

STATE OF FLORIDA



**2006
HIGHWAY PERFORMANCE
MONITORING SYSTEM
FACTS & FIGURES**

**FL/DOT/SMO/06-499
June 2006**

STATE MATERIALS OFFICE

The information in the following report is largely due to the team effort of the following individuals:

Gregory Beckner

William Bryant

Lucinda Cooke

Quentin Duke

Salil Gokhale

Earl Hall

Abdenour Nazef

Frank Ostanik

Gale Page

Glenn Salvo

Robert Schaub

Stacy Scott

Daryl Smith

Wayne Thomas

This team's hard work in collecting and processing the data, and organizing this report is greatly appreciated.

Table of Contents

What is HPMS?	1
What Purpose Does HPMS Serve?	1
How Does Florida Collect HPMS Data?	1
How Does Data Collection Procedure Affect HPMS Data?	2
2006 Statewide HPMS Sections	3
Historical HPMS Rated Sections	4
Historical HPMS Rated Miles	5
Historical HPMS Designated Sections	6
Historical HPMS Designated Miles	7
2006 IRI Frequency Distribution (Flexible Sections).....	8
2006 IRI Frequency Distribution (Rigid Sections).....	9
2006 IRI Frequency Distribution (Flexible and Rigid Sections)	10
2006 IRI Frequency Distribution (Sample Sections).....	11
1995 to 2006 HPMS Rated Miles vs. IRI Range (Flexible Sections)	12

Table of Contents (Continued)

1995 to 2006 HPMS Rated Miles vs. IRI Range (Rigid Sections)	13
Percent of Rated Miles within IRI Ranges from 1995 to 2006 (Flexible and Rigid Sections)	14
Percent of Rated Miles within IRI Ranges from 1995 to 2006 (Sample Sections)	15
Number of HPMS Off System Rated and Designated Sections	16
Number of HPMS Off System Rated and Designated Miles	17
2006 Frequency Distribution of IRI (HPMS Off System)	18
Percent of Rated Miles within IRI Ranges from 2000 to 2006 (HPMS Off System)	19

What Is HPMS?

The Highway Performance Monitoring System (HPMS) is an inventory system with an integrated database that provides essential information on the extent, condition, performance, use, and operating characteristics of the Nation's Highway System.

What Purpose Does HPMS Serve?

The HPMS was developed in 1978 to address a need for a national highway transportation system database. Since then, several enhancements have sharpened its focus on timely issues and enhanced analytical tools.

Traditionally, HPMS data has been used to support informed highway planning, policy and decision making at the national, State, and local levels. This includes the apportionment and allocation of federal-aid funds as well as the determination of appropriate cost-effective strategies to rehabilitate and preserve existing highway transportation infrastructure.

The HPMS database is unique because it directly ties together the data on the physical, operational, usage (travel), condition, and performance of the roadway that can be analyzed and summarized at sub-state, statewide, and national levels by highway system. A newly added Geographic Information System (GIS) capability will greatly enhance the users' ability to analyze and display HPMS data.

How Does Florida Collect HPMS Data?

The State Materials Office (SMO) of the Florida Department of Transportation (FDOT) collects the required ride data on pre-selected sections of the State Highway System on an annual basis. The SMO Office began collecting ride data for the HPMS in 1991, in conjunction with its annual Pavement Condition Survey (PCS) program. Prior to the 1994/1995 survey, FDOT reported the data collected on sample sections only. Thereafter, the Department was required to report the ride values in one direction for both flexible and rigid roadways from the Pavement Management System (PMS) database, in addition to the HPMS sample sections. For PMS purposes, the SMO collects ride values in both directions for divided roadways and in one direction for composite roadways on the entire State Highway System, using class I inertial profilers..

Currently, FHWA requires collecting HPMS ride data, in one direction only, on the entire State Highway System. These Sections, referred to as "*Designated Sections*," follow the same section lengths and limits as the PCS sections. At times, a *Designated Section* may not be rated for a number of reasons (e.g. section is under reconstruction, part of on-going construction projects, or other reasons). FHWA further requires the collection of ride data on specific locations (in either roadway direction) which, in most cases, do not coincide with any PCS section. These sections are known as "*Sample Sections*" and are identified by an HPMS ID number, county section number, beginning and ending mileposts.

Prior to the 1998/99 survey, the data was collected using ultrasonic sensors and the ride values were reported in terms of International Roughness Index (IRI) in inches/mile, without any filtering. Thereafter, the Department implemented the use of laser sensors for ride data collection. The ride values are still reported as IRI but filtered to a 300-foot wavelength (IRI_{F300}). IRI is rigorously defined as a specific mathematical transform, or property, of a true profile. The calculation of IRI is most sensitive to wavelengths between 4 and 100 feet. It is believed that wavelengths outside this band contribute much less to the roughness felt in vehicles at speeds near 50 mph. IRI values are reported in compliance with the FHWA Appendix E of the *Highway Performance Monitoring System Field Manual*, dated May 2003.

In January of 2000, the SMO started collecting HPMS off system sections ride data, in terms of IRI. The data collection process in this case is similar to that of HPMS sections and is conducted between annual PCS surveys.

The data collected between 1991 and 1996, in compliance with previous FHWA requirements, included bridges, railroad crossings, etc. Currently these structures are omitted from the database in accordance with Appendix E of the May 2003 HPMS Field Manual.

The five (5) High Speed Profilers used by the FDOT are calibrated in accordance with the manufacturer's recommendations. These profilers are field verified every 30 days on field sections exhibiting a range of roughness measured with and ASTM E950-98 class I contact type reference device annually.

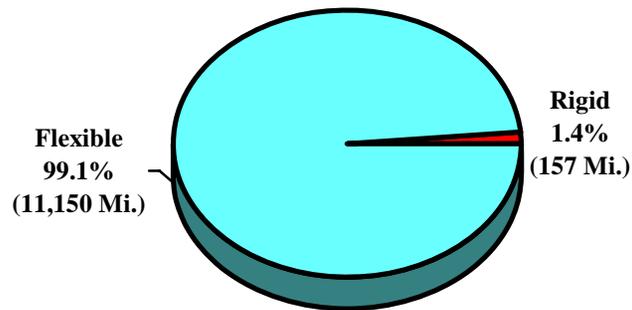
How Does Data Collection Procedures Affect HPMS Data?

Although standards specifying the HPMS data collection and reporting process do exist (Appendix E), their interpretation/implementation may not always be the same among the state highway agencies. For instance, in order to determine IRI values, the profile data may be averaged differently (moving average, straight average, etc.). The profile data may also be filtered differently (no filtering, 300-foot wavelength, etc.). In addition, the profile data may be collected using various sensor types (ultrasonic, laser, optical, or infrared sensors) and different sensor spacing (63 to 71 inches) (transverse locations). Moreover, some states report HPMS data from that collected as part of their Pavement Management System, rather than the specific HPMS sample sections. Consequently, it may not be realistic or appropriate to compare data between states.

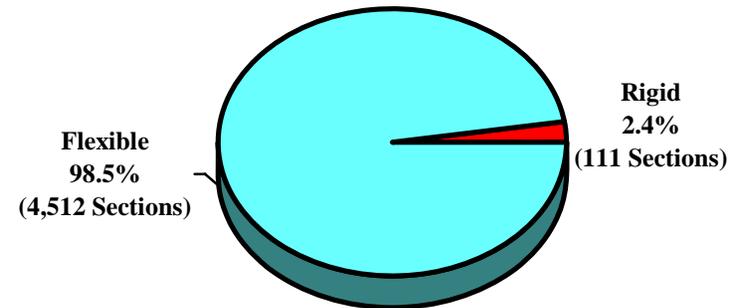
The present report provides essential information on the current ride quality of the Florida roadway system. It also includes a summary of the historical ride data.

2006 Statewide HPMS Sections

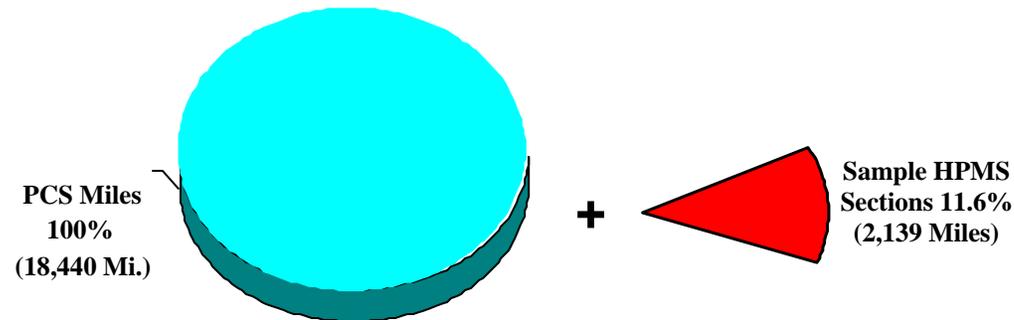
HPMS Rated Miles: 11,246 Mi.
(One Direction from PCS)



HPMS Rated Sections: 4,579
(One Direction from PCS)

