U.S. Department of Transportation
Federal Highway Administration

Office of Highway Policy Information

Truck Weight Study (TWS) & Weigh-In-Motion (WIM)

Highway Information Seminar

Wednesday November 16, 2011

By: David L. Jones Sr. ,Transportation Specialist

OBJECTIVE

- Brief History of TWS
- State Reporting Requirements
- Traffic Monitoring Guide (TMG) Update
- WIM System Deployment
- TWS Status & National Loading Trends
- Identify Traffic Monitoring Sensor Technology

180 Years of Vehicle Weighing

- **1831** Thaddeus Fairbanks
- **1918** BPRs First Road Test
- **1934** Hayden-Cartwright Act
- **1939** Type A Loadometer
- **1942** Strain Gage Load Cell

180 Years of Vehicle Weighing

- **1950** O.K. Norman
- **1955** AASHO Road Test Approved
- **1971** TWS Manual
- **1985** Traffic Monitoring Guide
- **201X** Traffic Monitoring Guide Update

FHWA's Current Role

1. Reviews and Approvals
2. Distribute Line of Credit
3. Reimburse States
4. Technical Assistance
5. Develop Standards
6. Develop Regulations

EXECUTIVE SUMMARY

Table of Contents

Section – Overview of the Traffic Monitoring Guide
Section – Traffic Data Collection Theory and Equipment
Section – Traffic Monitoring Concepts
Section – Traffic Monitoring Program Design
Section – Traffic Monitoring Methodologies
Section – ITS Data Utilization
Section – Metadata for Traffic Data

Table of Contents

Section – HPMS Requirements

Section – Compendium of Additional Methodologies

Section – Compendium of Data Quality Control Criteria

Section – Compendium of Equipment Calibration Procedures, Current Practices, and New Procedures

Section – Traffic Monitoring Data Formats

- Leading Office: FHWA, Office of Highway Policy Information, David Jones, Program Manager

Leading Contractors : Cambridge Systematics Team:
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850-671-0204

http://fhwatmgupdate.camsys.com/index.htm

Weigh-In-Motion?

- **Process of Measuring Dynamic Tire Forces**
- **Using in Pavement Sensors**
- **To Estimate a Static Vehicle Weight**

