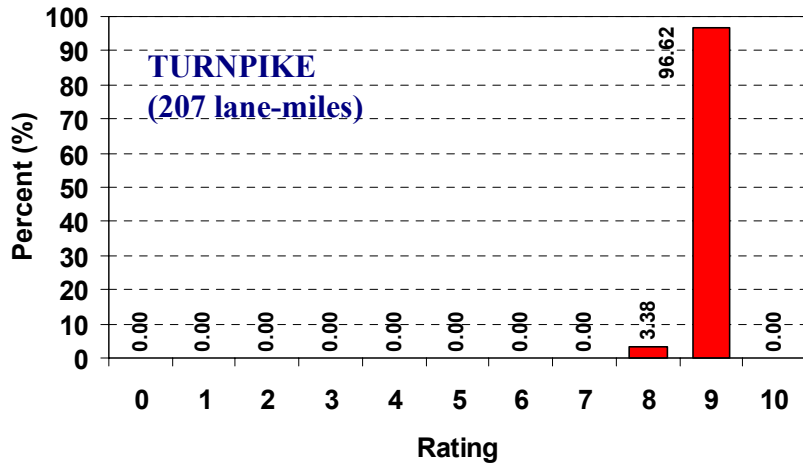
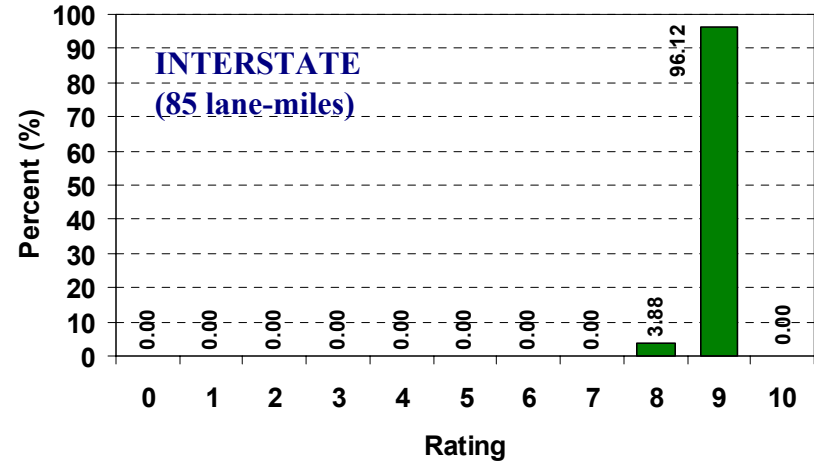
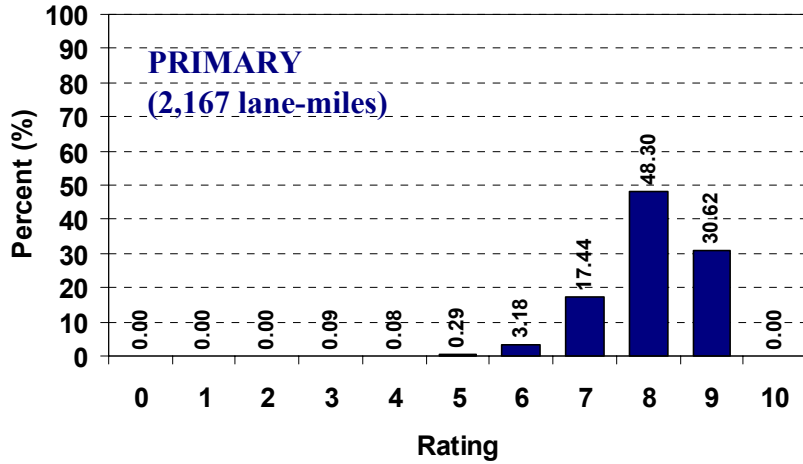
## District 5



1998 Data

# Ride Distribution by System

## District 6

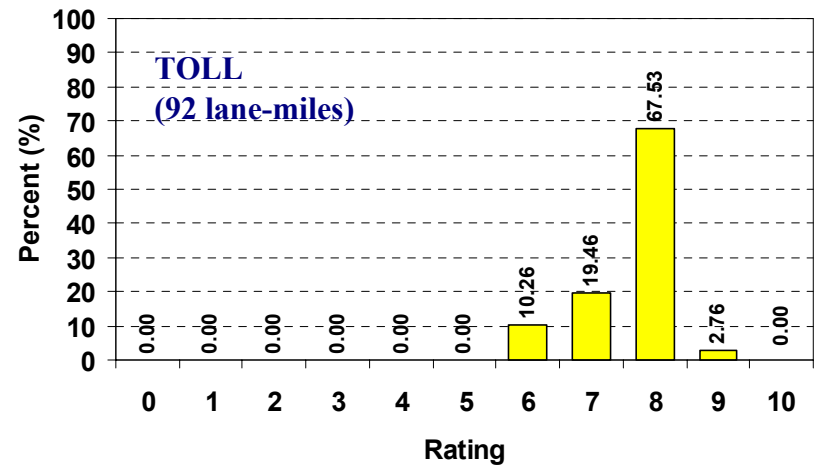
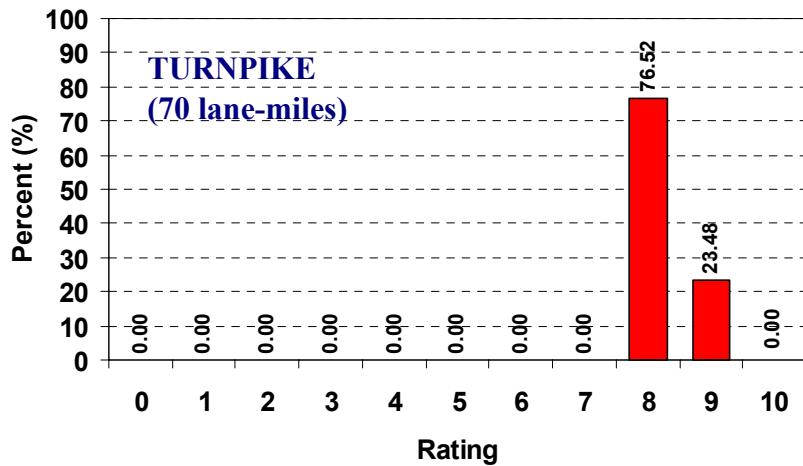
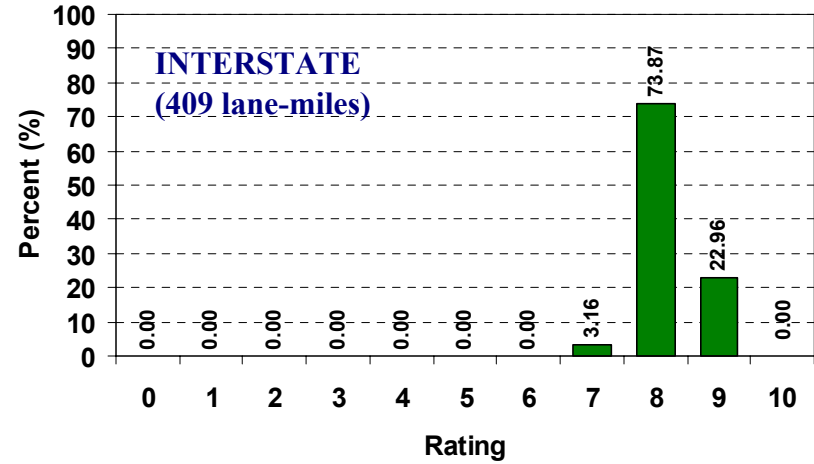
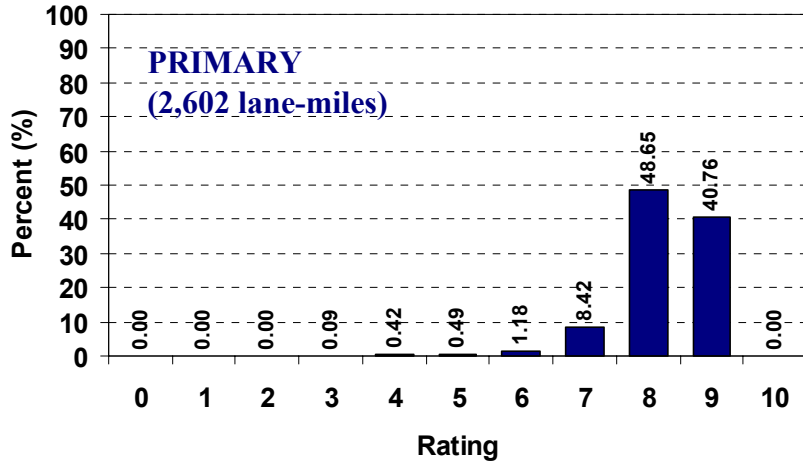


1998 Data



# Ride Distribution by System

## District 7



1998 Data

**SECTION V**

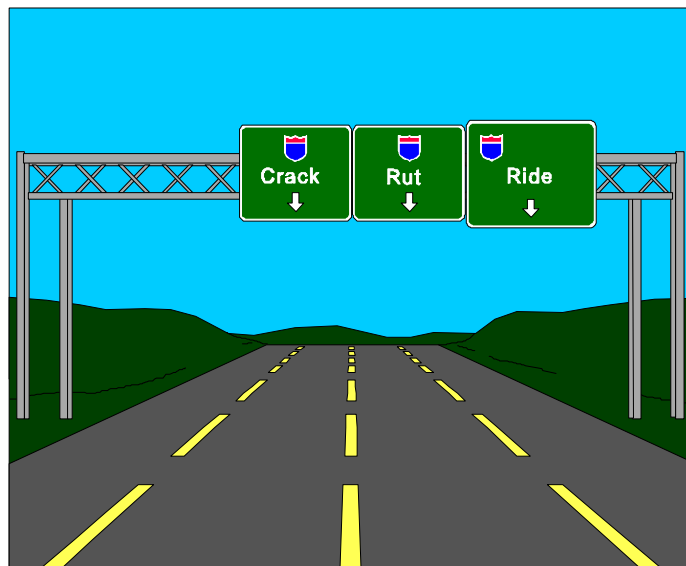
**CRACK, RUT & RIDE**

**DISTRIBUTIONS**

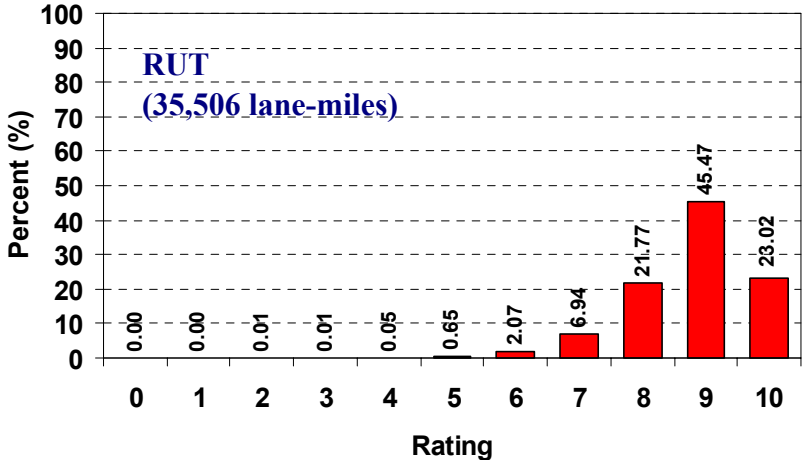
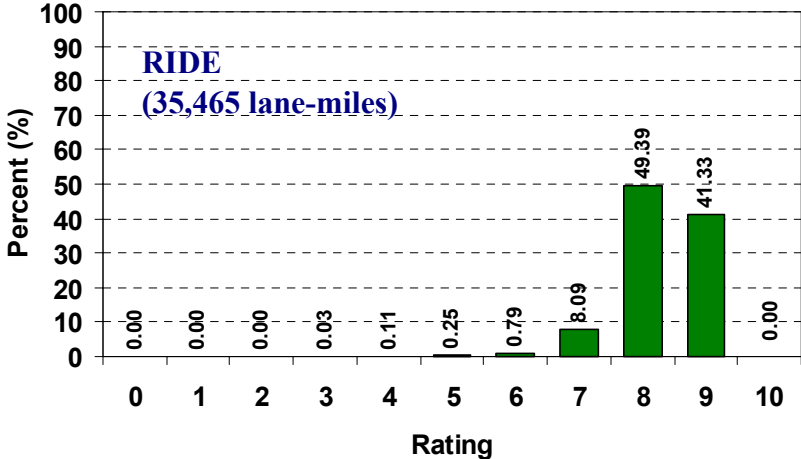
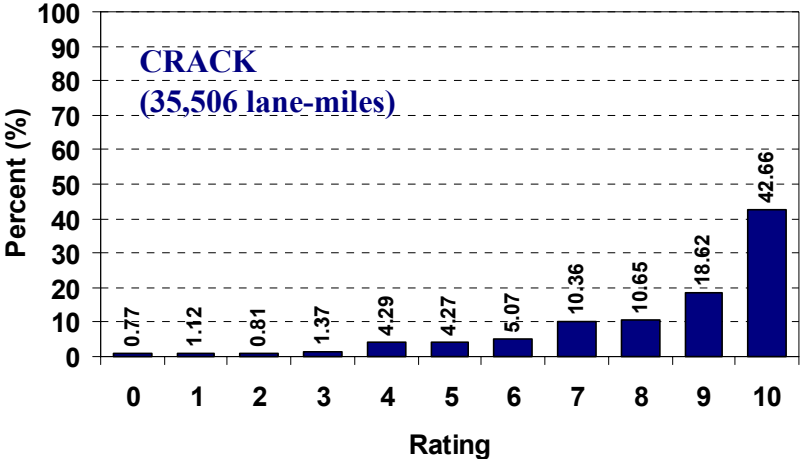
**BY**