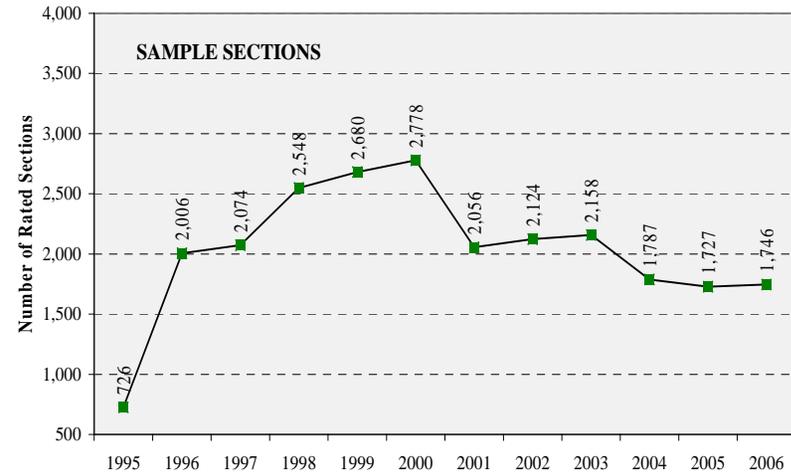
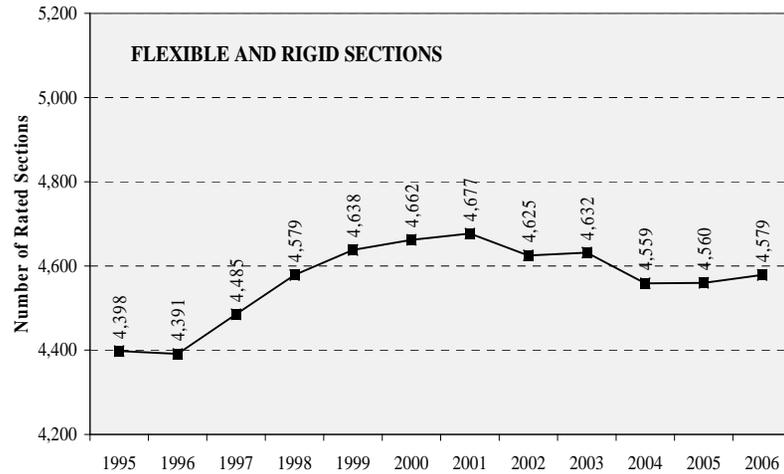
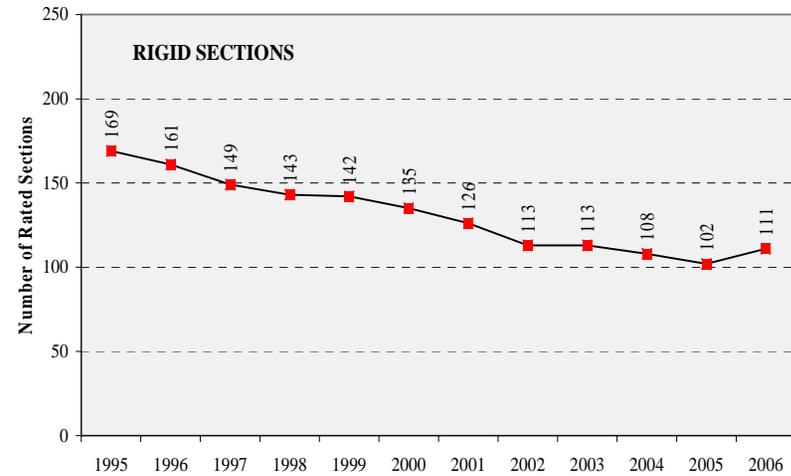
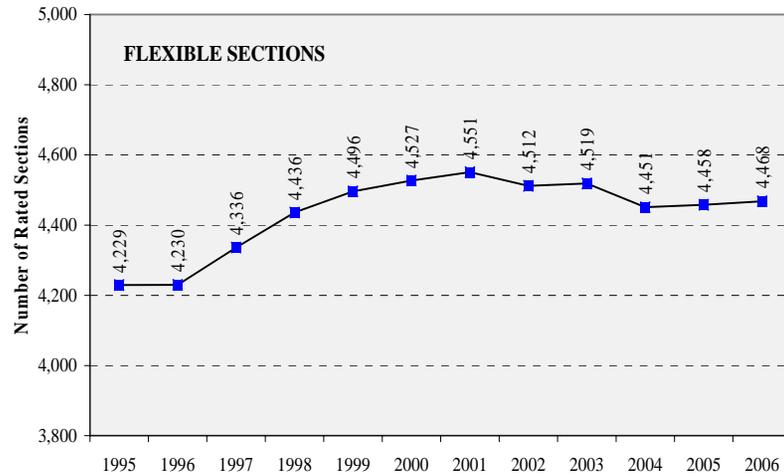


Total PCS Rated Miles 18,440
(Both Directions)

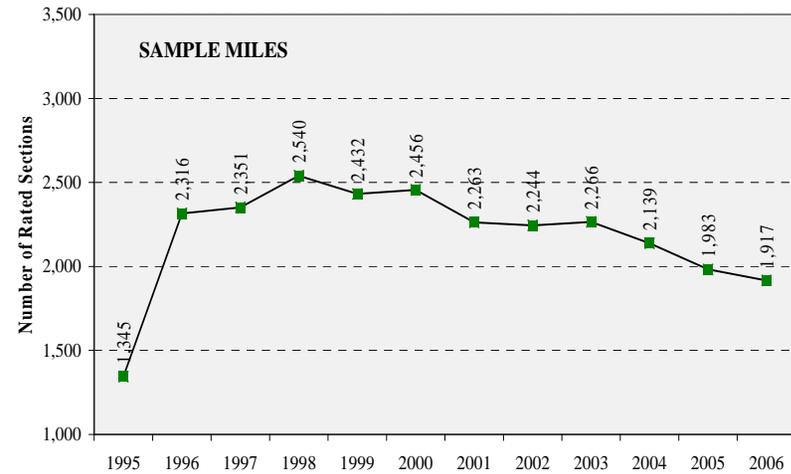
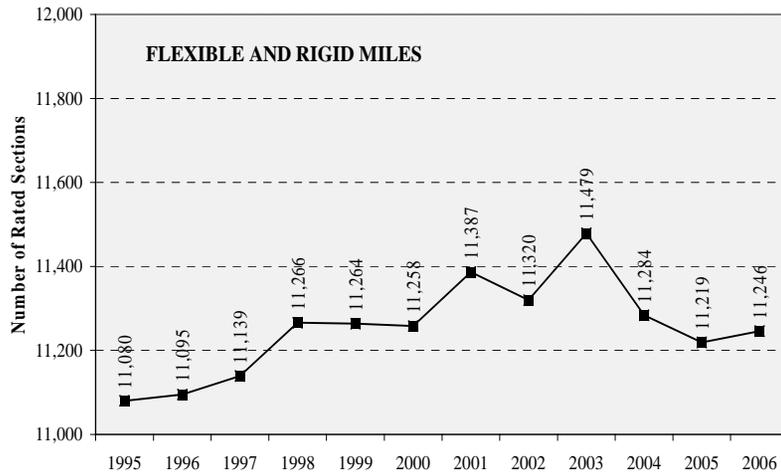
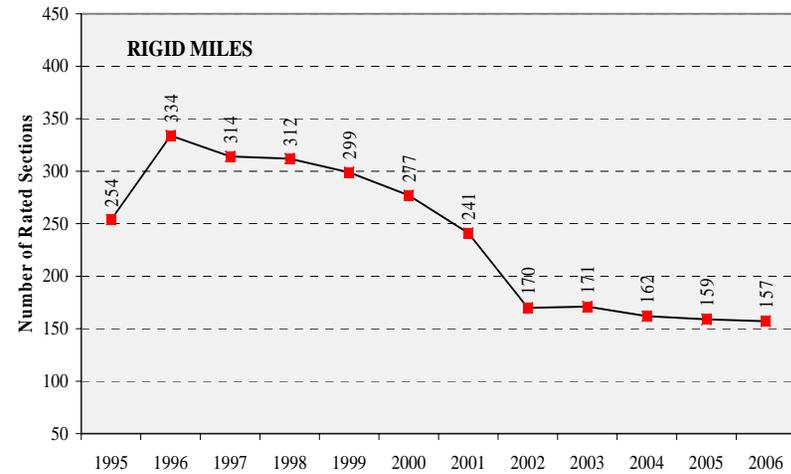
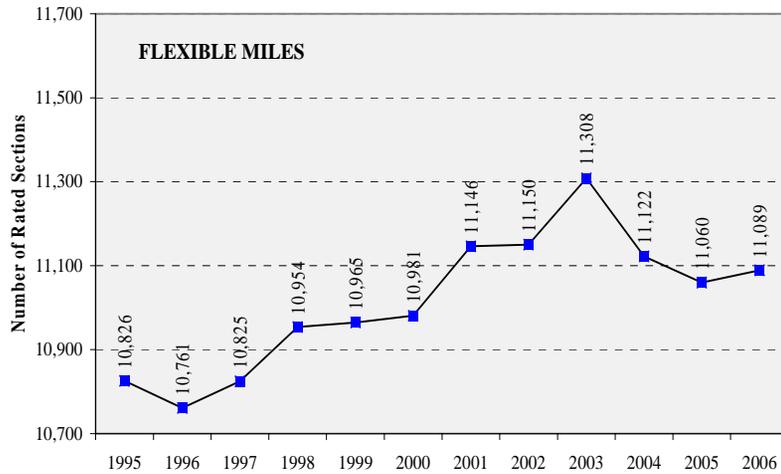