Truck Weight Study Status

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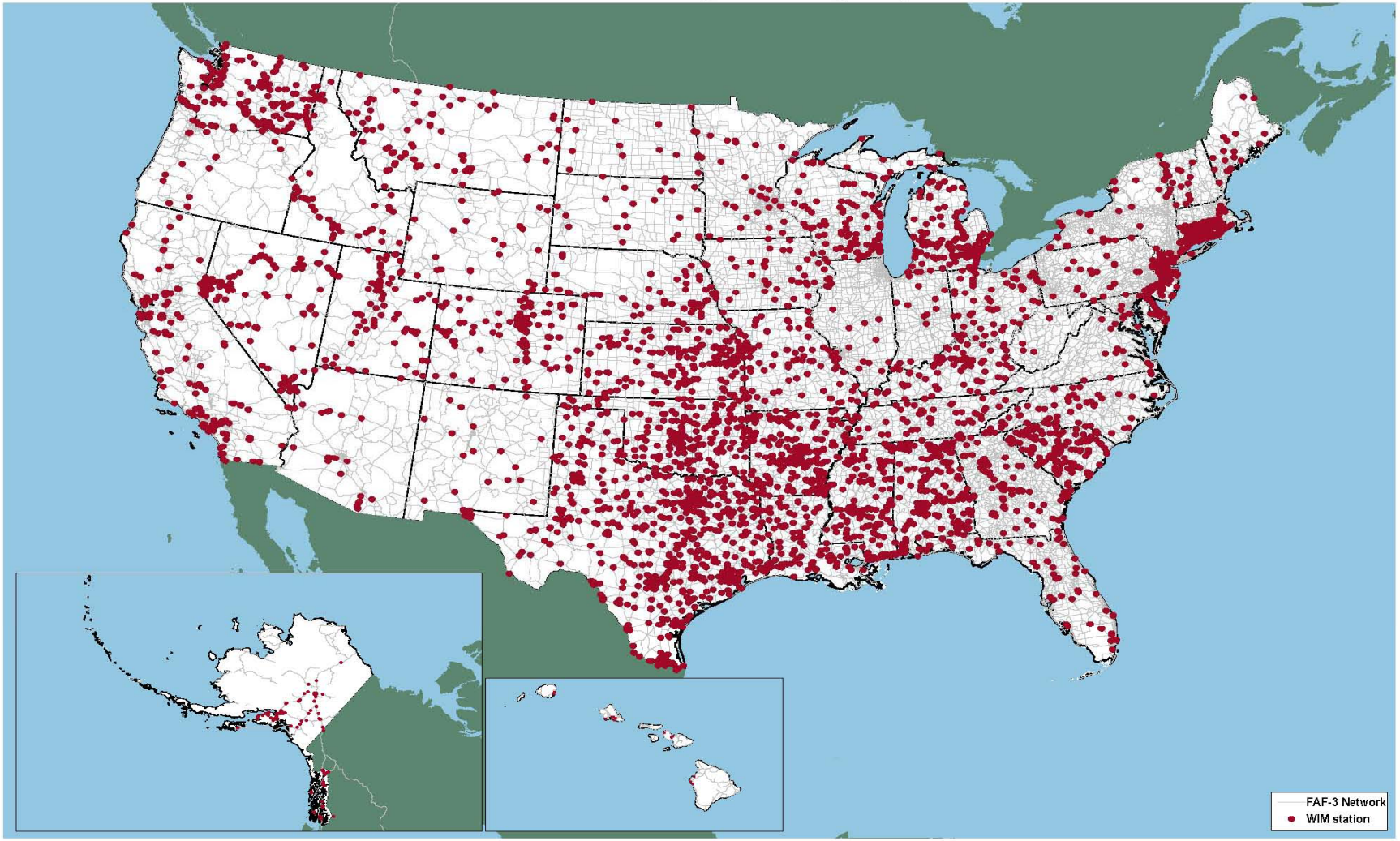
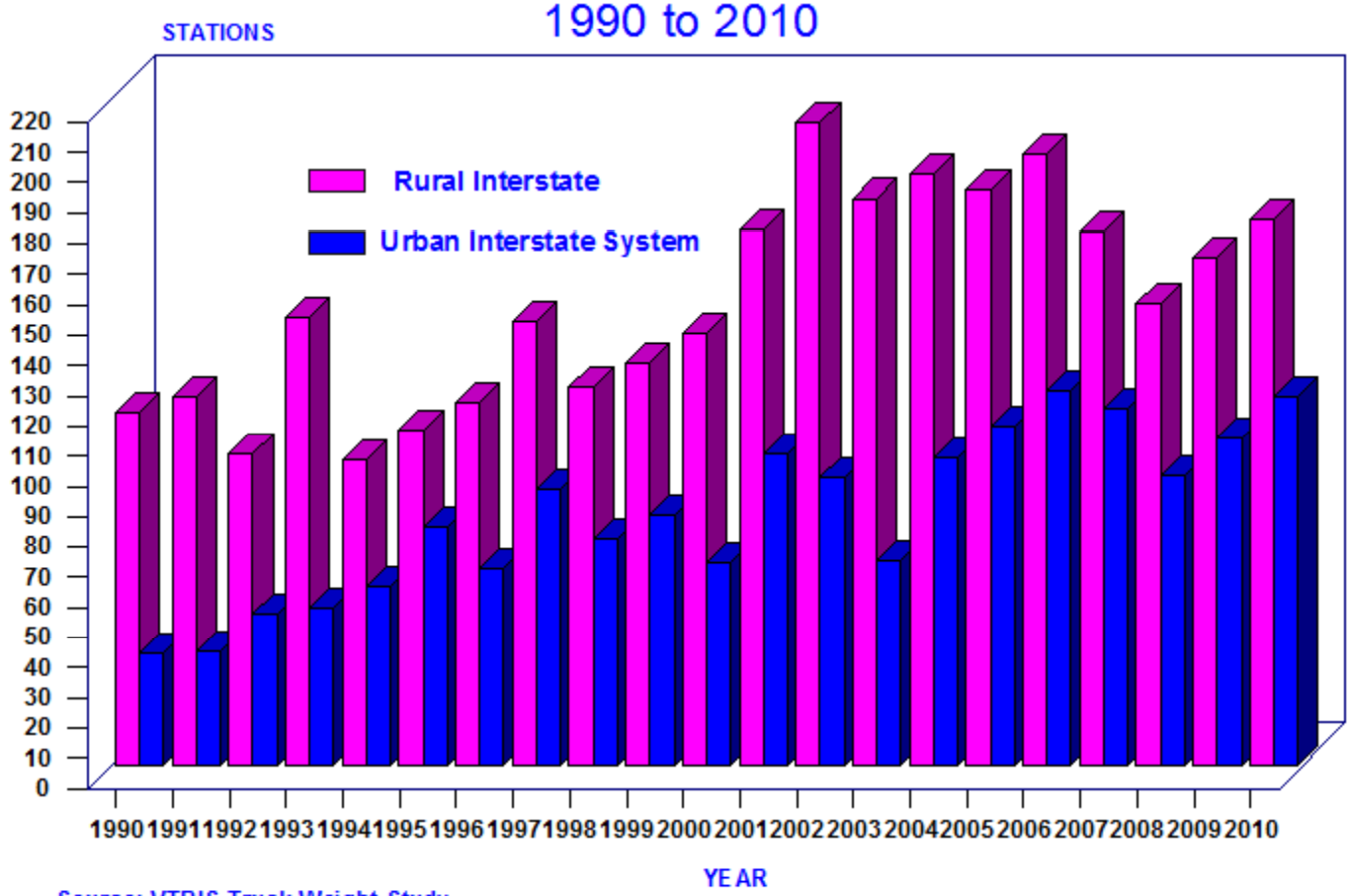


Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3, 2010.