**DISTRICT**

**(ALL SYSTEMS COMBINED)**



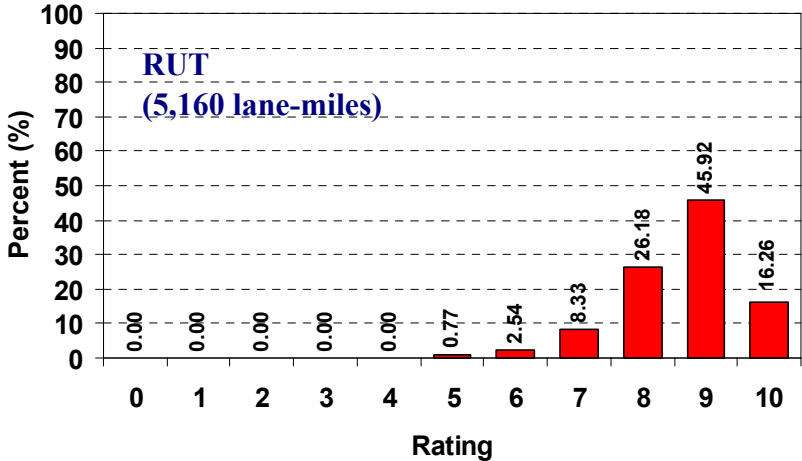
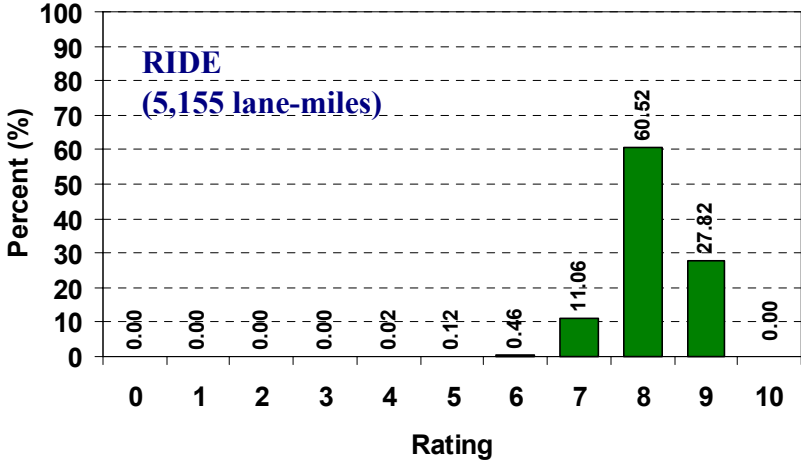
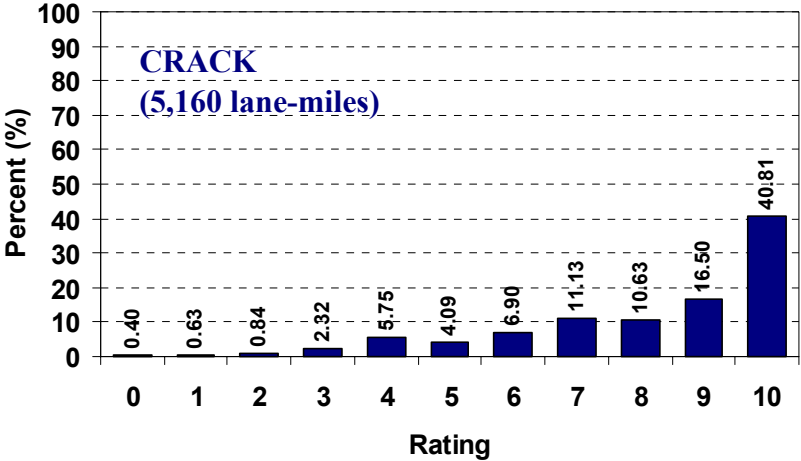
# Crack, Ride & Rut Distribution Statewide (All Systems)



1998 Data

# Crack, Ride & Rut Distribution

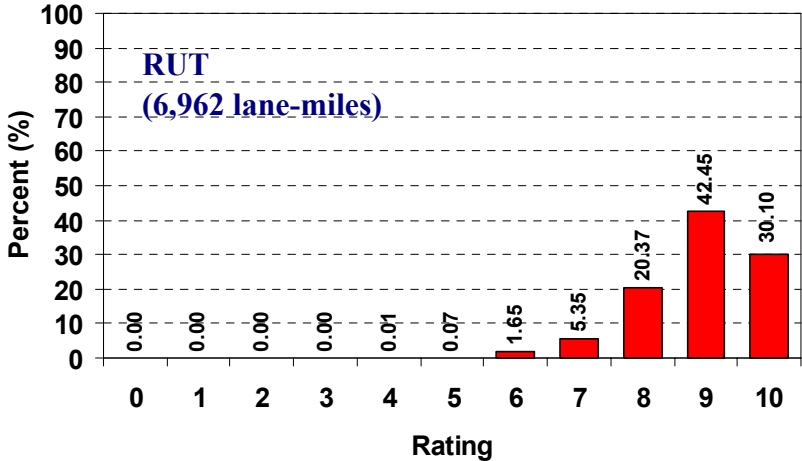
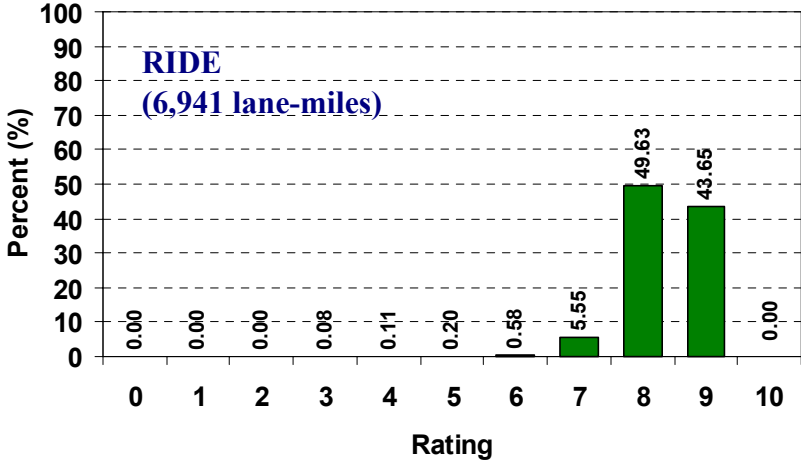
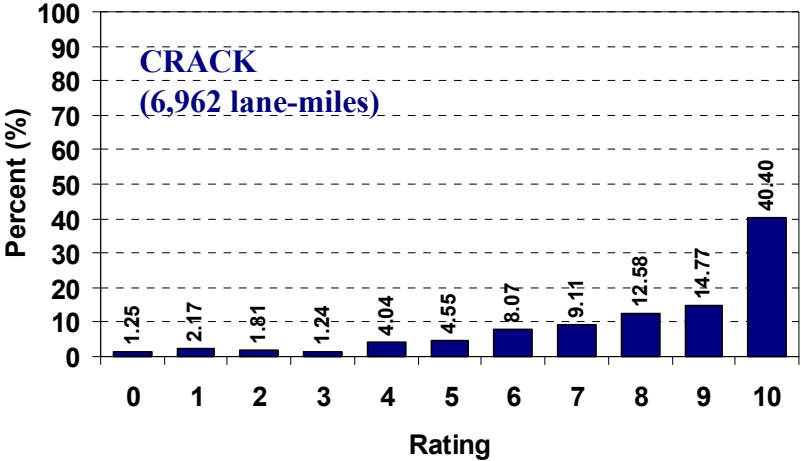
## District 1 (All Systems)



1998 Data

# Crack, Ride & Rut Distribution

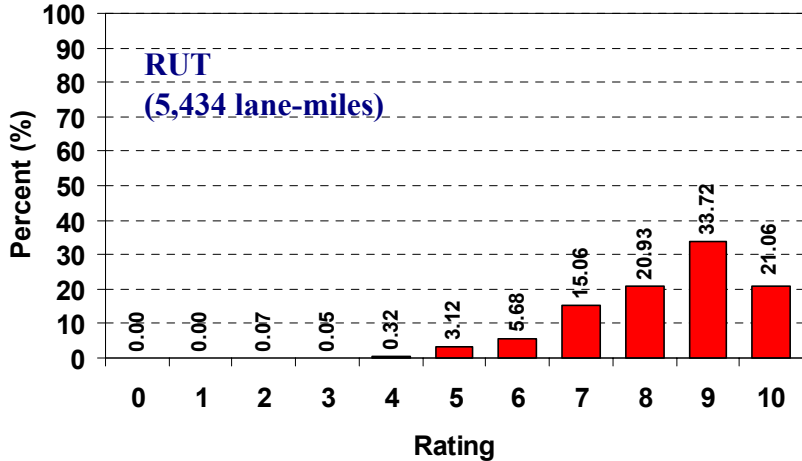
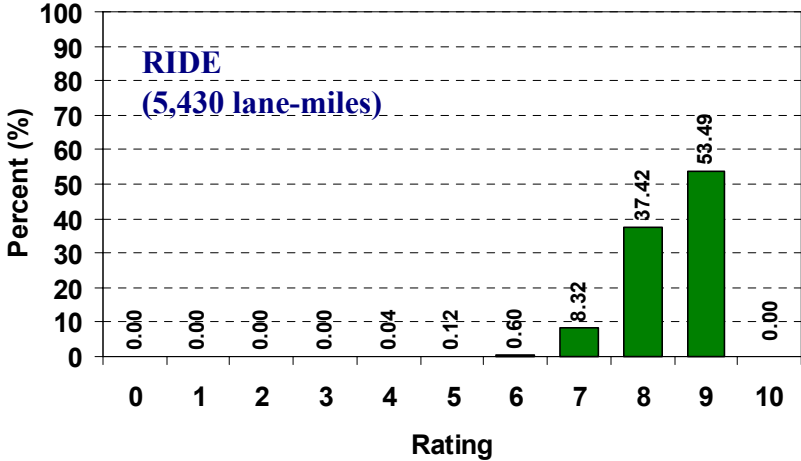
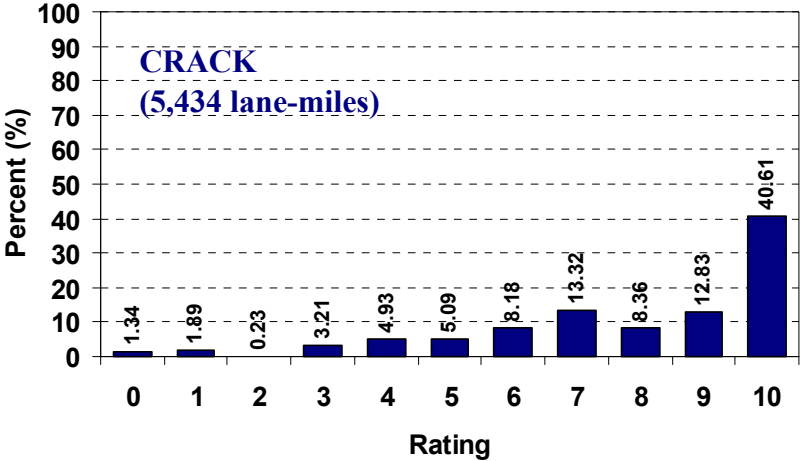
## District 2 (All Systems)