Sample HPMS Sections are extracted from PCS data and reported to FHWA

Historical HPMS Rated Sections

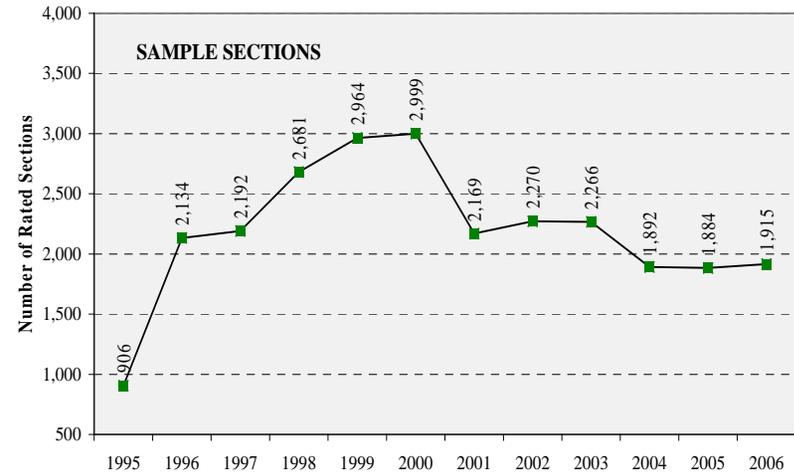
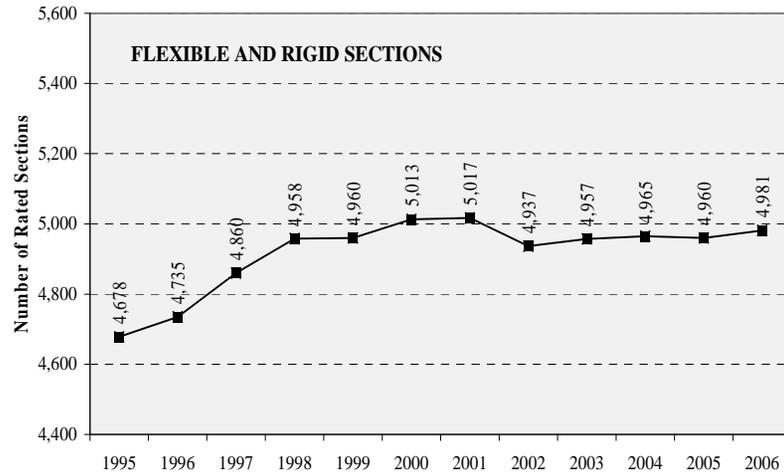
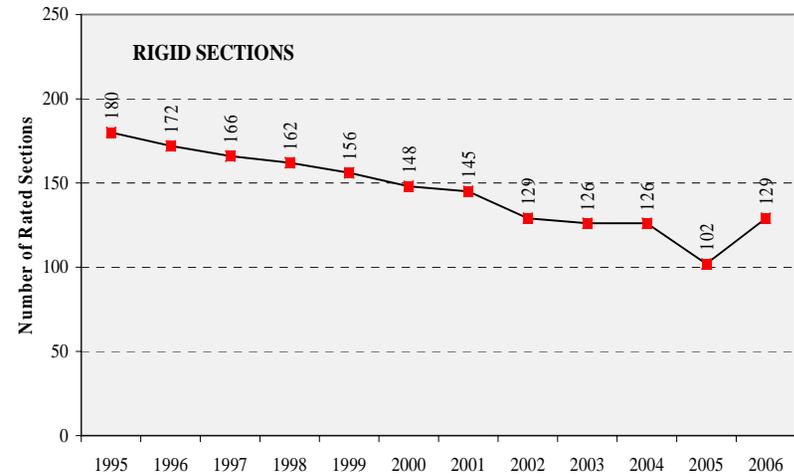
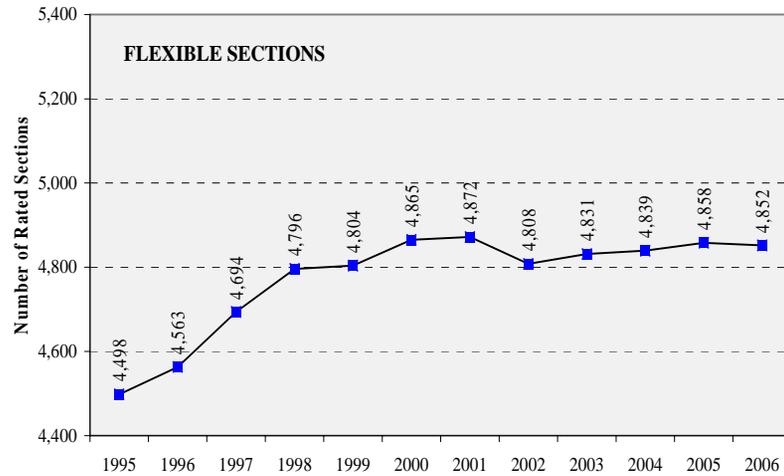


Historical HPMS Rated Miles

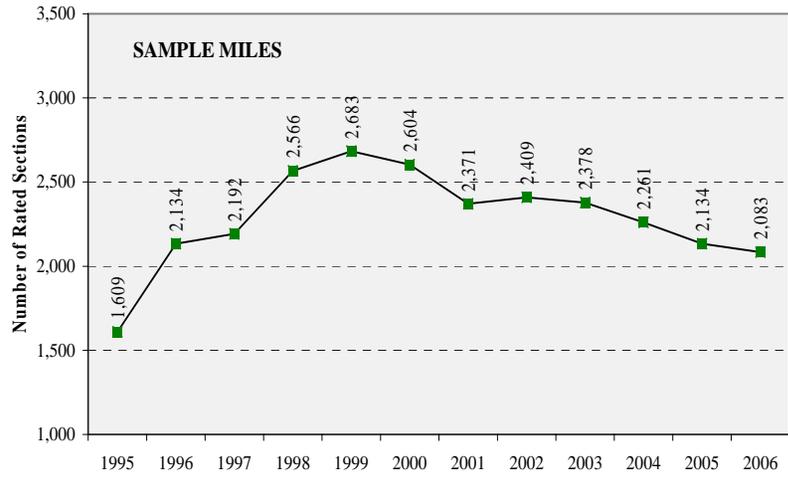
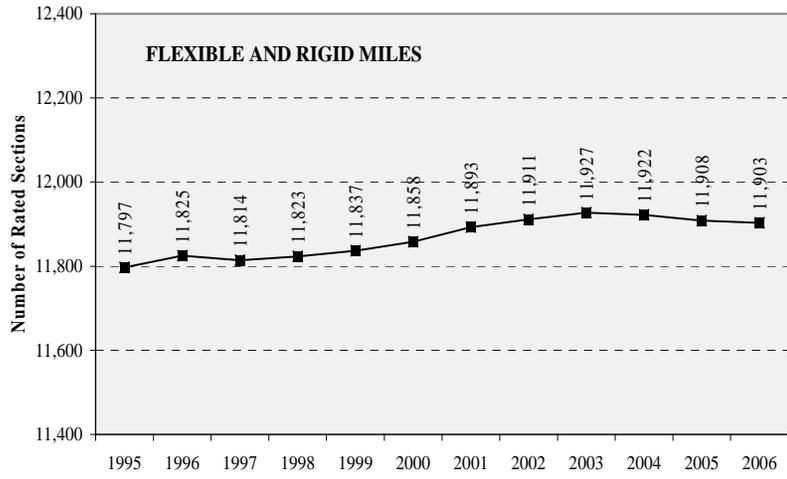
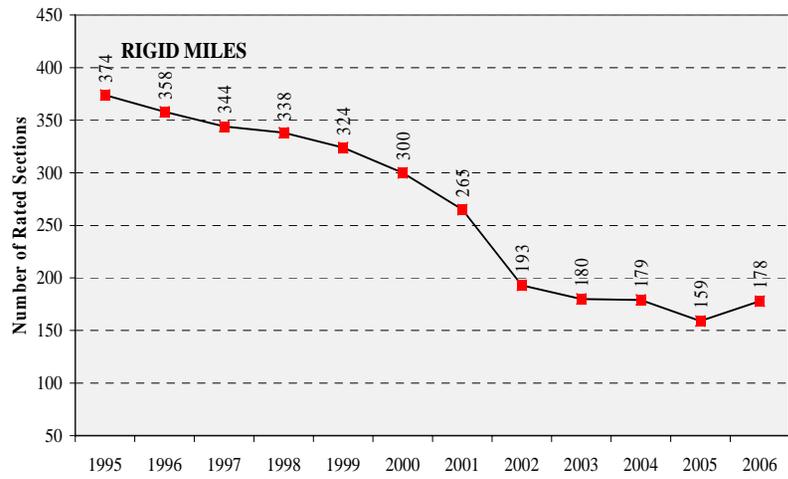
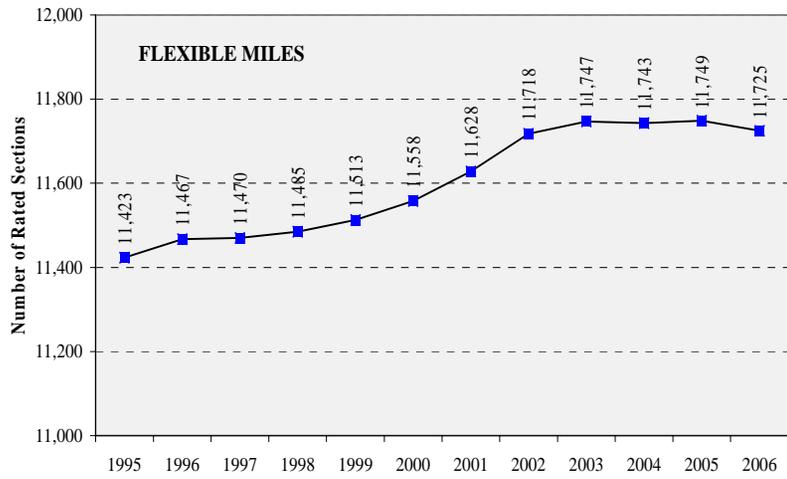