Urban and Rural Interstate Station

1990 to 2010



Source: VTRIS Truck Weight Study

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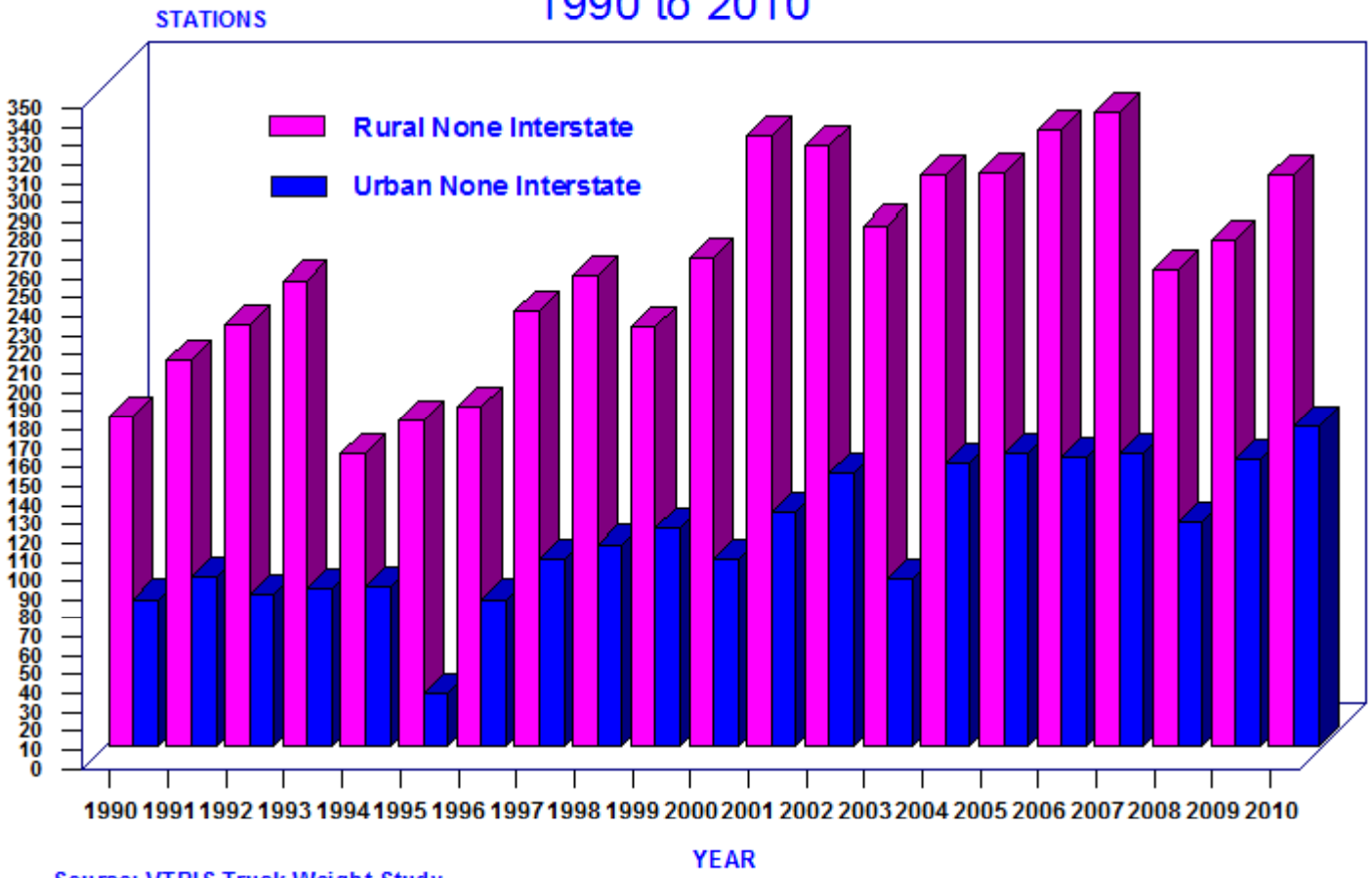
None Interstate Station Urban and Rural

1990 to 2010



Source: VTRIS Truck Weight Study

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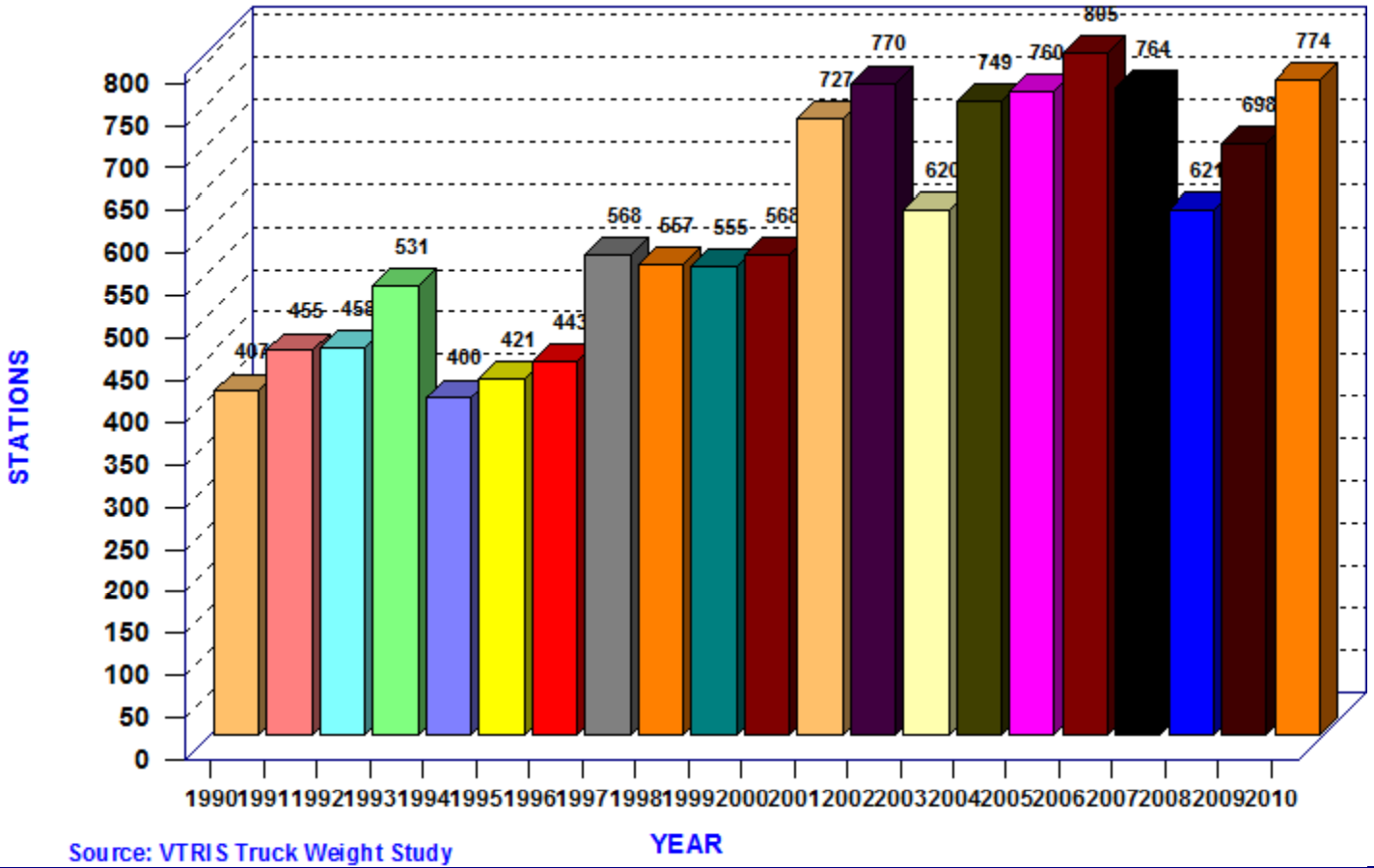
National Total All Functional Classification