1998 Data

# Crack, Ride & Rut Distribution

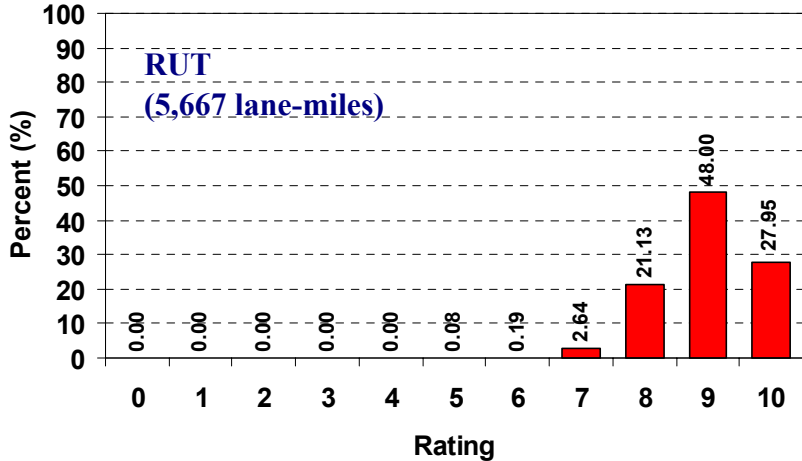
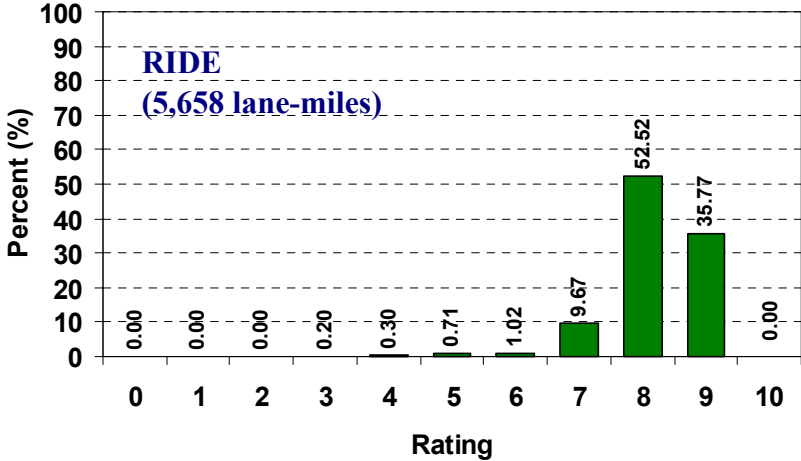
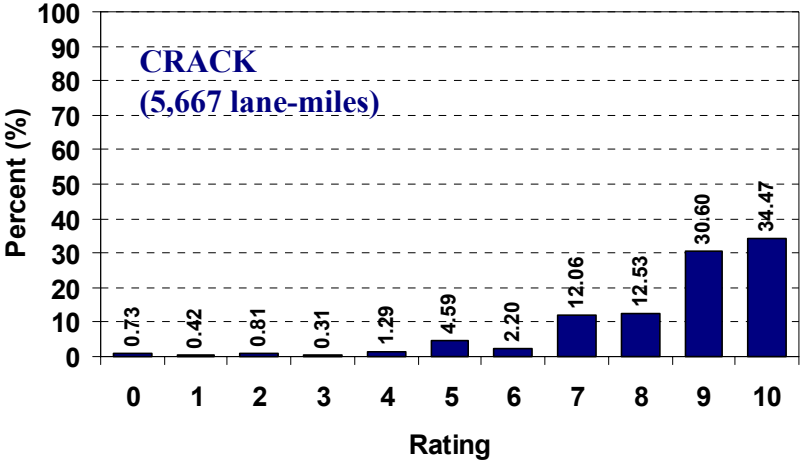
## District 3 (All Systems)



1998 Data

# Crack, Ride & Rut Distribution

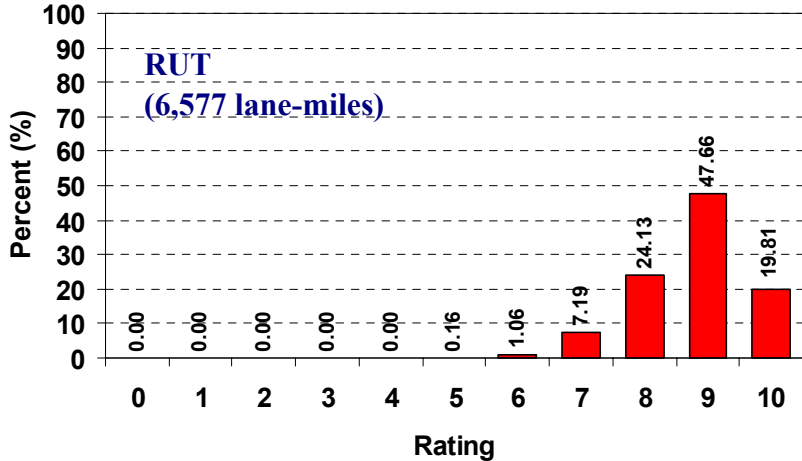
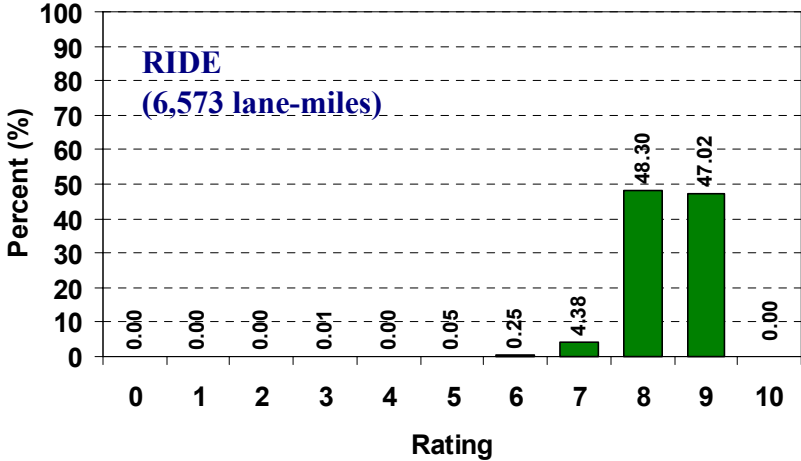
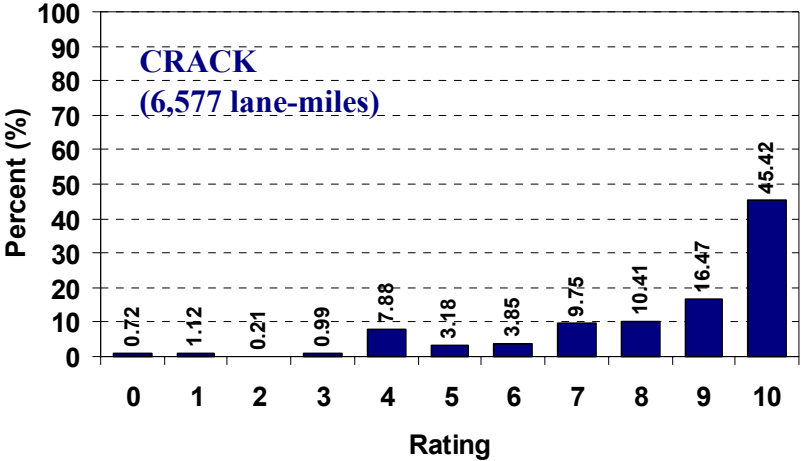
## District 4 (All Systems)



1998 Data

# Crack, Ride & Rut Distribution

## District 5 (All Systems)

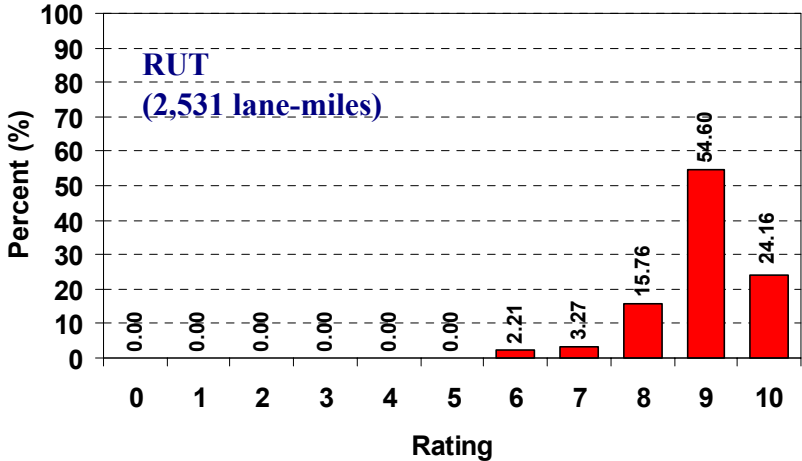
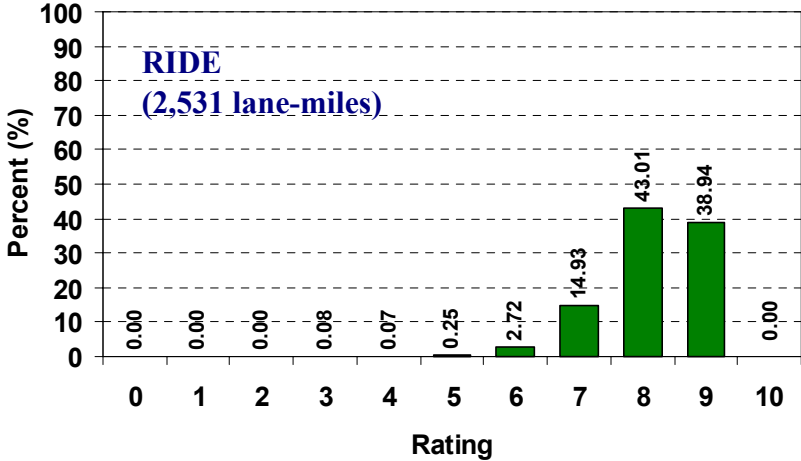
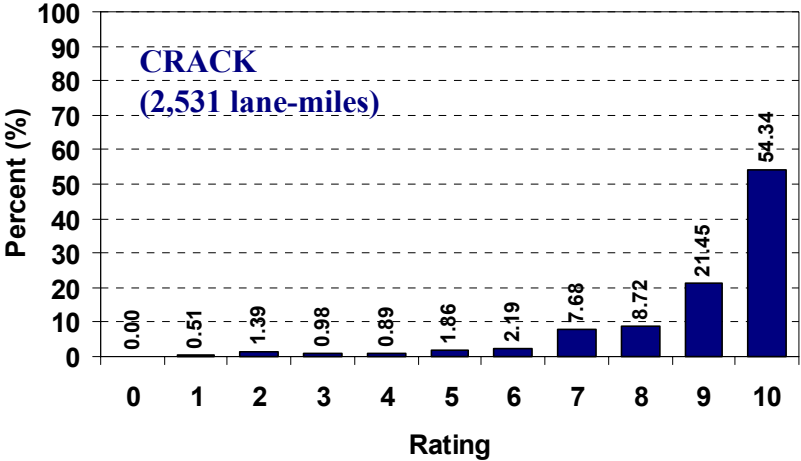


1998 Data



# Crack, Ride & Rut Distribution

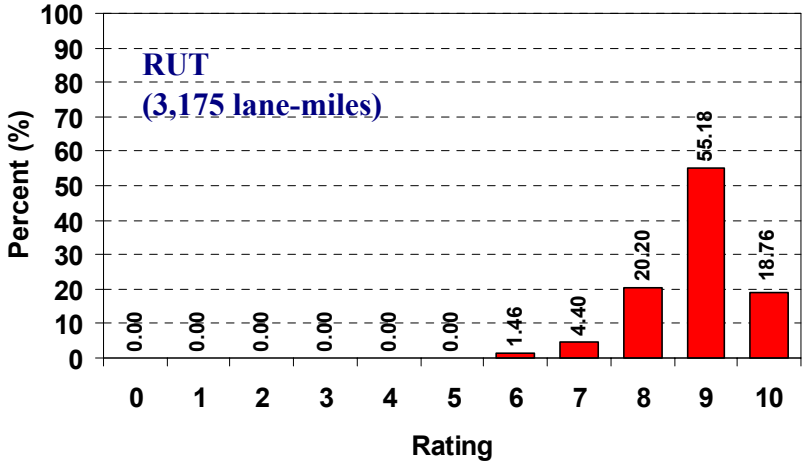
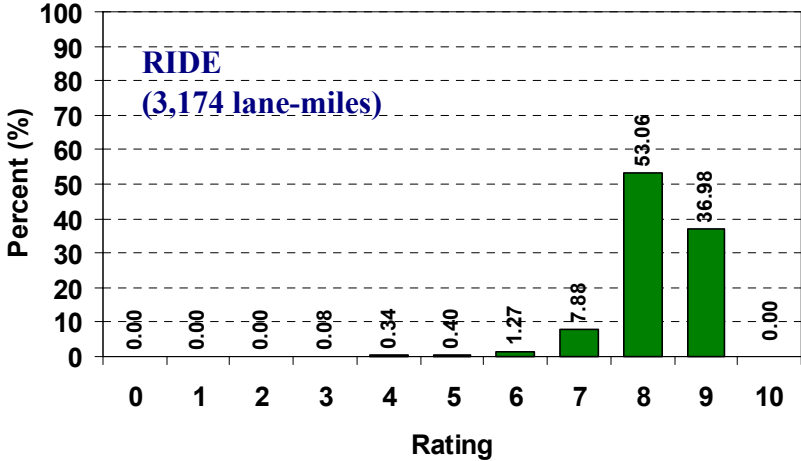
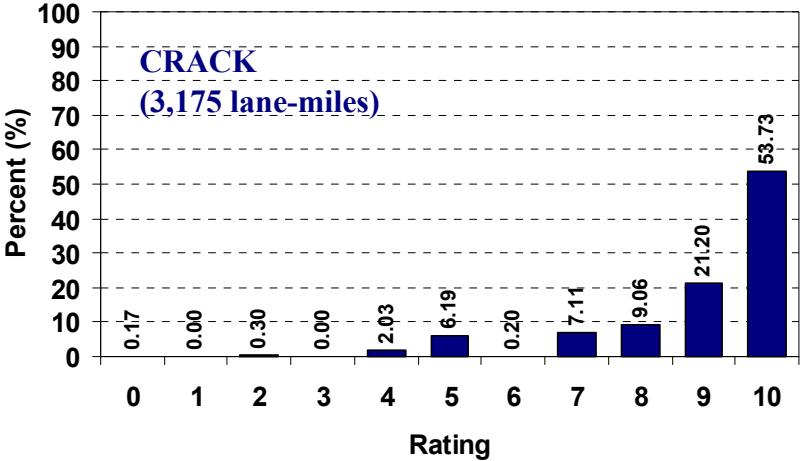
## District 6 (All Systems)