Historical HPMS Designated Sections

9



Historical HPMS Designated Miles



L

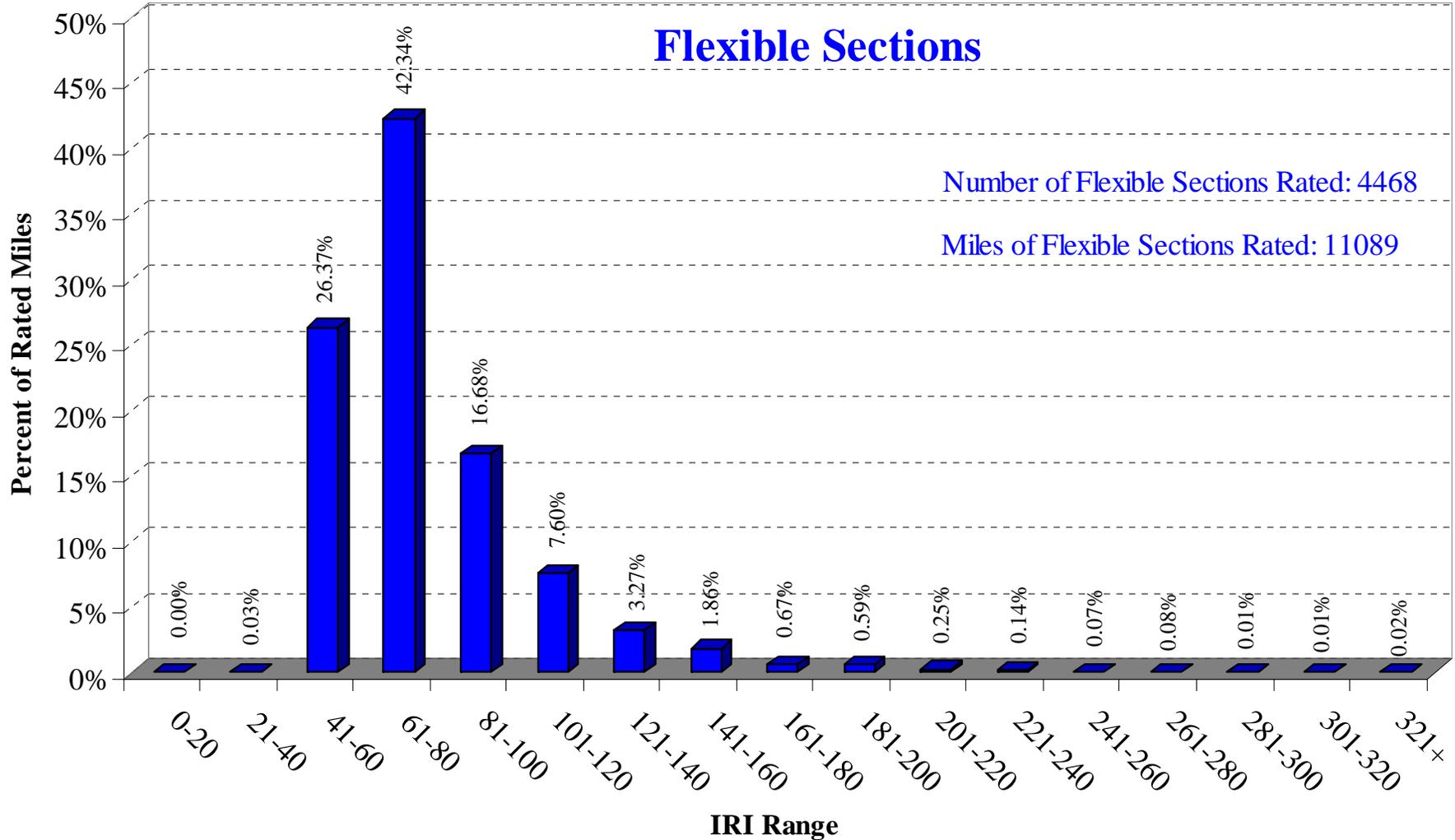
2006 IRI Frequency Distribution

Flexible Sections

Number of Flexible Sections Rated: 4468

Miles of Flexible Sections Rated: 11089

8

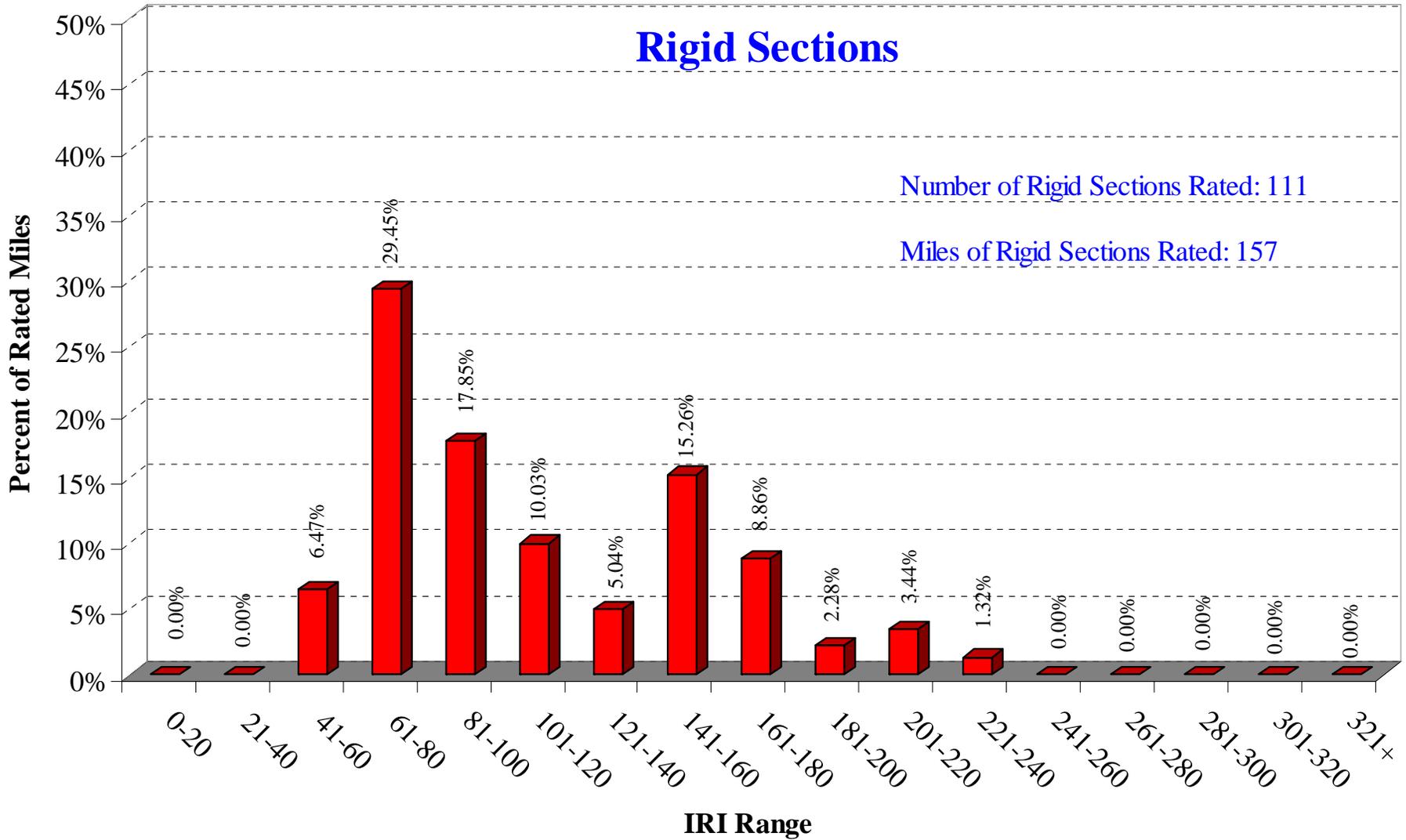


2006 IRI Frequency Distribution

Rigid Sections