1990 to 2010



Source: VTRIS Truck Weight Study

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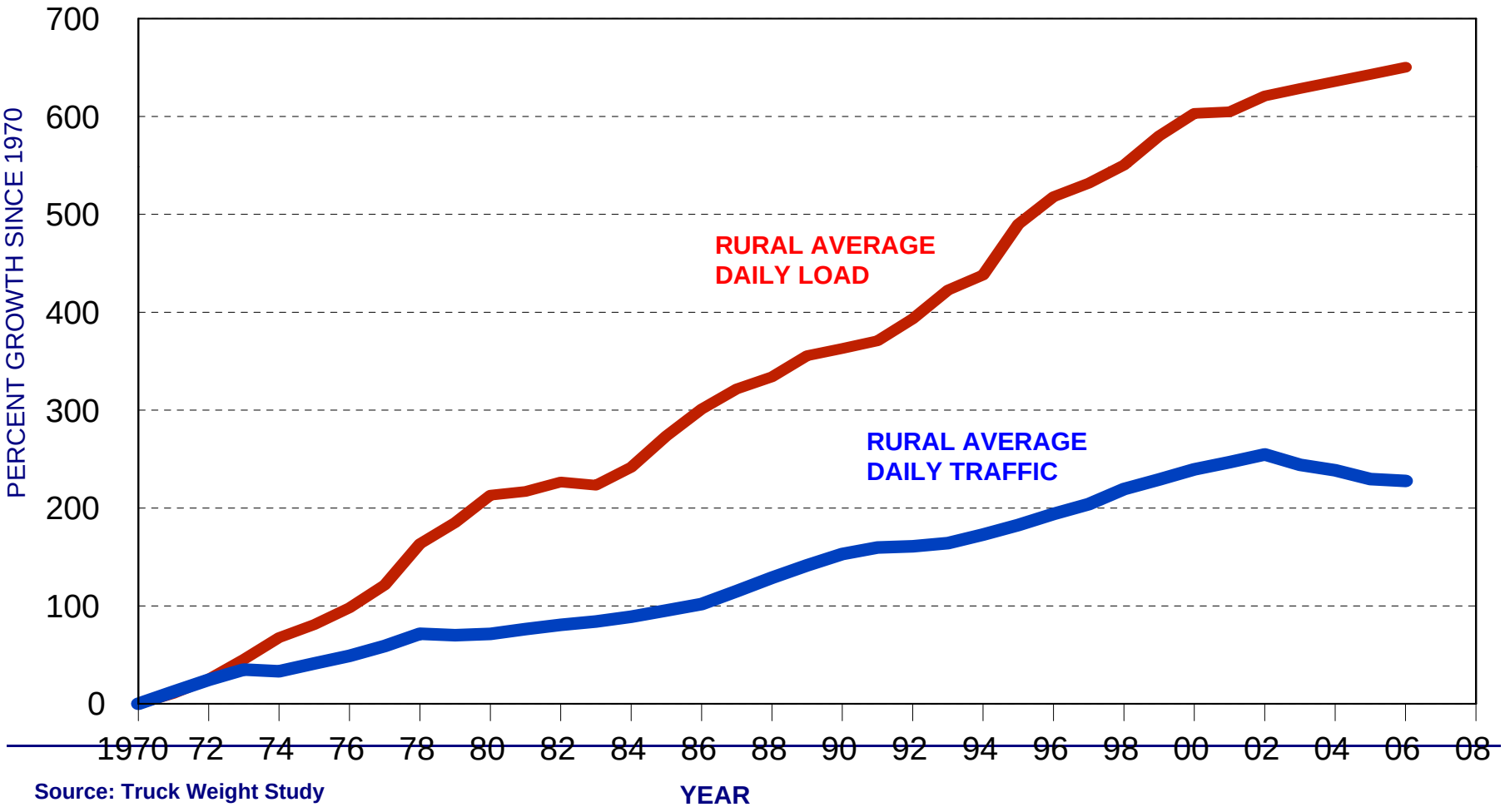
COMPARISON OF GROWTH IN VOLUME AND LOADINGS ON THE RURAL INTERSTATE SYSTEM