1998 Data

# Crack, Ride & Rut Distribution

## District 7 (All Systems)



1998 Data

**SECTION VI**

**HISTORICAL**

**INFORMATION**

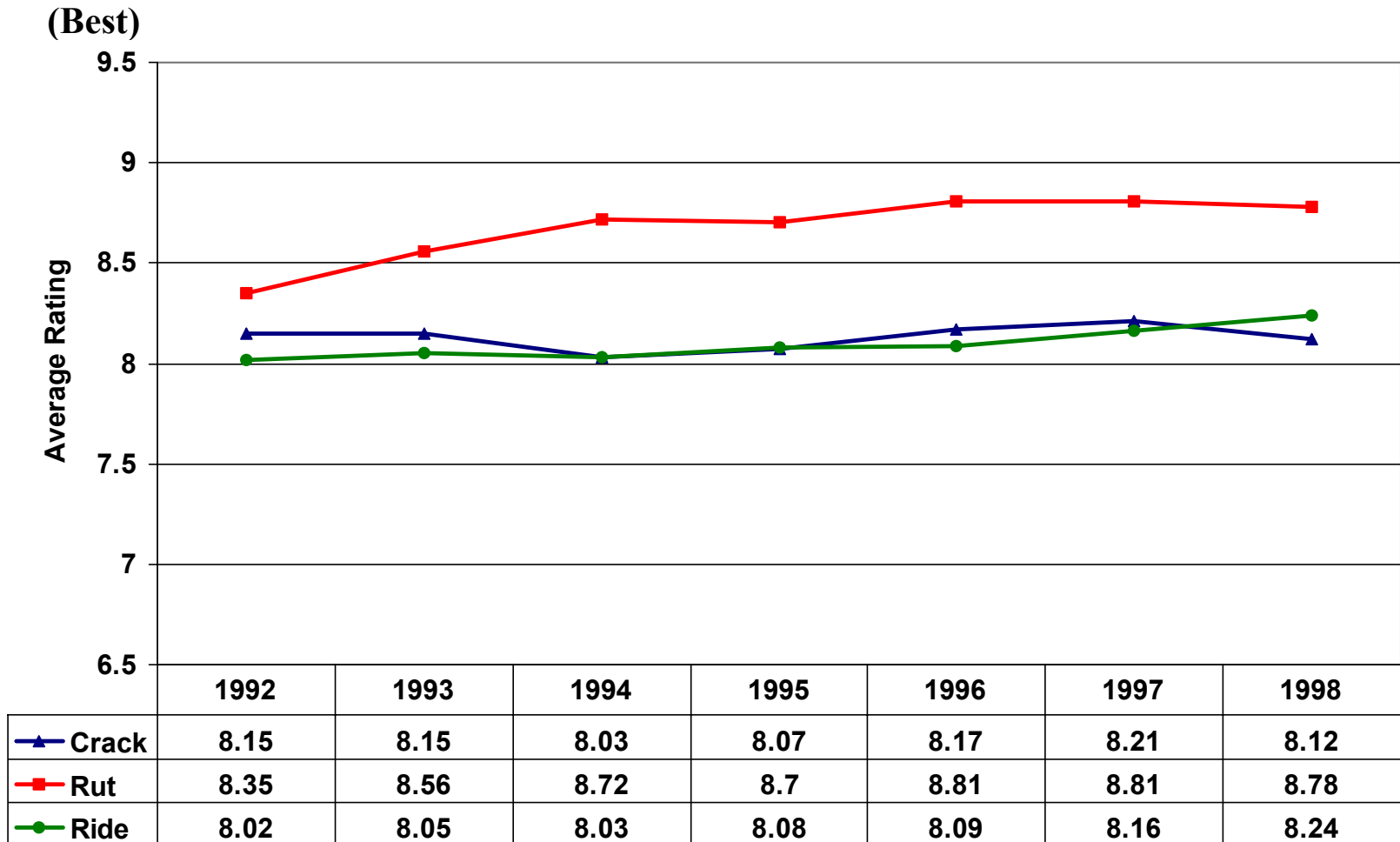
**BY**

**DISTRICT**



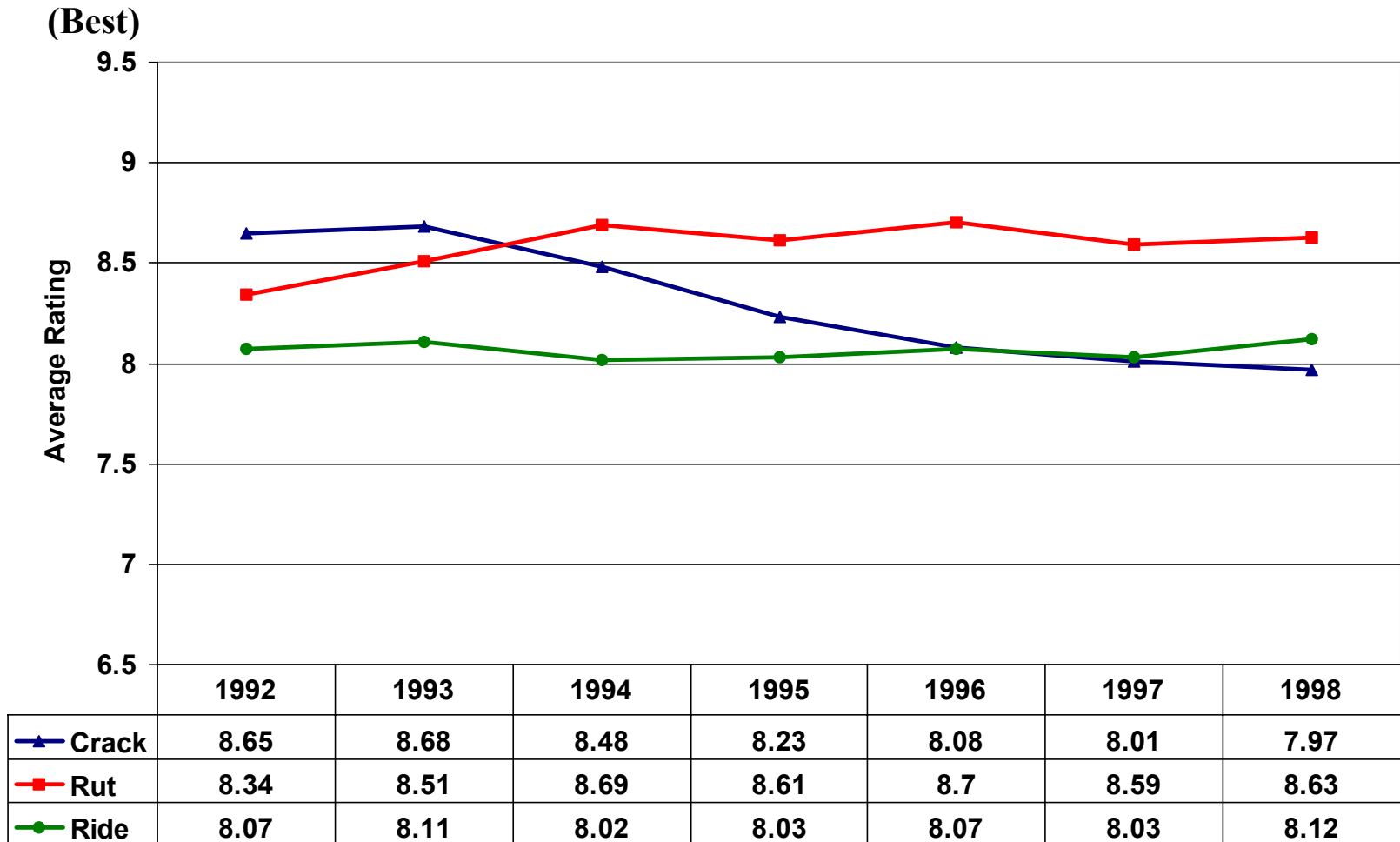
# ALL Districts

## HISTORICAL INFORMATION



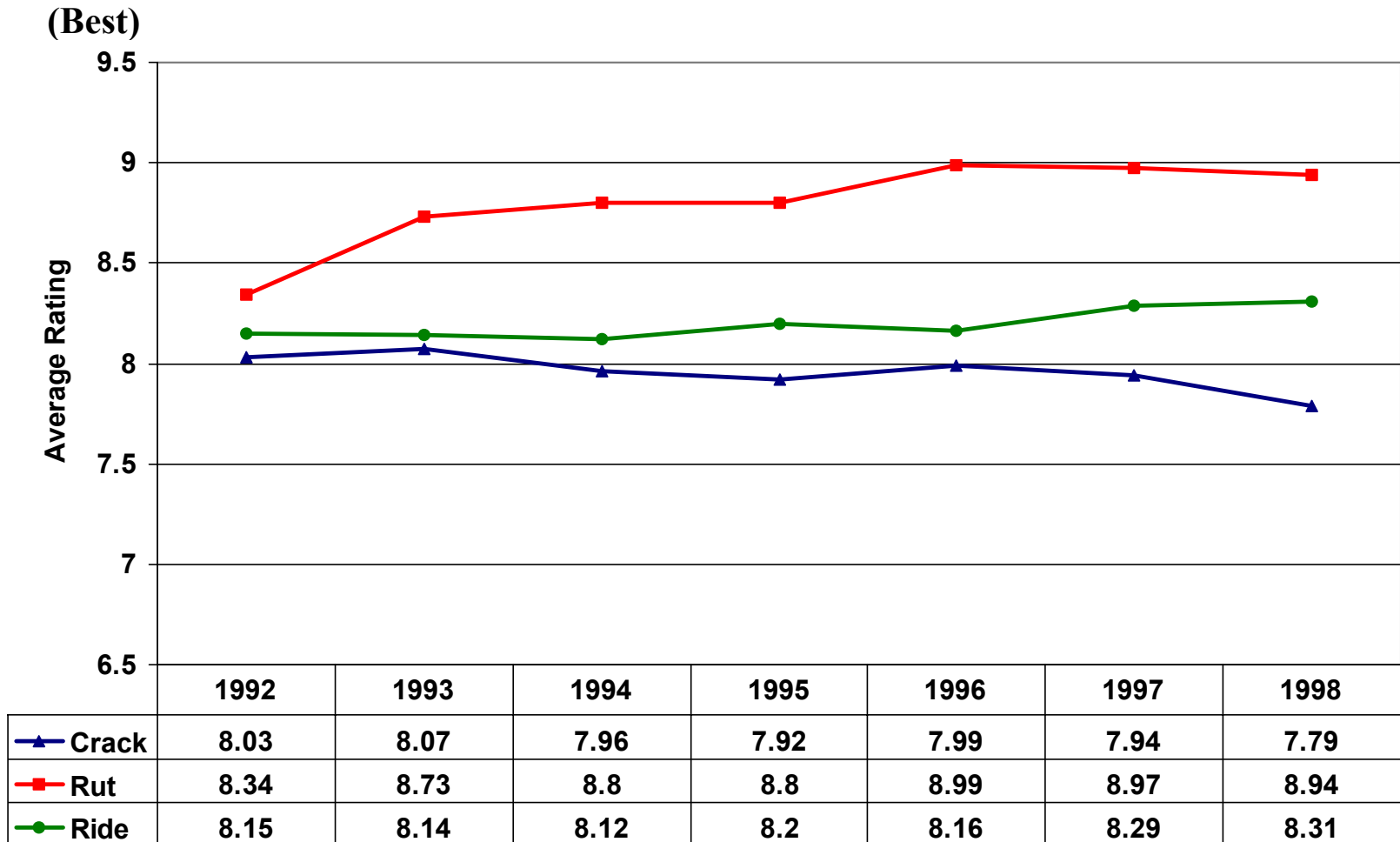
# District 1

## HISTORICAL INFORMATION



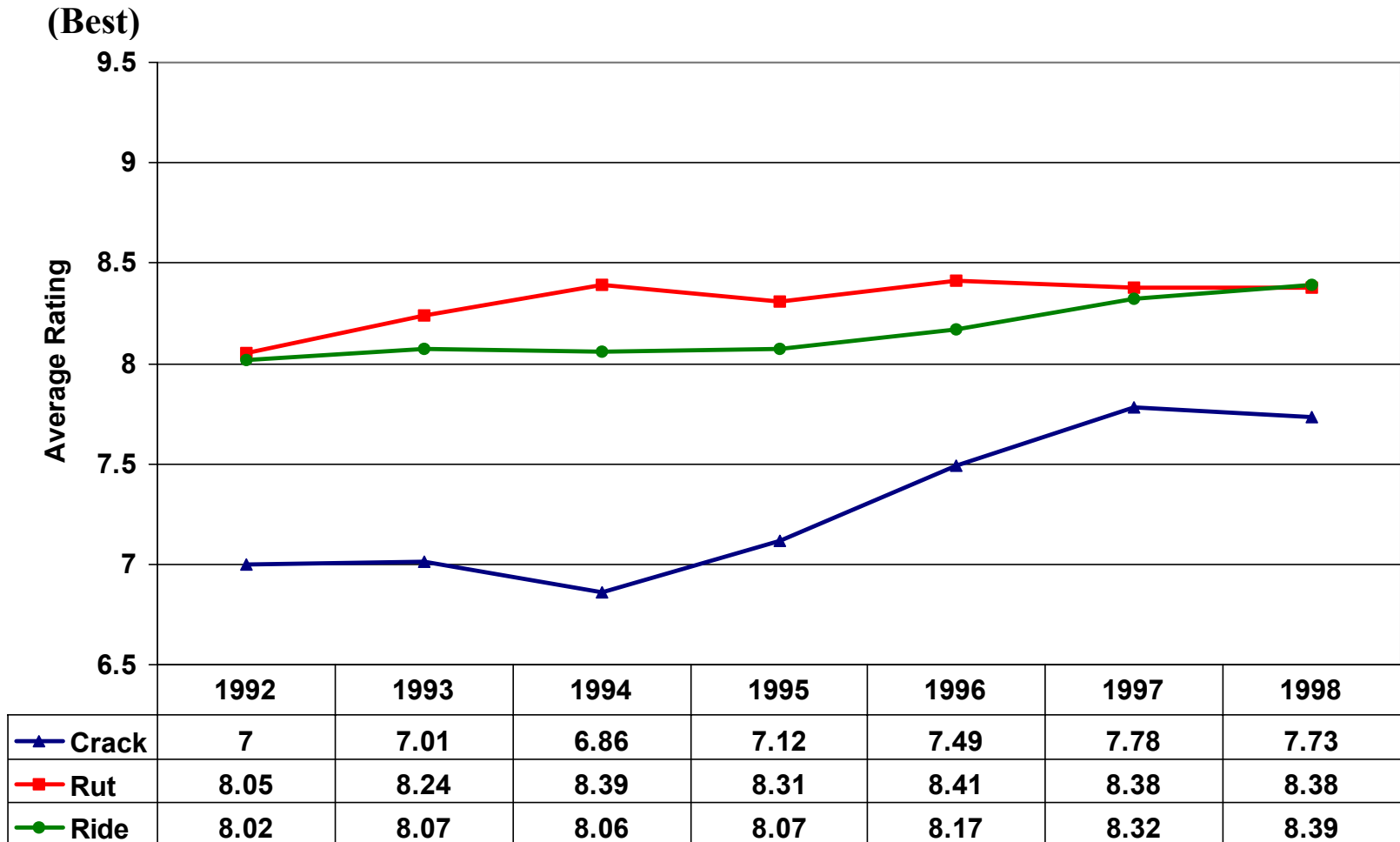
# District 2

## HISTORICAL INFORMATION



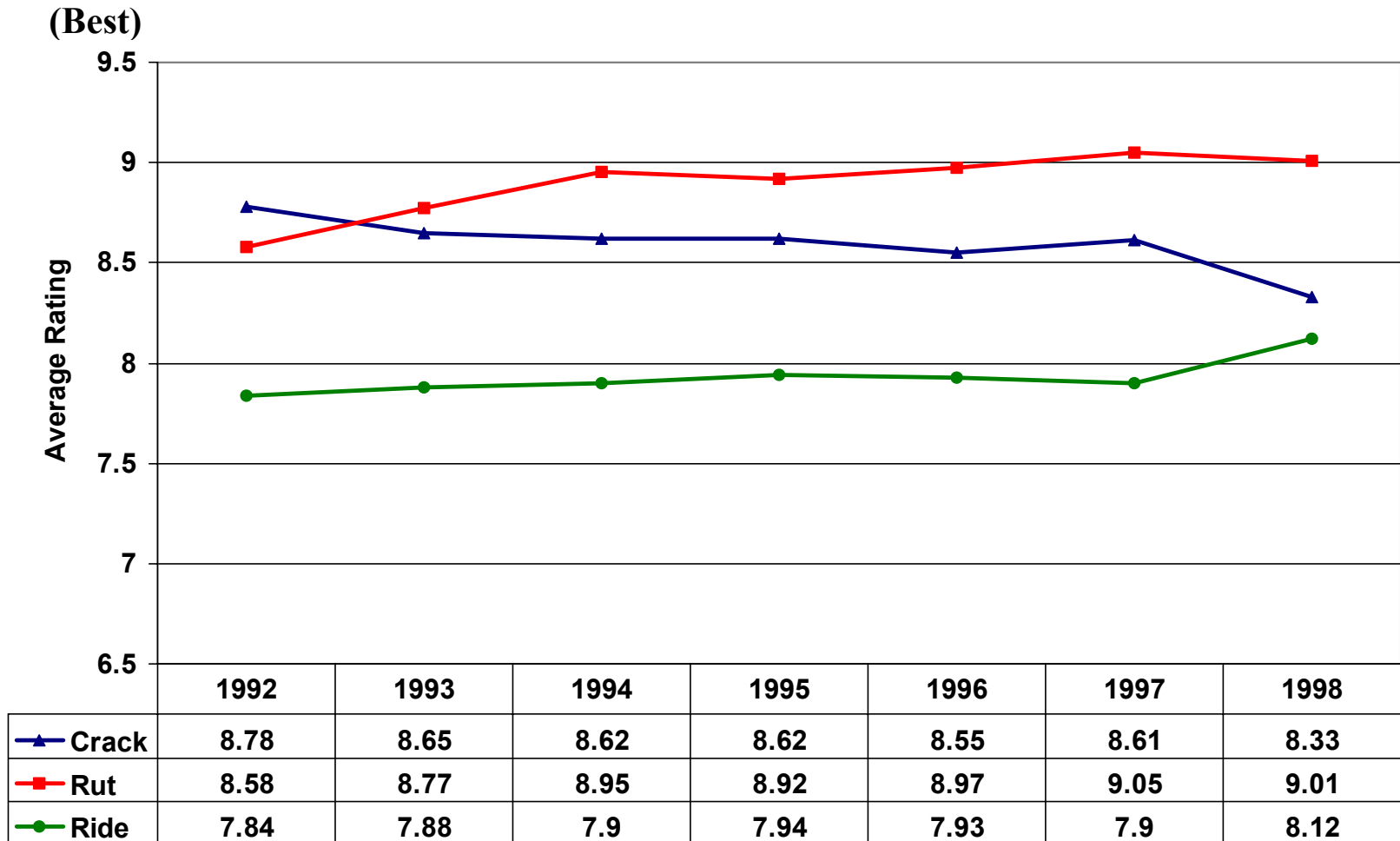
# District 3

## HISTORICAL INFORMATION



# District 4

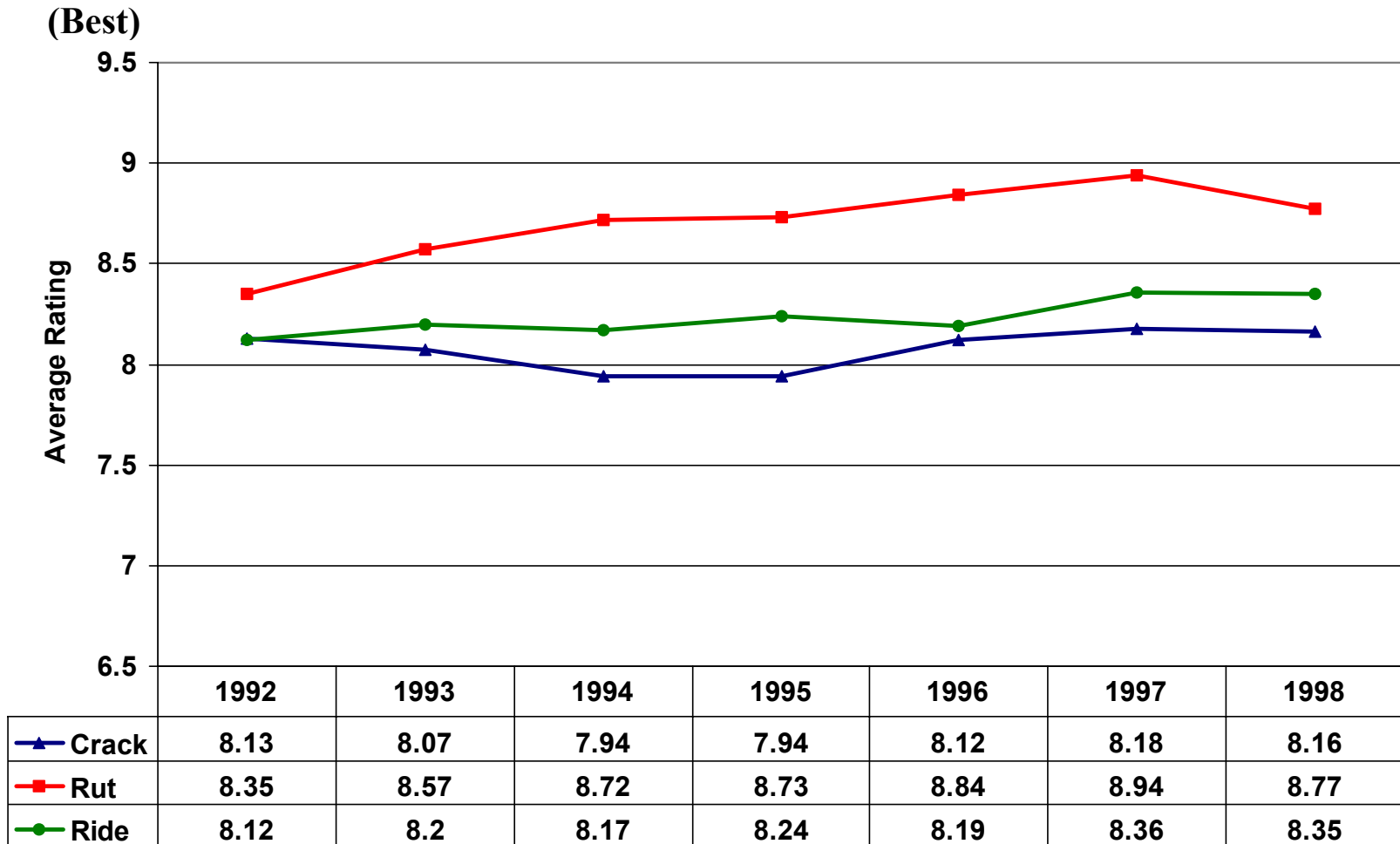
## HISTORICAL INFORMATION





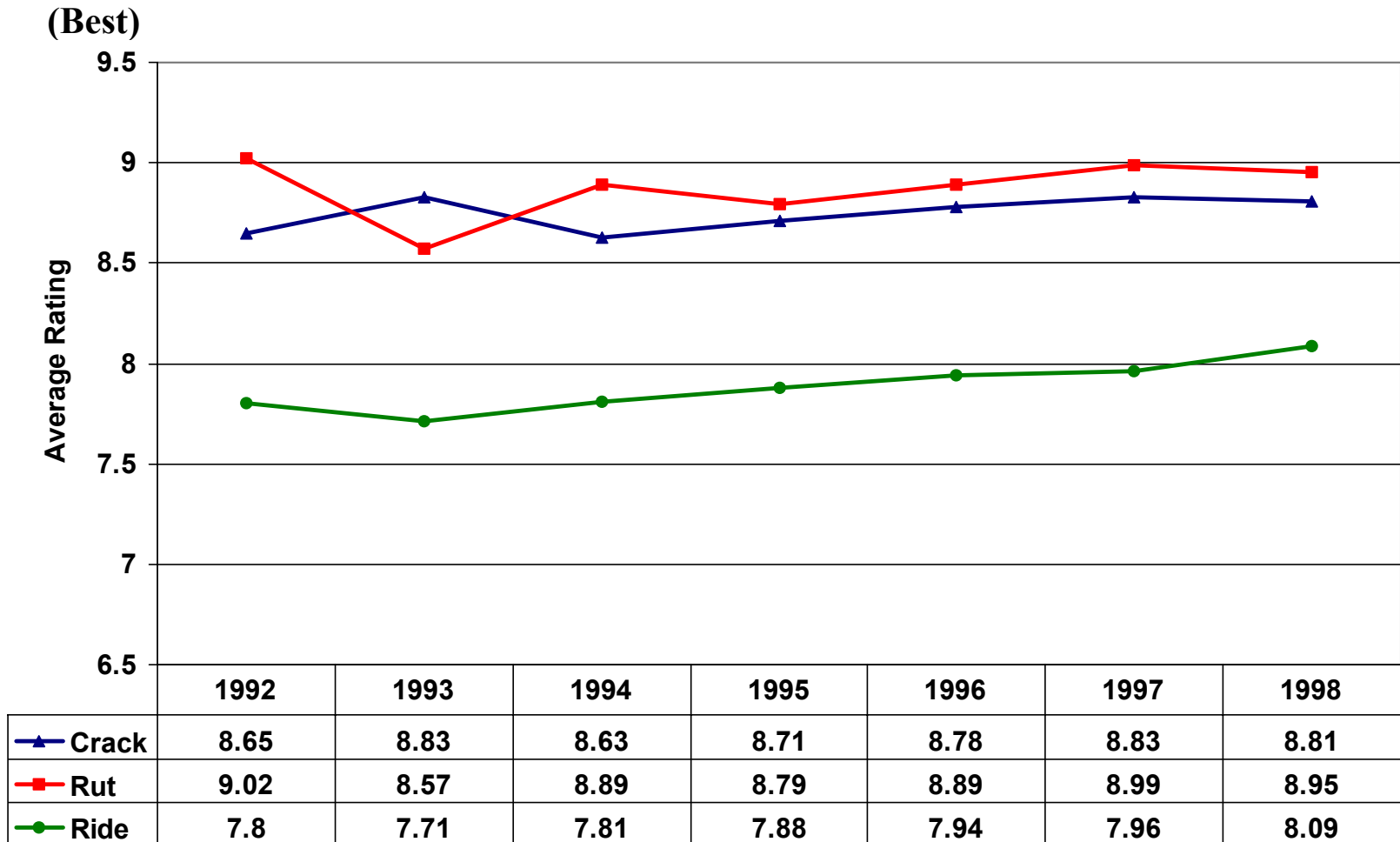
# District 5

## HISTORICAL INFORMATION



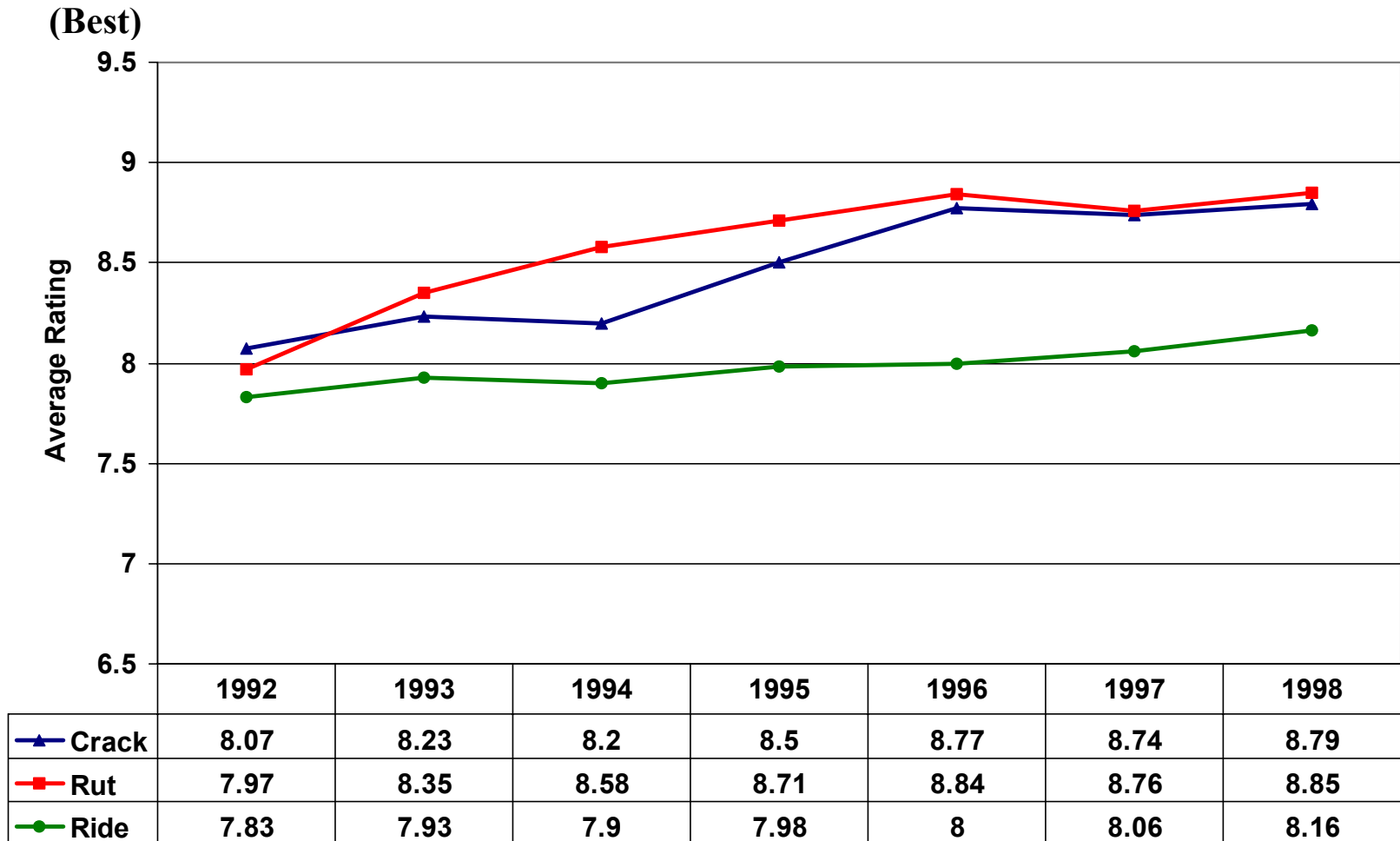
# District 6

## HISTORICAL INFORMATION



# District 7

## HISTORICAL INFORMATION



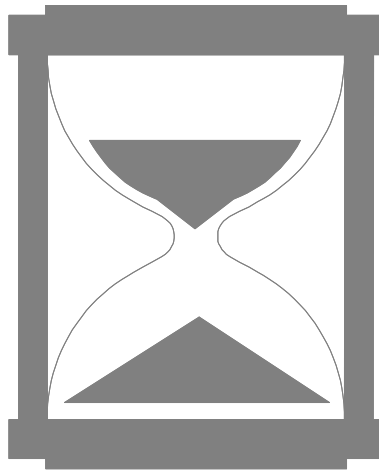