Number of Rigid Sections Rated: 111

Miles of Rigid Sections Rated: 157

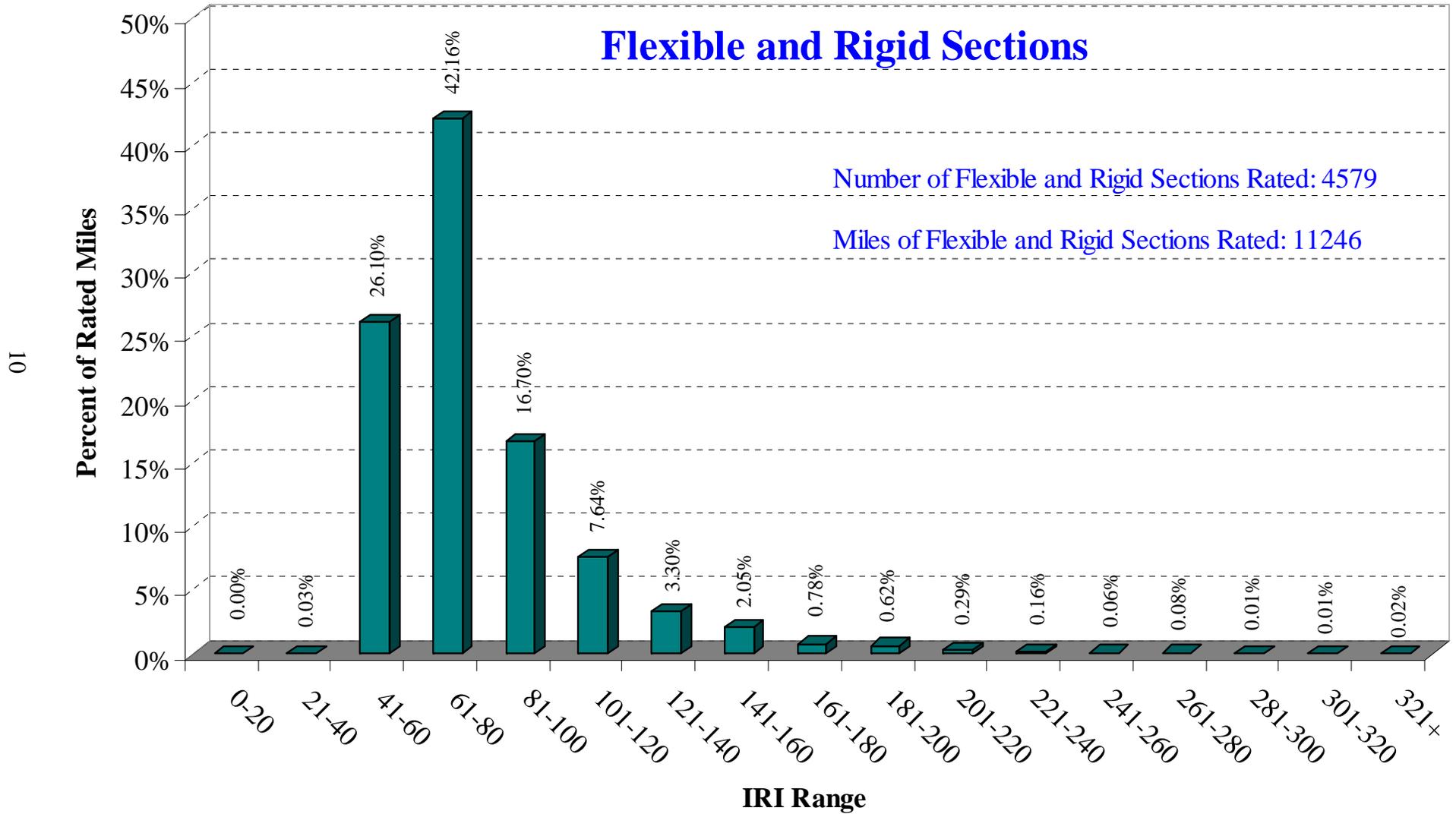


2006 IRI Frequency Distribution

Flexible and Rigid Sections

Number of Flexible and Rigid Sections Rated: 4579

Miles of Flexible and Rigid Sections Rated: 11246

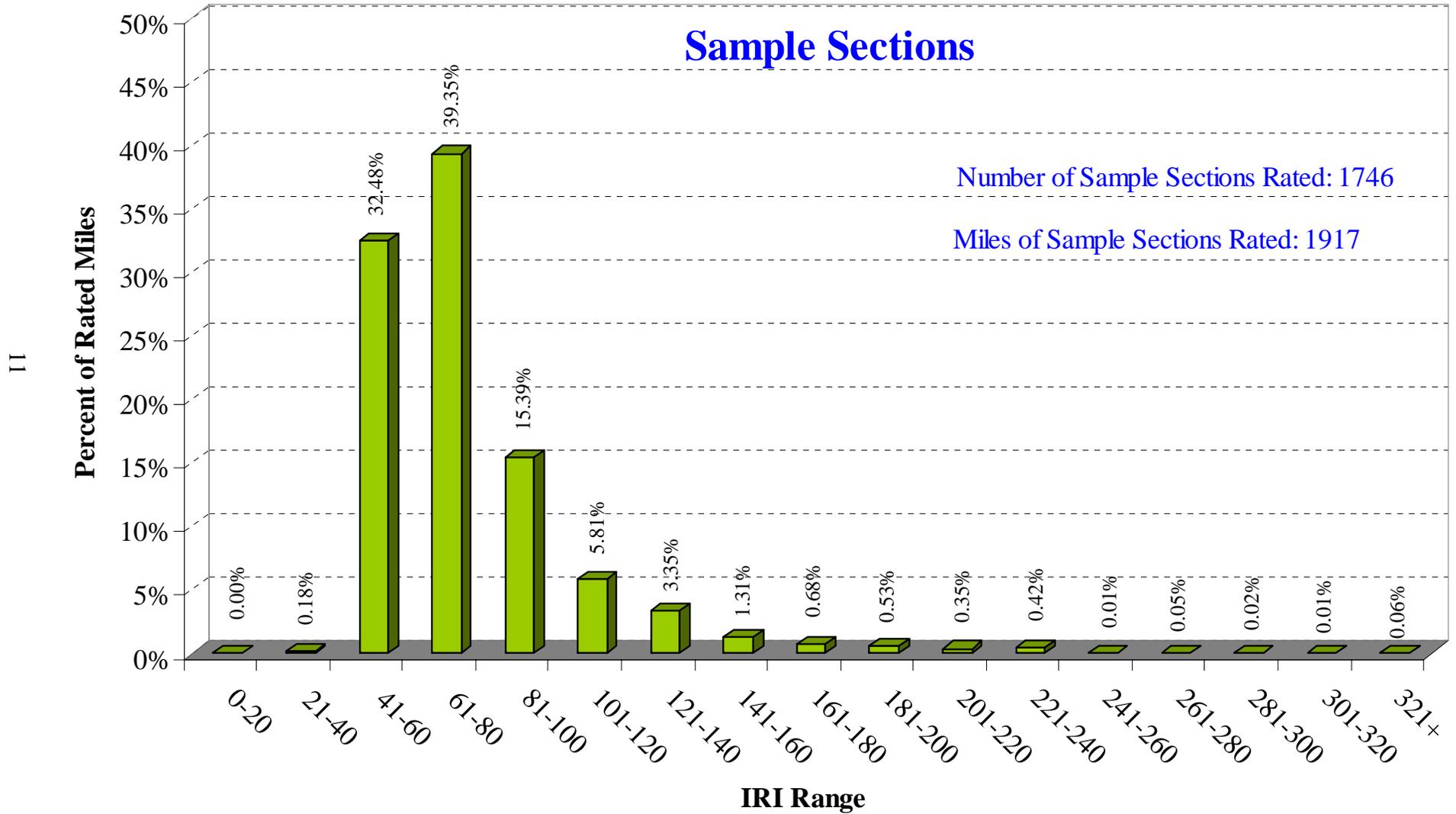


2006 IRI Frequency Distribution