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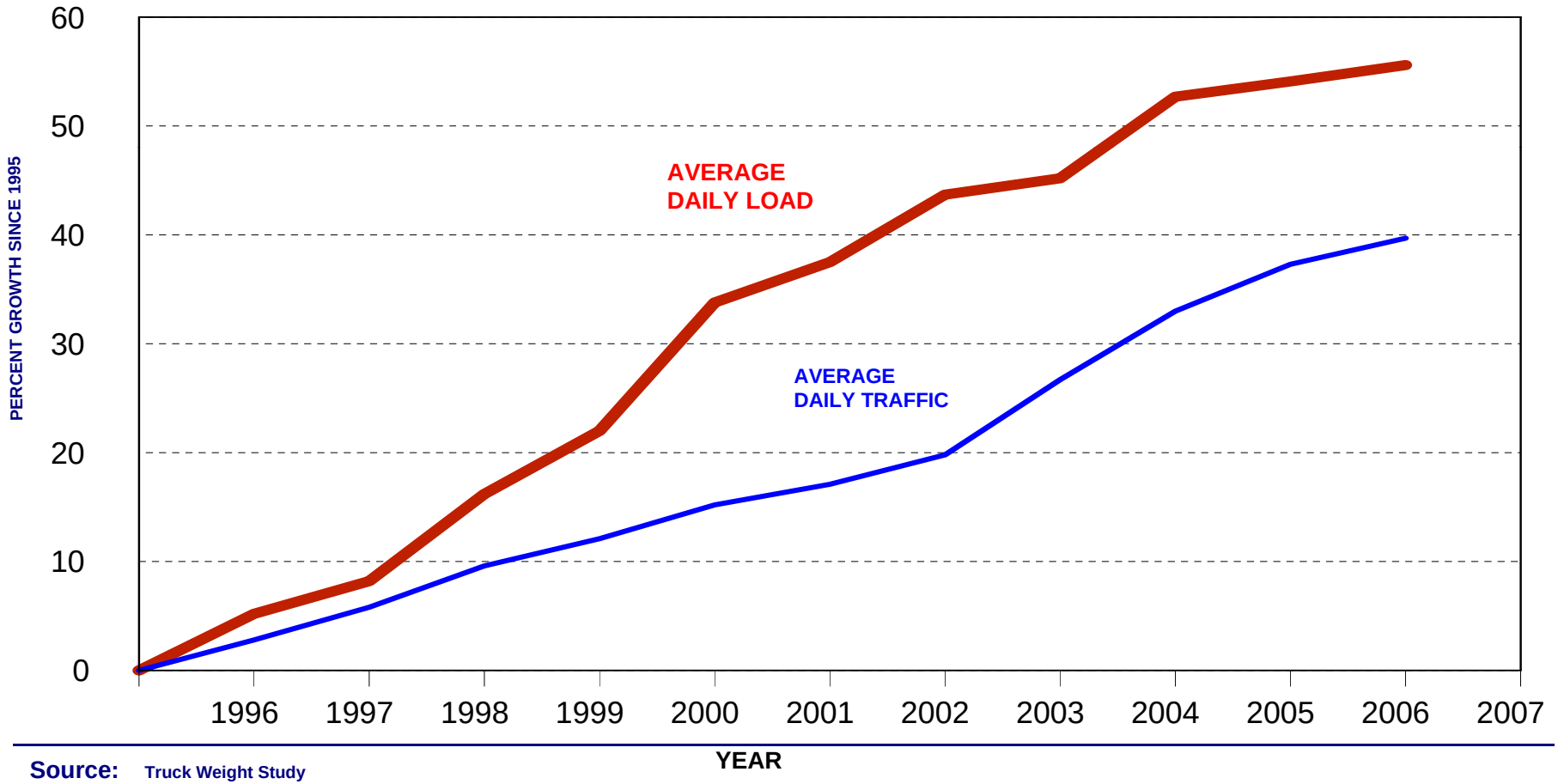