**SECTION VII**

**HISTORICAL**

**INFORMATION**

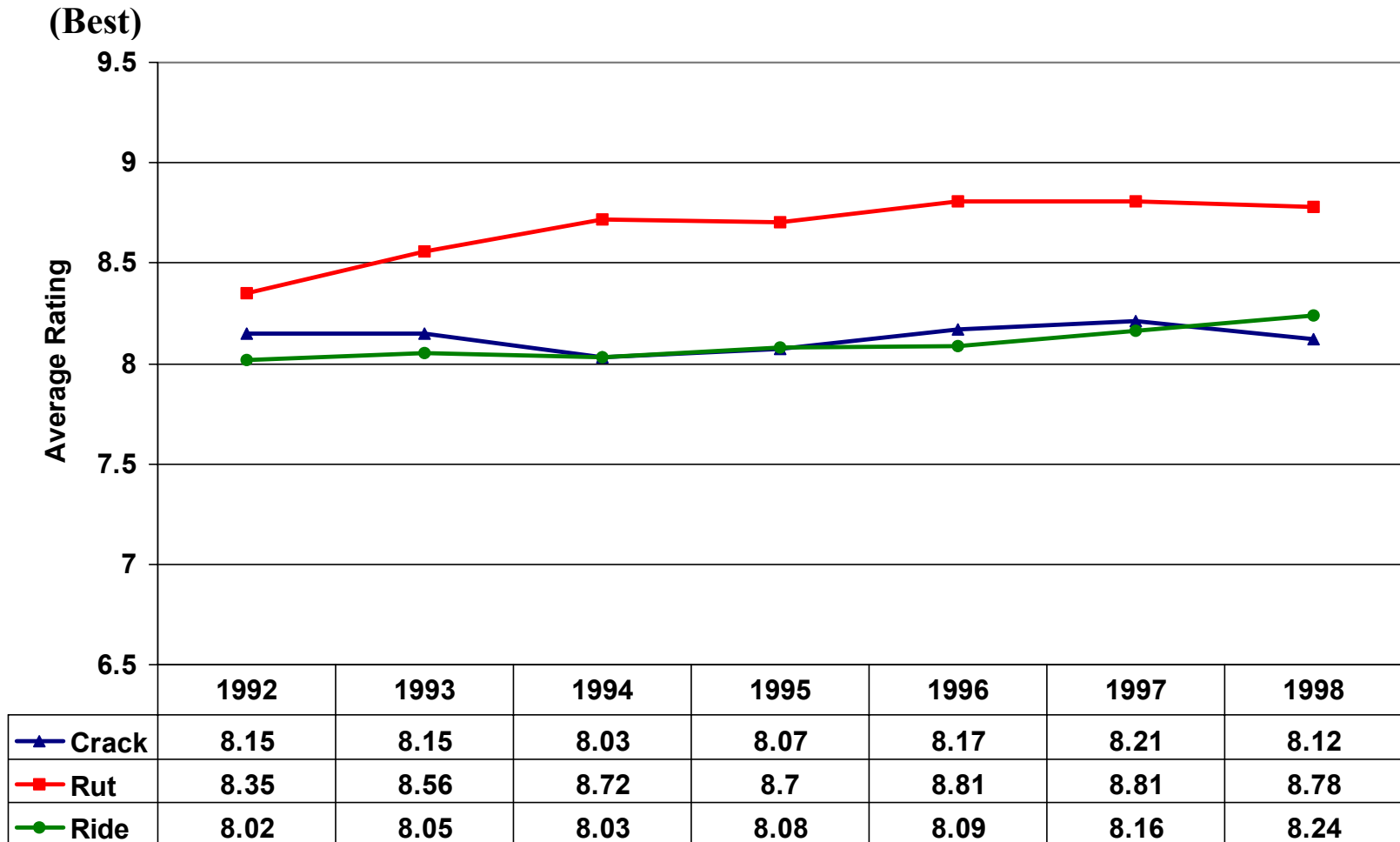
**BY**

**SYSTEM**

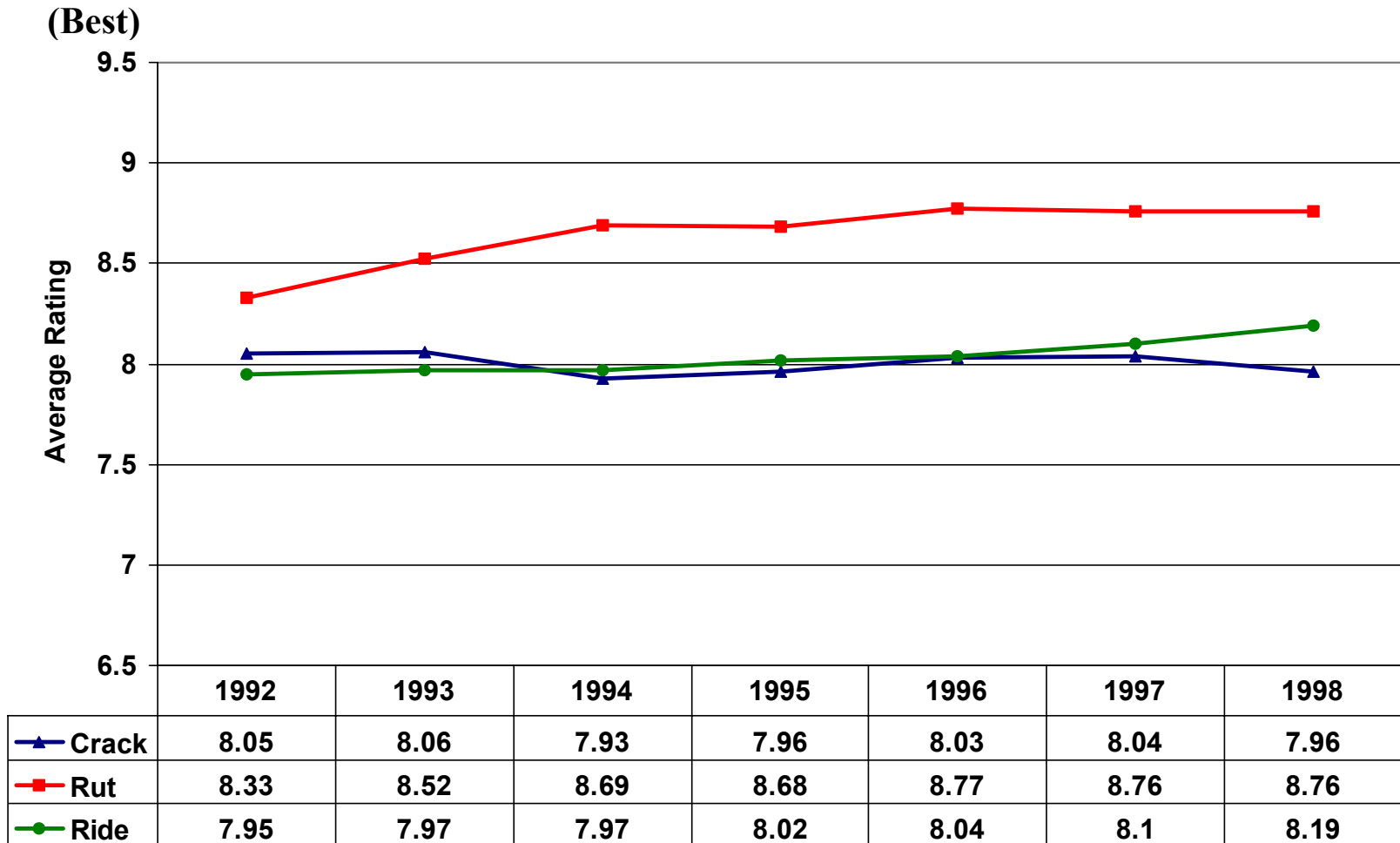


# ALL Systems

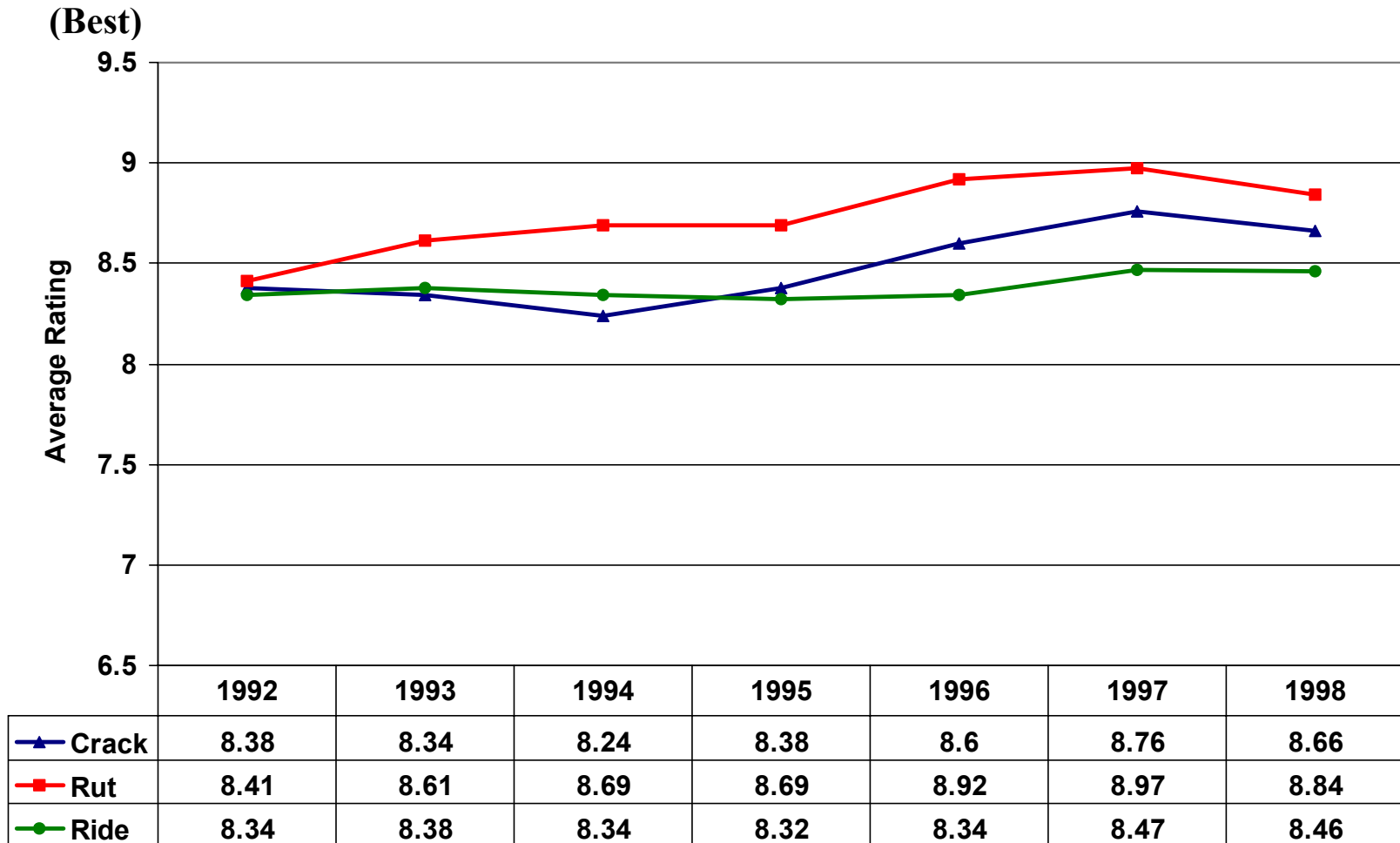
## HISTORICAL INFORMATION



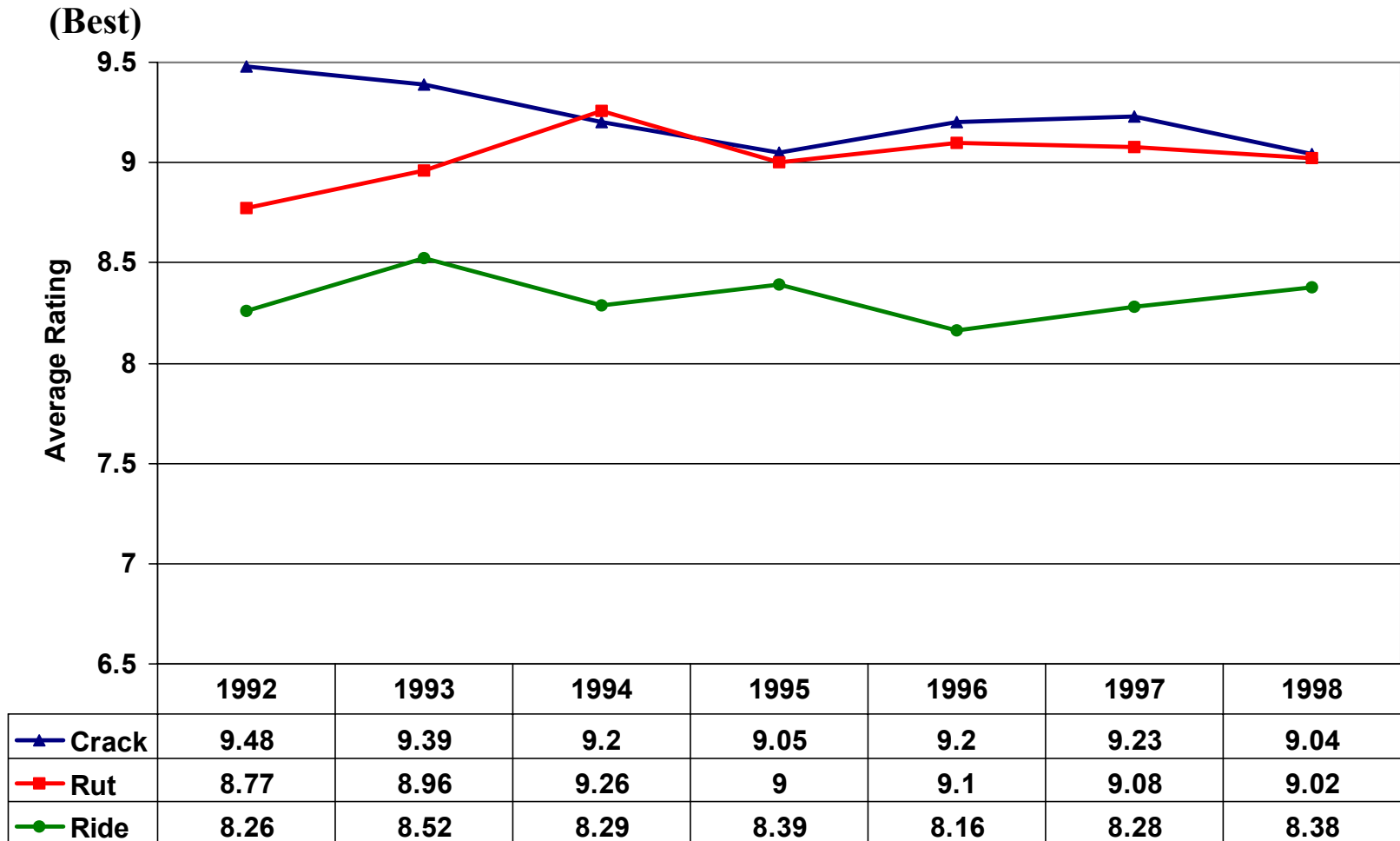
# PRIMARY System HISTORICAL INFORMATION



# INTERSTATE System HISTORICAL INFORMATION

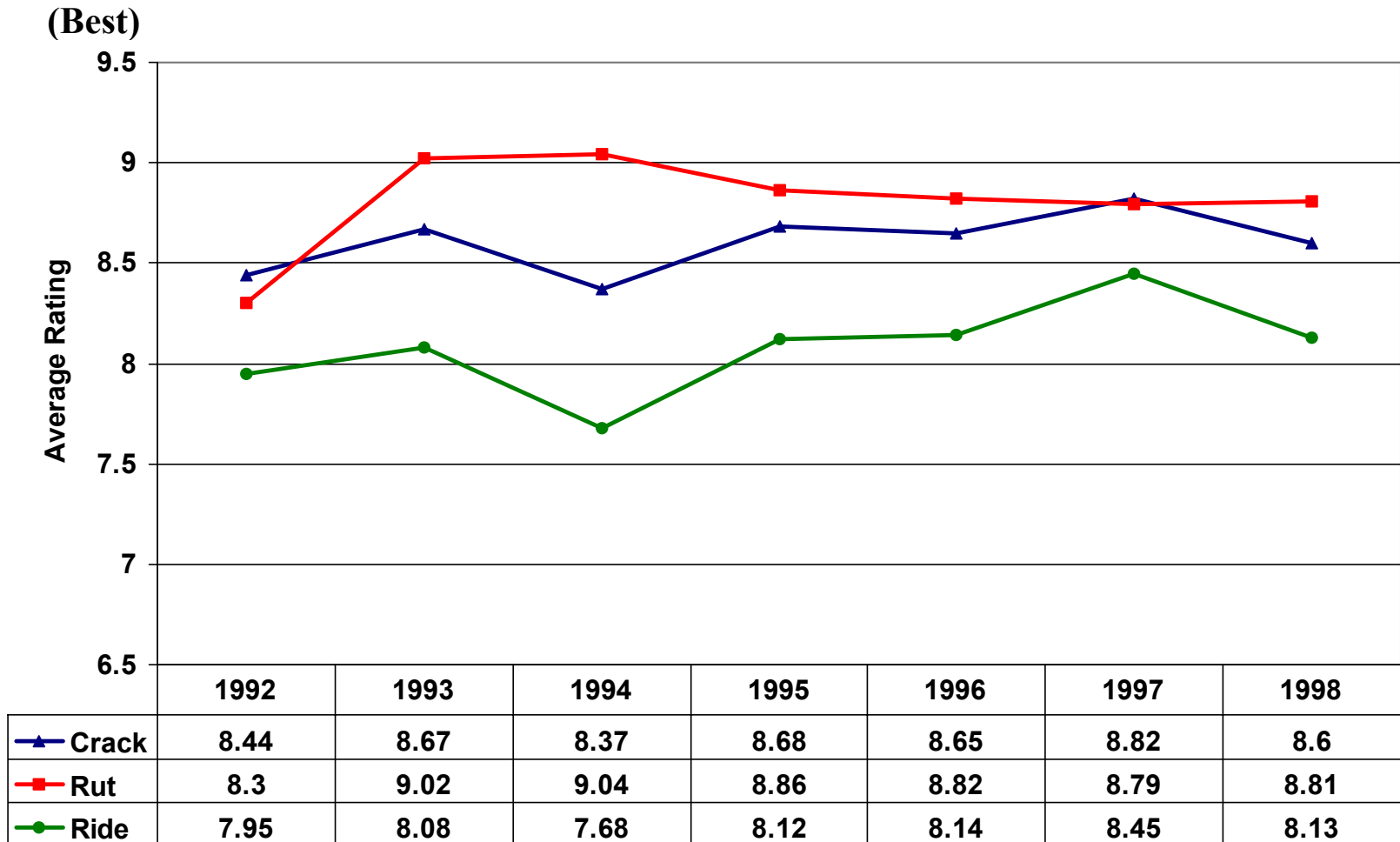


# TURNPIKE System HISTORICAL INFORMATION





# TOLL System HISTORICAL INFORMATION



**SECTION VIII**

**RAVELING**

**HISTORICAL INFORMATION**

**BY**

**DISTRICT**



# SECTION VIII

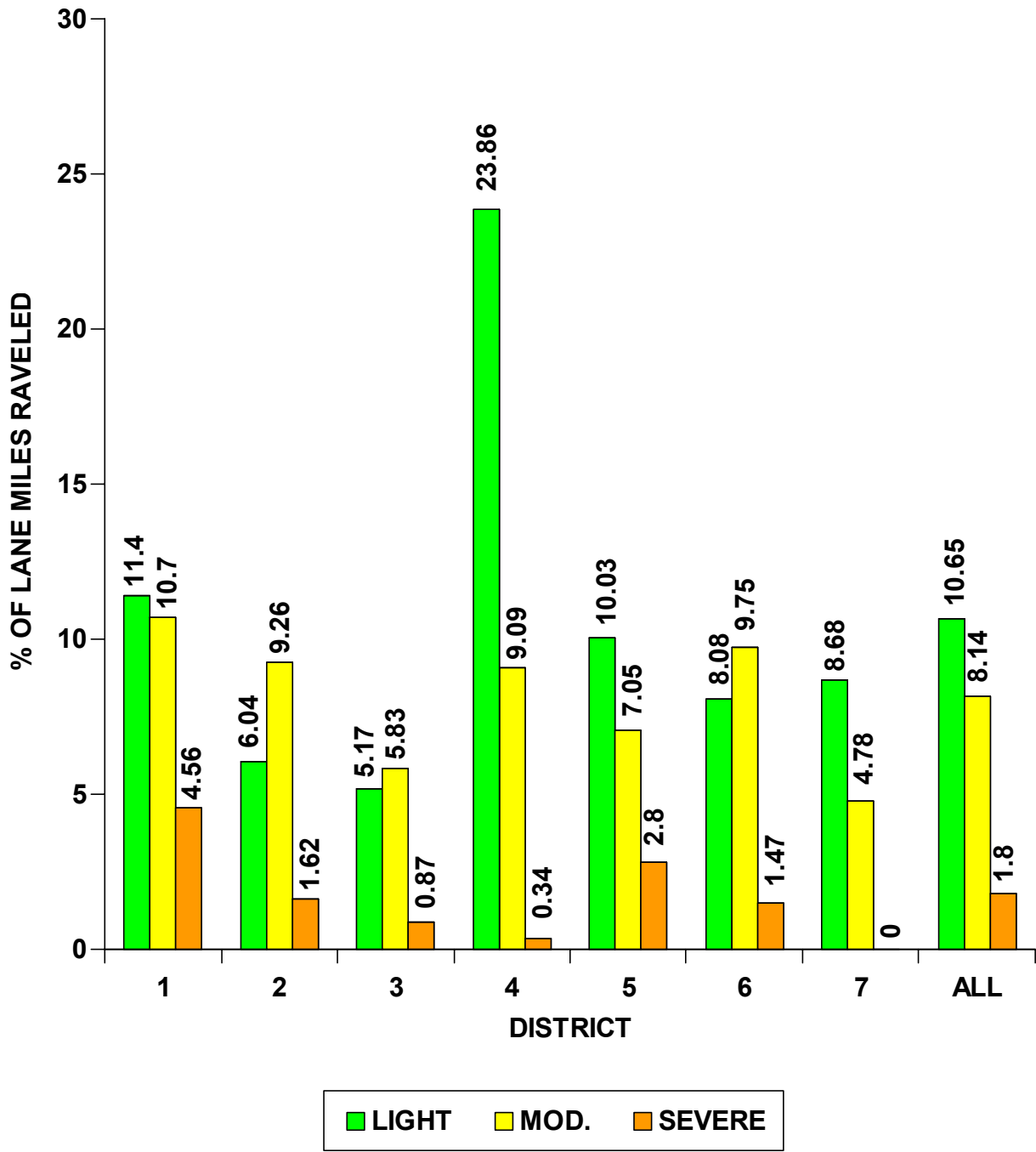
## Raveling

### Raveling Rating Criteria

- ! Raveling is the wearing away of the pavement surface caused by the dislodging of aggregate particles and the loss of asphalt binder due to weathering.