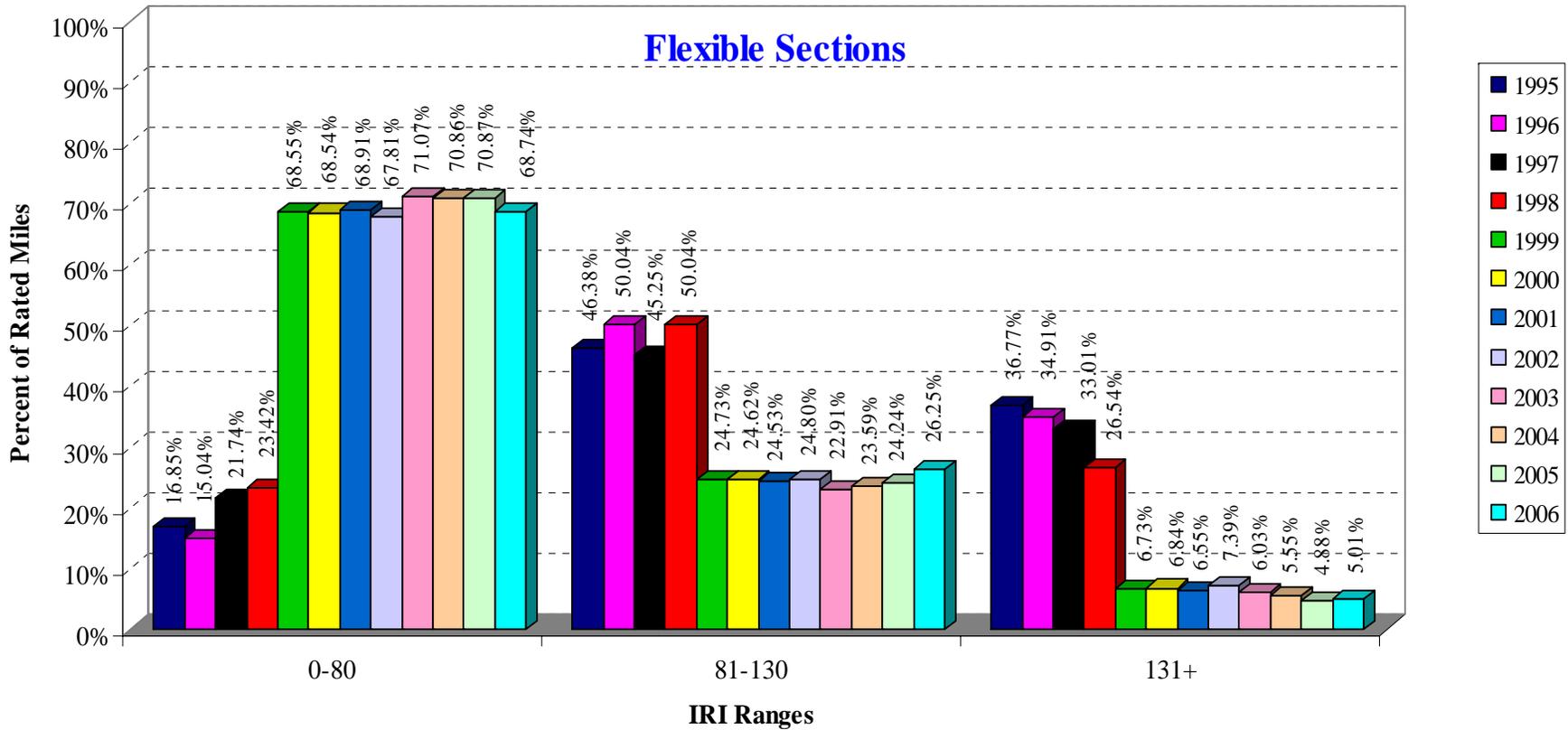
Sample Sections

Number of Sample Sections Rated: 1746

Miles of Sample Sections Rated: 1917

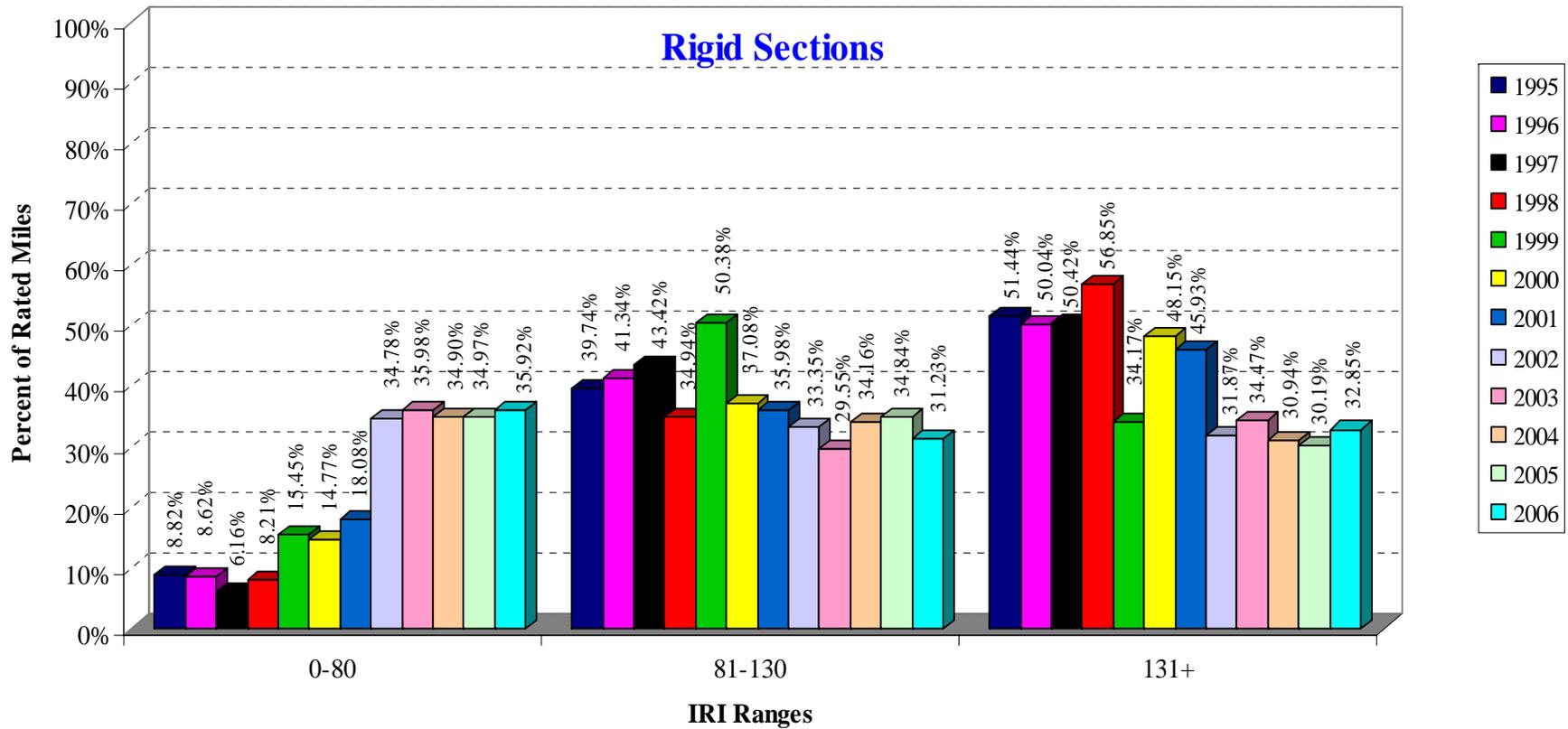


Percent HPMS Rated Miles vs. IRI Range (1995 – 2006)



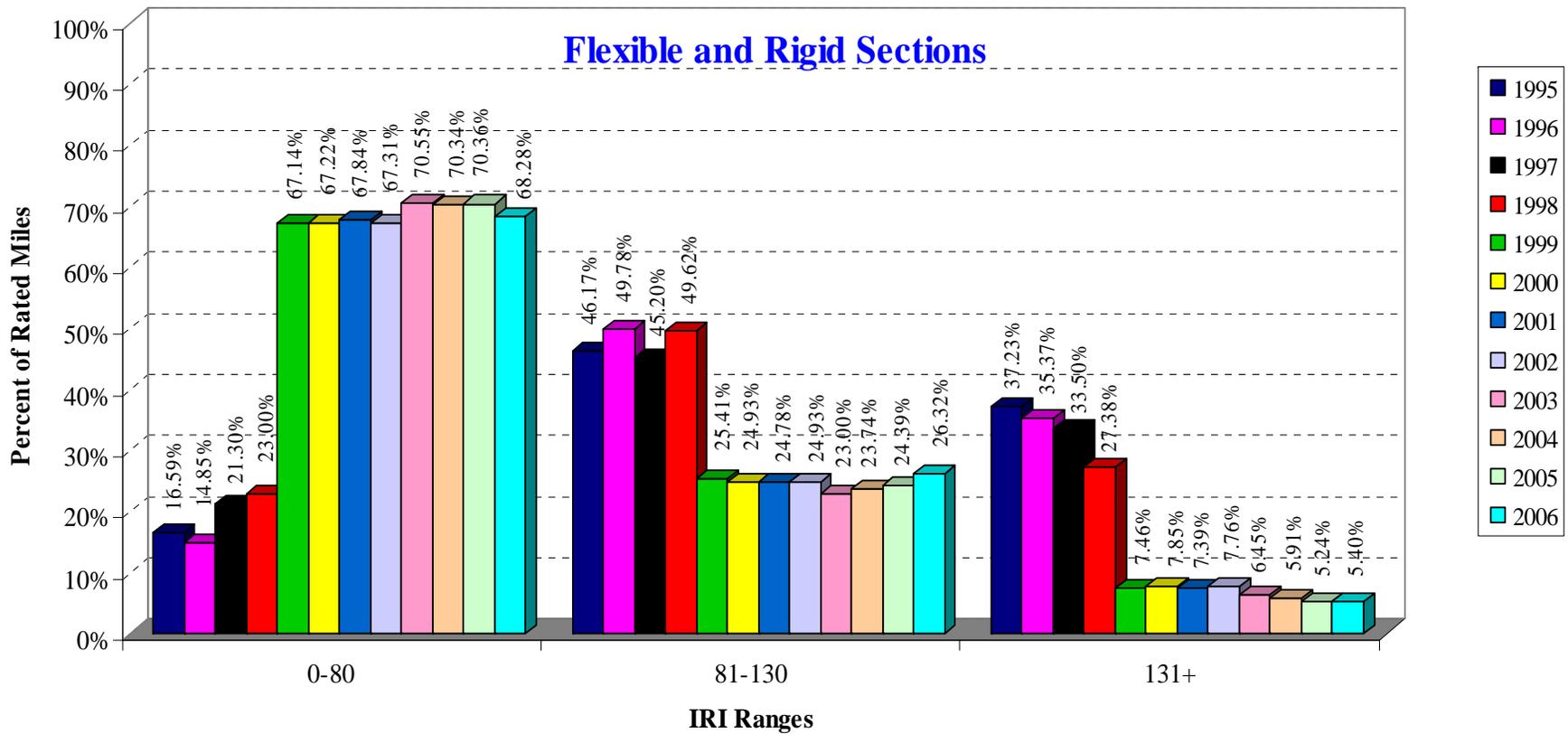
IRI Ranges According to Calibration Ranges

Percent HPMS Rated Miles vs. IRI Range (1995 – 2006)