Source: Truck Weight Study

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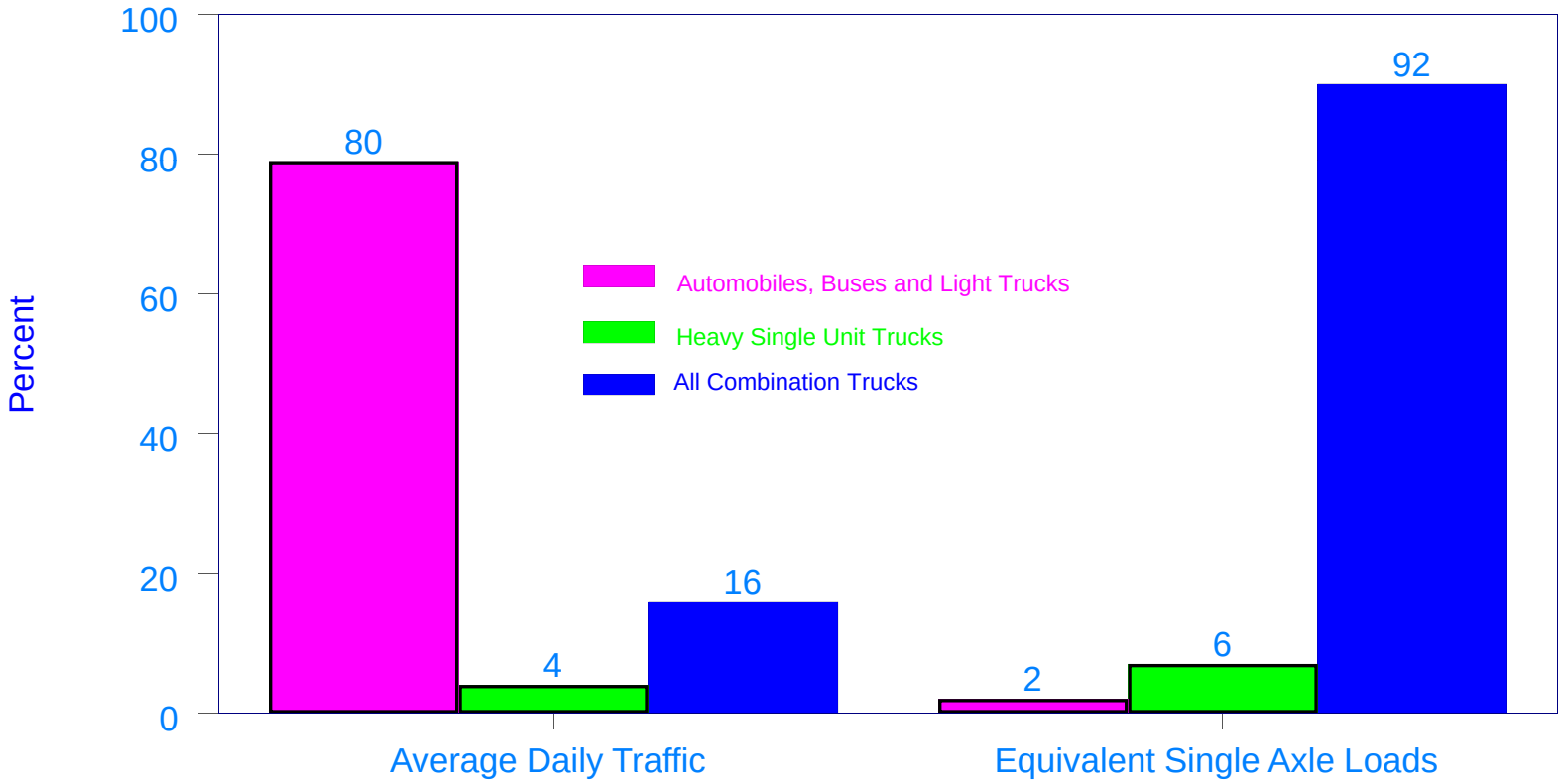
Rural Interstate Travel by Vehicle Type

Distribution of Average Daily Traffic Volumes and Equivalent Axle Loads on the Rural Interstate System as a Percent of Total



1Equivalent axle loads provide a means of measuring vehicle wear on pavements by relating them to an 80 kilonewton (18,000 pound) single axle load.

2All 2-axle, 4-tire trucks. Includes pickup trucks, panel trucks, vans and other vehicles (such as campers, motor homes, etc.)

3All vehicles on a single frame have either 2 axles and 6 tires or 3 or more axles (including camping and recreational vehicles and motor homes.)

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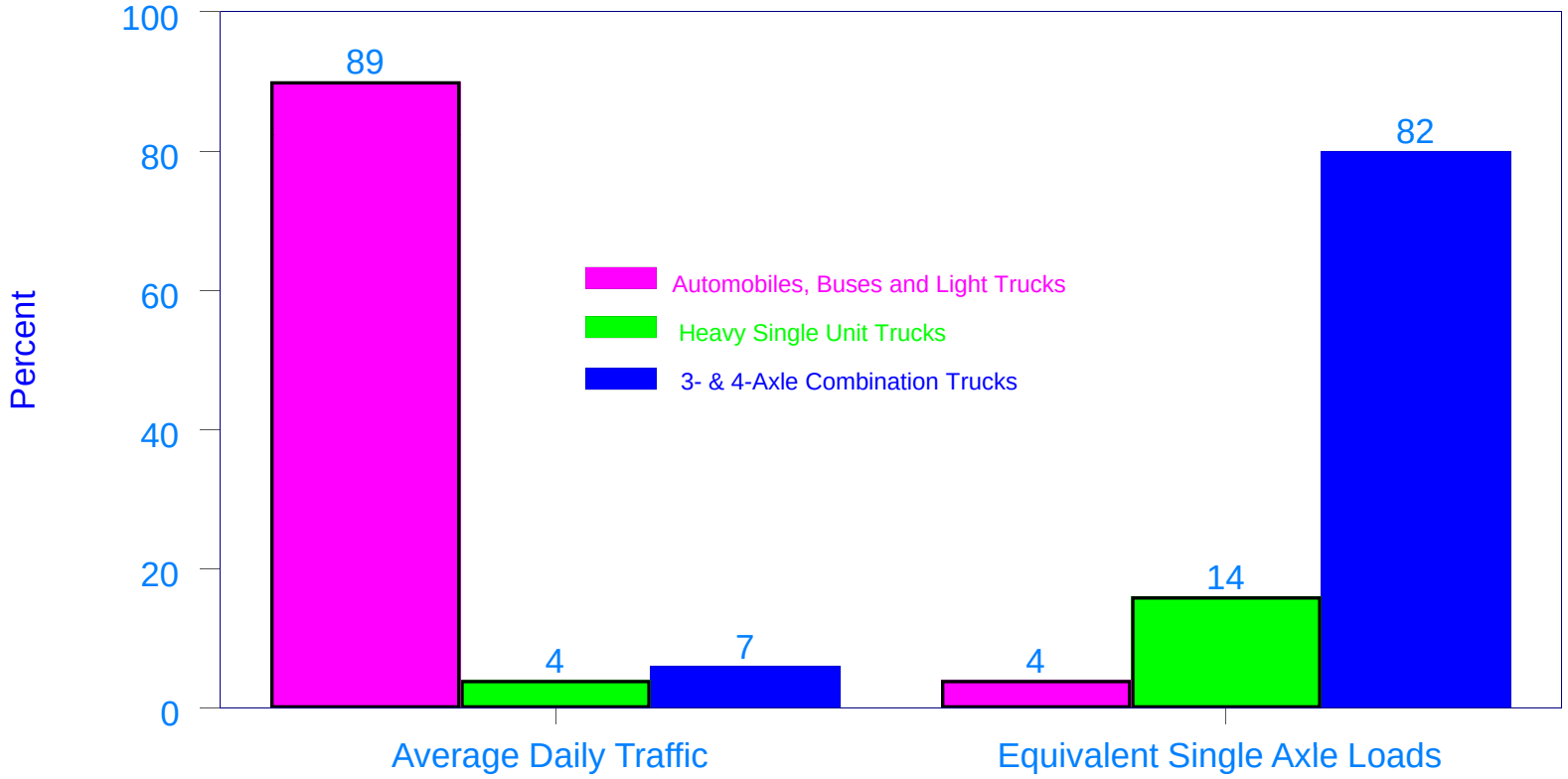