- ! Raveling and weathering may be caused by:
  - ✓ Hardening of the asphalt binder.
  - ✓ Low adhesion of the asphalt binder.
  - ✓ Low wear resistant aggregate in the mix or poor asphalt mix (dirty aggregate in the mix).
  - ✓ Water sensitive asphalt-aggregate mixture.
  - ✓ Any combination of the above items.
- ! Raveling became a noticeable defect by raters and was required to be listed in their comments as of 1992.
- ! Beginning in 1995, Raveling was rated by severity level (light, moderate, and severe) and percent of affected area, where only the predominate severity level was recorded.
- ! Light Raveling occurs when the aggregate and/or binder has begun to wear away but has not progressed significantly. Some loss of aggregate.
- ! Moderate Raveling occurs when the aggregate and/or binder has worn away and the surface texture is becoming rough and pitted; loose particles generally exist; loss of aggregate has progressed.
- ! Severe Raveling occurs when the aggregate and/or binder has worn away and the surface texture is becoming rough and pitted; loss of aggregate very noticeable.

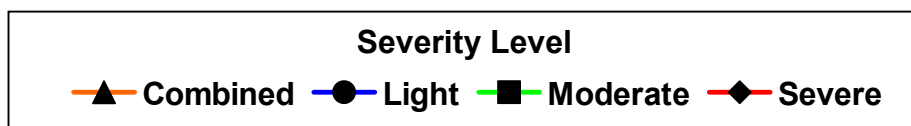
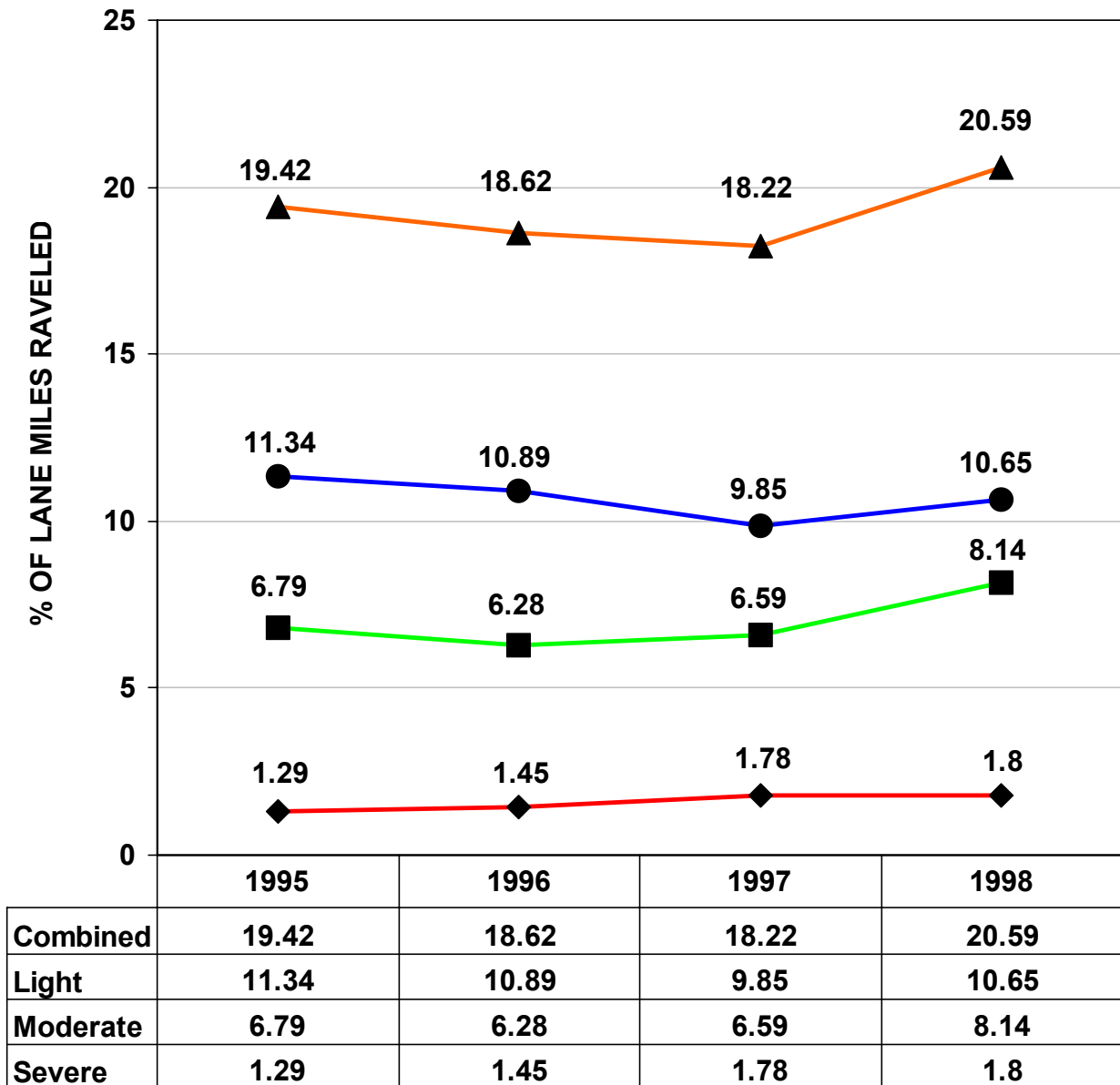
# 1998

## Raveling Survey By District



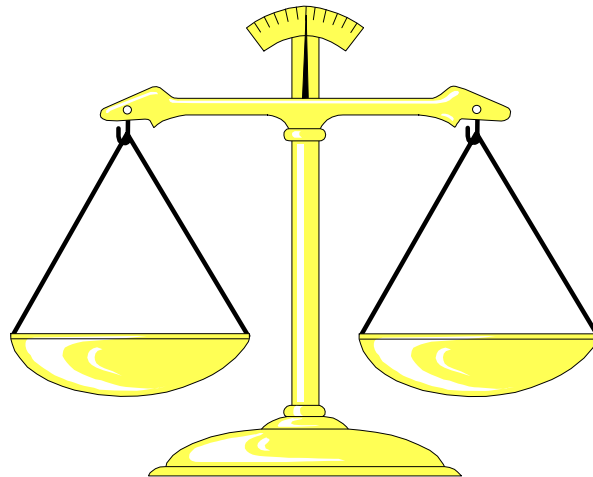
# Raveling Survey History

## All Systems Combined



# **SECTION IX**

## **CRACK, RUT & RIDE RATINGS COMPARISON BETWEEN 1998 & 1997**



# **SECTION IX**

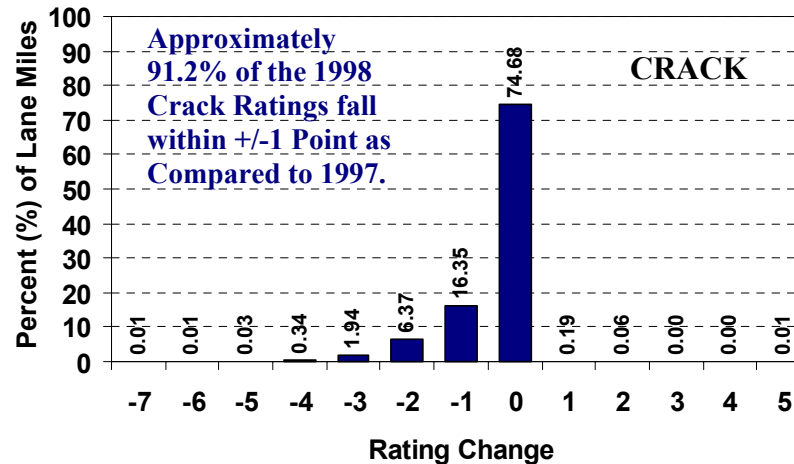
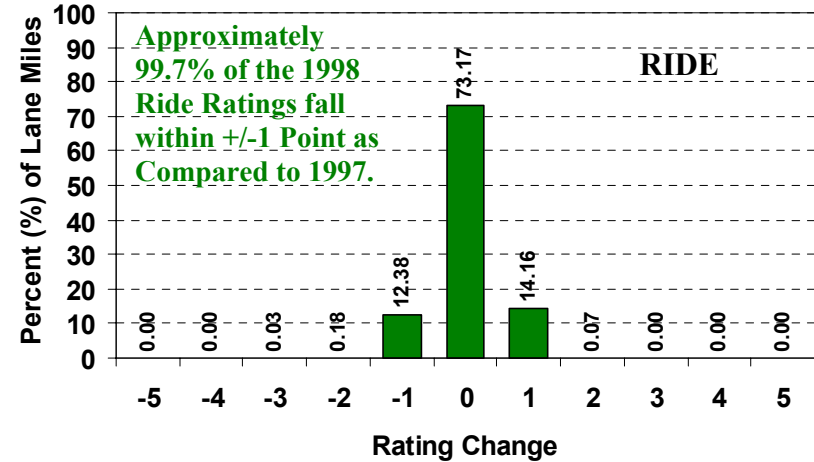
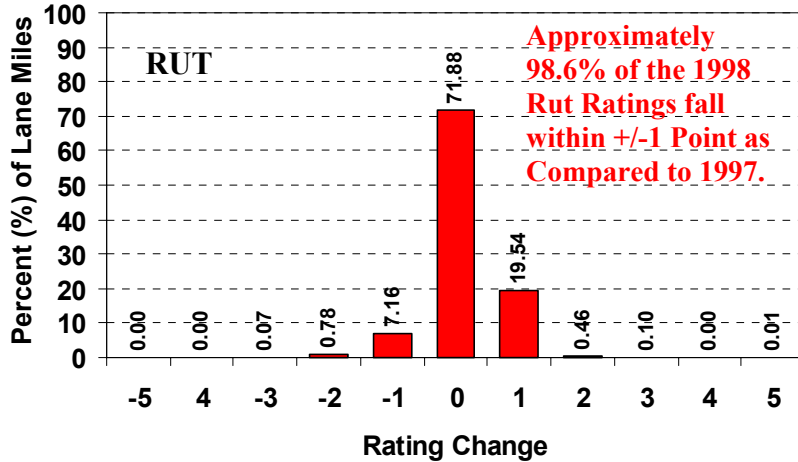
## **Crack, Rut & Ride Ratings Comparison**

### **Rating Comparison Criteria**

The following pavement types have been omitted because they exhibit known changes to the pavement surface, such as new construction, rehabilitation, or no ratings:

- Type 0 - Pavement sections not State-maintained, duplicated under another county section number, or added under rigid pavement survey.
- Type 2 - Surface treatment or pavement improvement without new construction, such as intersection improvements, wheel path leveling, bridge approach or area resurfacing.
- Type 4 - Rigid Pavements.
- Type 5 - New Construction.
- Type 6 - No Ride taken for this Section (normally because of length constraint)
- Type 7 - New pavement (Overlays)
- Type 8 - Under construction
- Type 9 - Structures or exceptions that are State-maintained

# Crack, Ride & Rut Changes 1998 as Compared to 1997



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

POSITIVE VALUES COULD INDICATE VARIABILITY IN THE DATA COLLECTION PROCESS.