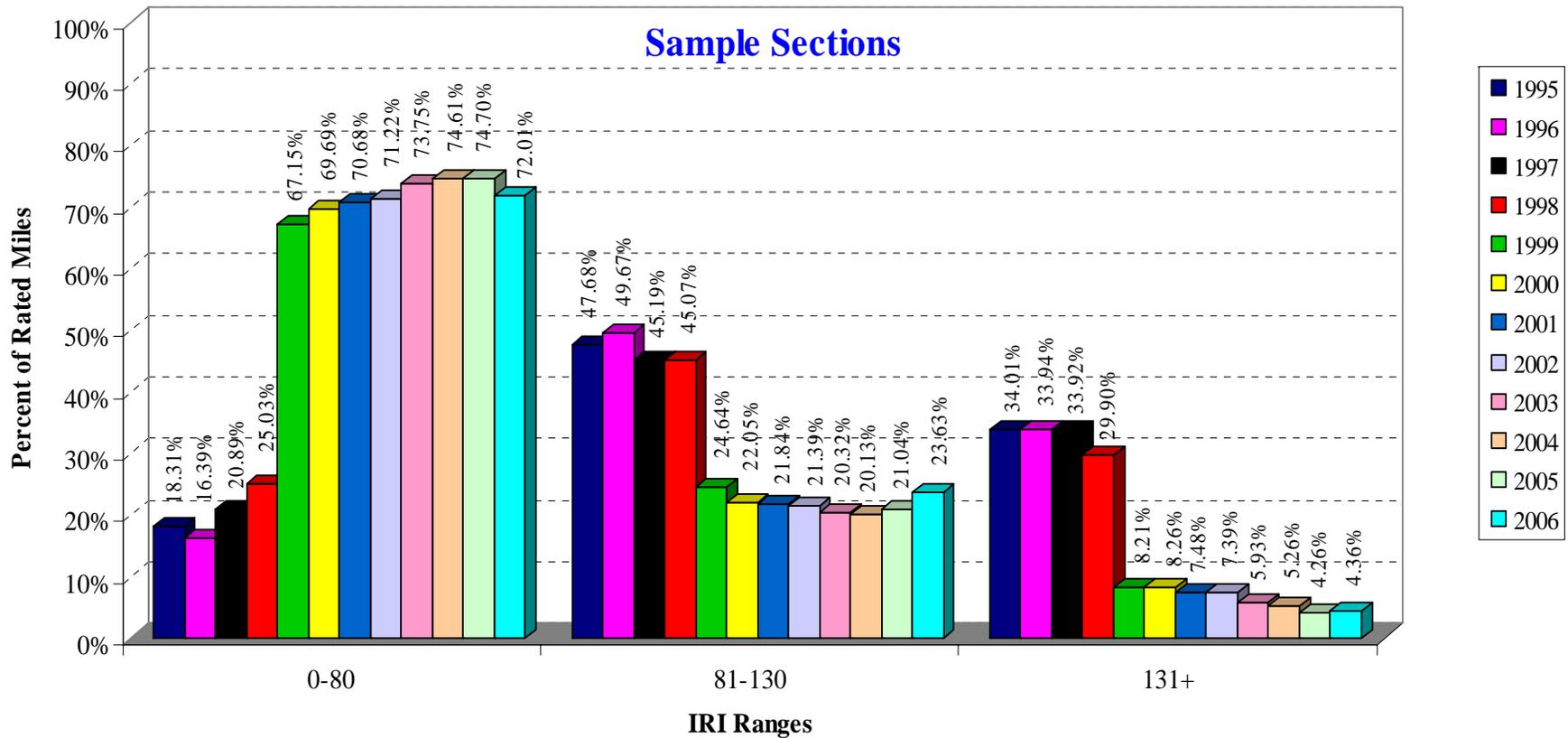
IRI Ranges According to Calibration Ranges

Percent HPMS Rated Miles vs. IRI Range (1995 – 2006)



IRI Ranges According to Calibration Ranges

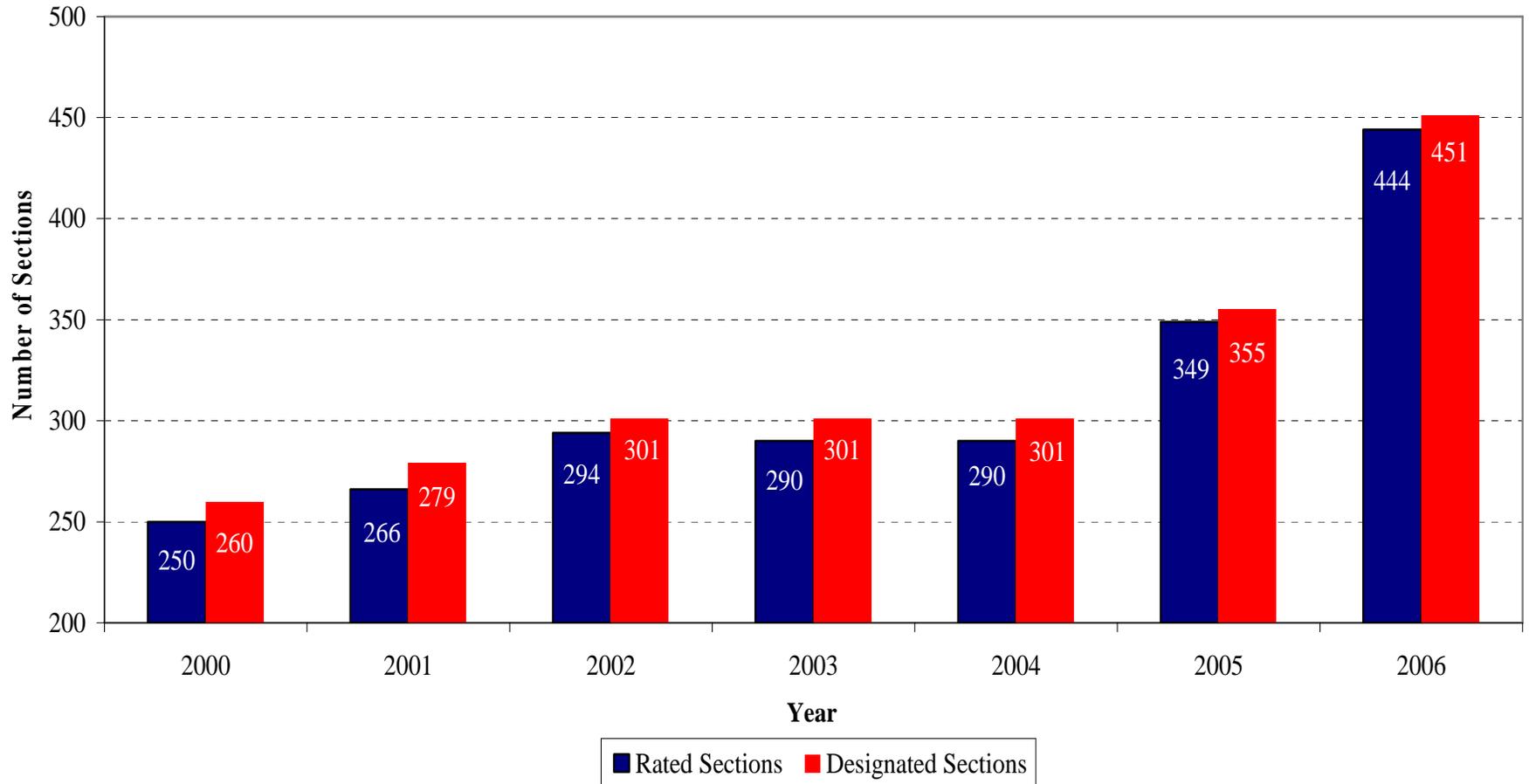
Percent HPMS Rated Miles vs. IRI Range (1995 – 2006)



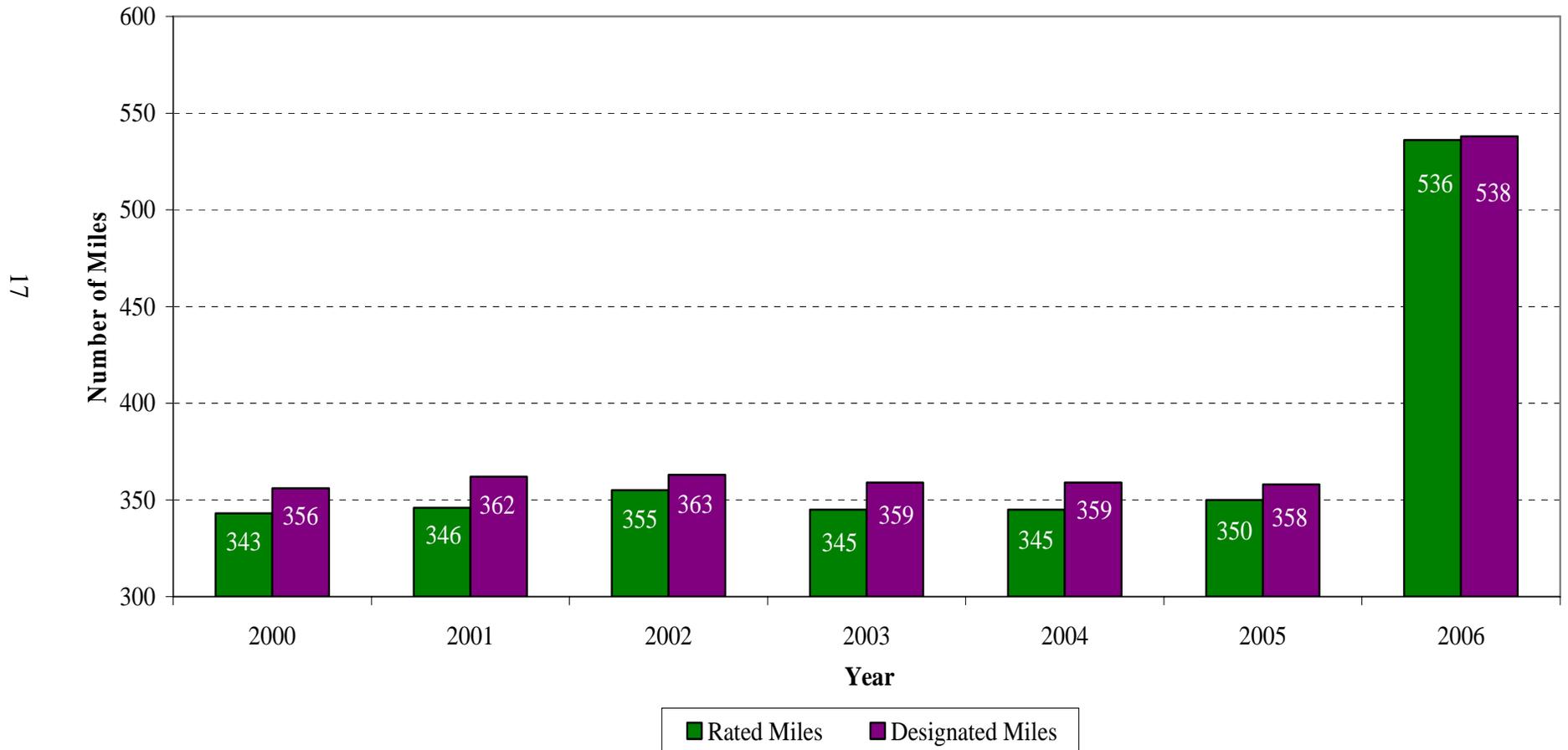
IRI Ranges According to Calibration Ranges