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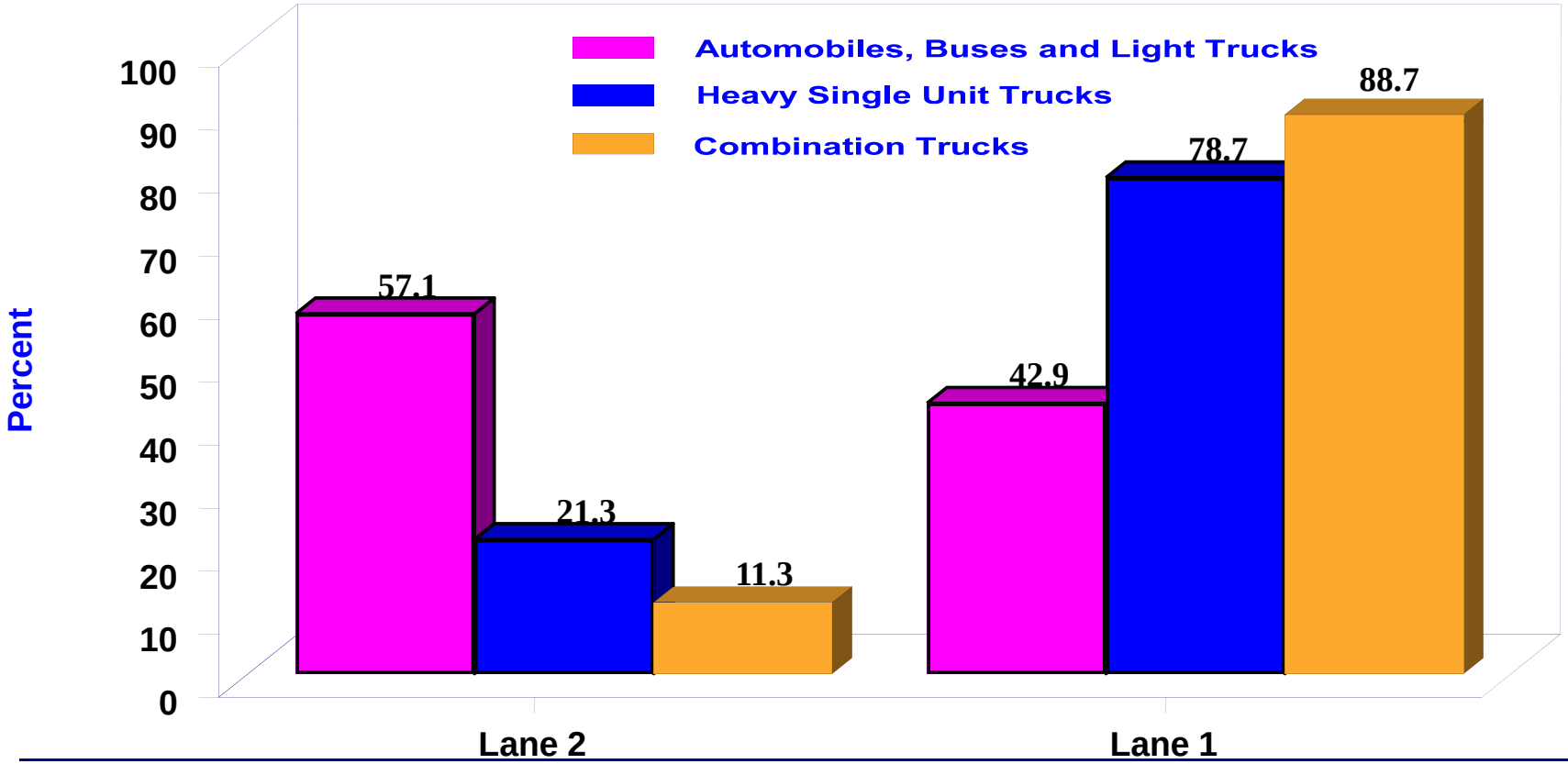
Distribution of Vehicle Travel by Lane
by Vehicle Type