HPMS Off-System Production History: Rated & Designated Sections

16

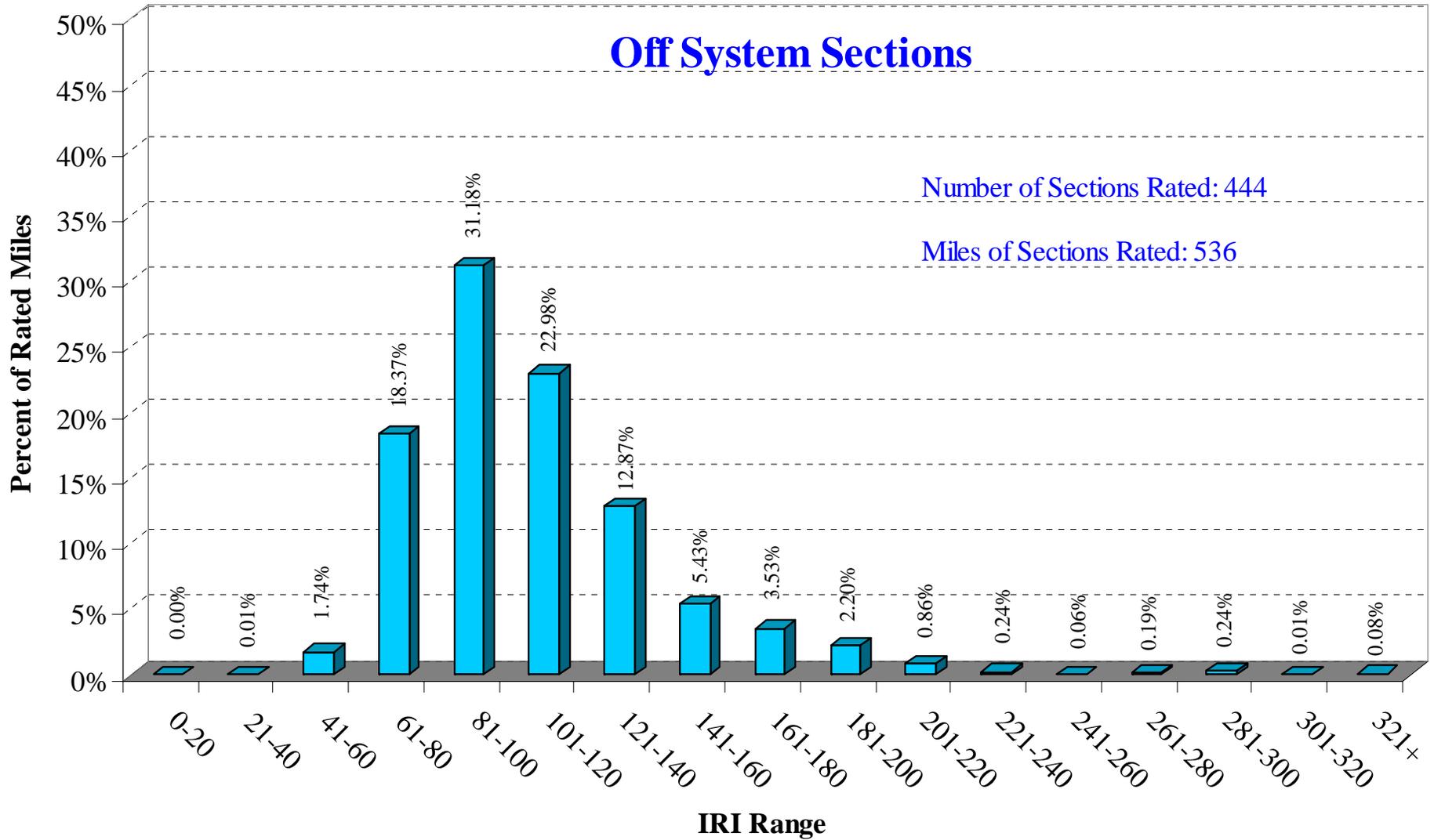


HPMS Off-System Production History: Rated & Designated Miles



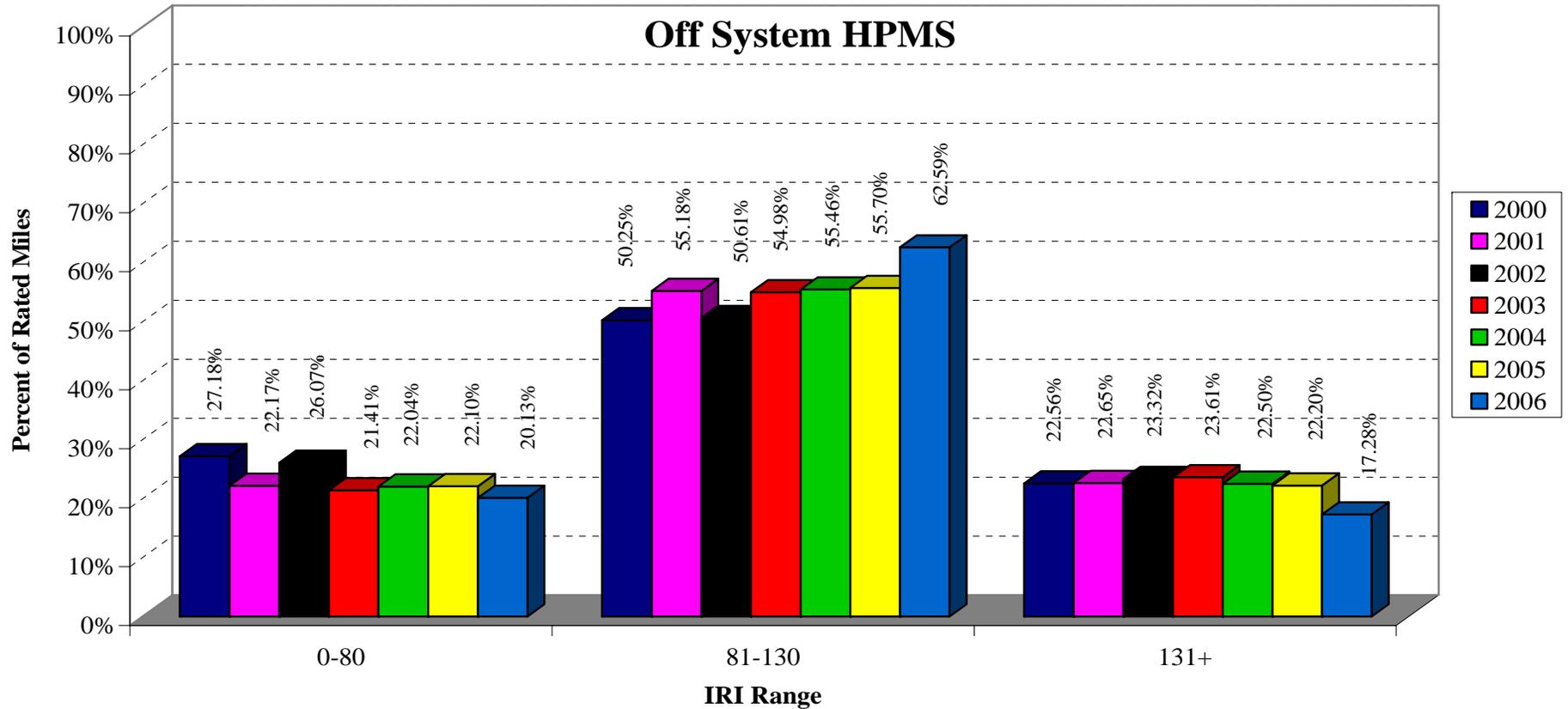
2006 IRI Frequency Distribution

81



Percent of Rated Miles vs. IRI Range (2000 – 2006)

61



IRI Ranges According to Calibration Ranges

Customer Service Form

In an effort to continue providing useful documentation to our customers, and to further improve documentation such as this, the FDOT Pavement Systems Evaluation Team would like your input.

(Optional)

Your name: _____ Title: _____

Company or Organization: _____

Address: _____ City/State/Zip: _____

Phone: (____)____ — _____ e-mail: _____

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

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

Organization of Data..... 1 2 3 4 5
O O O O O

Clarity of Graphical Data..... 1 2 3 4 5
O O O O O

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

Overall Value of This Report..... 1 2 3 4 5
O O O O O

Please provide a short answer to the questions below.

What was the most useful or informative part of this report? _____

What was the least useful or informative part of this report? _____

What other general comments might benefit the generators of this report? _____

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

Or send via email to: abdenour.nazef@dot.state.fl.us