2 Lane Facilities



Source: VTRIS Truck Weight Study

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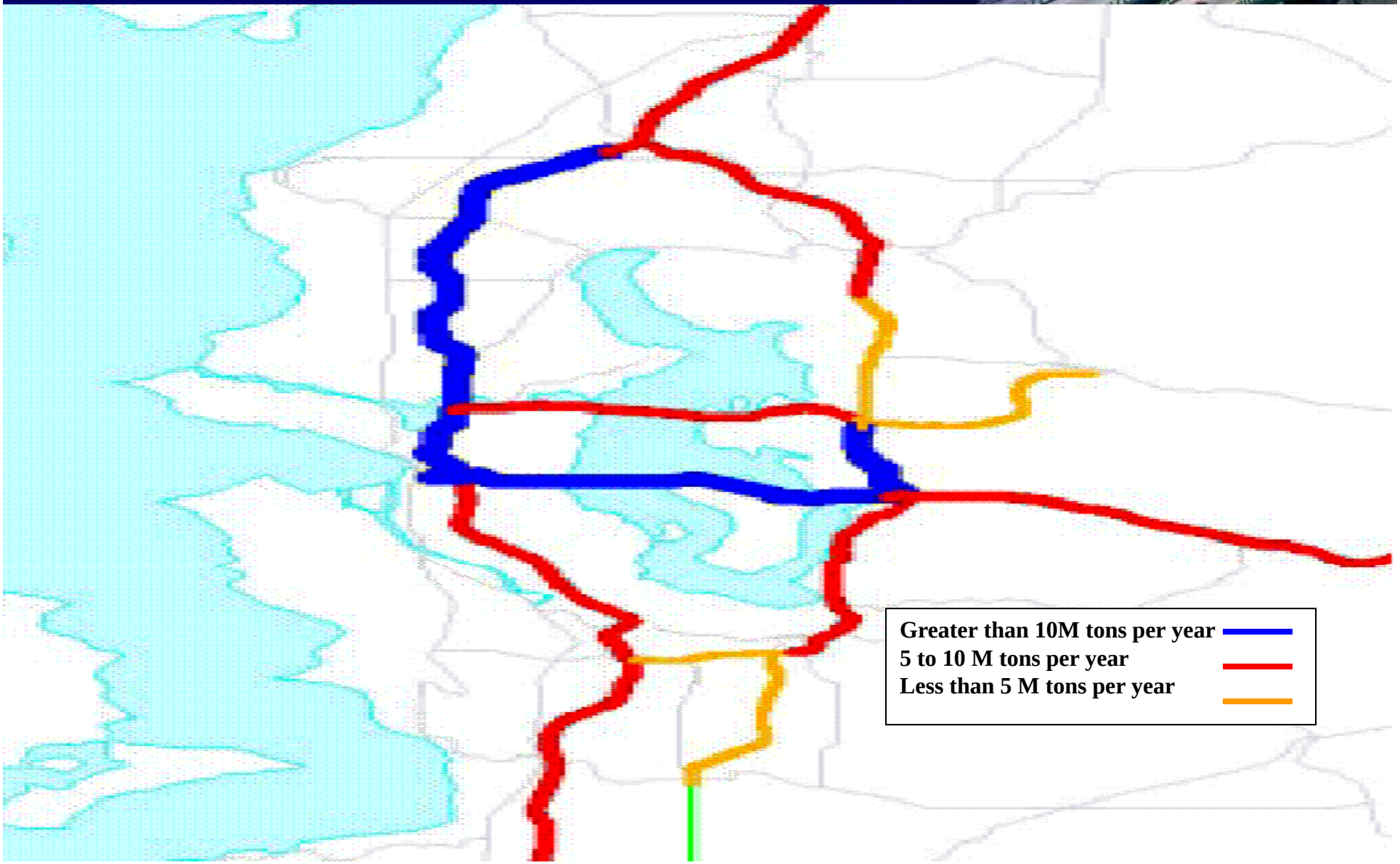

Why Weigh?

- **Pavement Design / Maintenance**

- **Pavement Design / Maintenance**
- **Bridge Design / Loading**

- **Pavement Design / Maintenance**
- **Bridge Design / Loading**

$$W = 500\left[\frac{LN}{N-1} + 12N + 36\right]$$

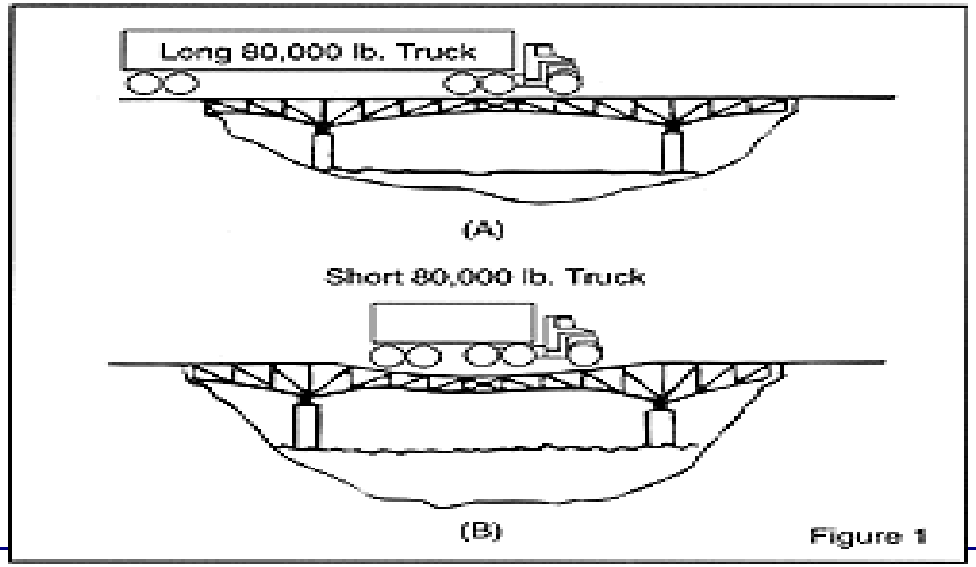

Figure 1

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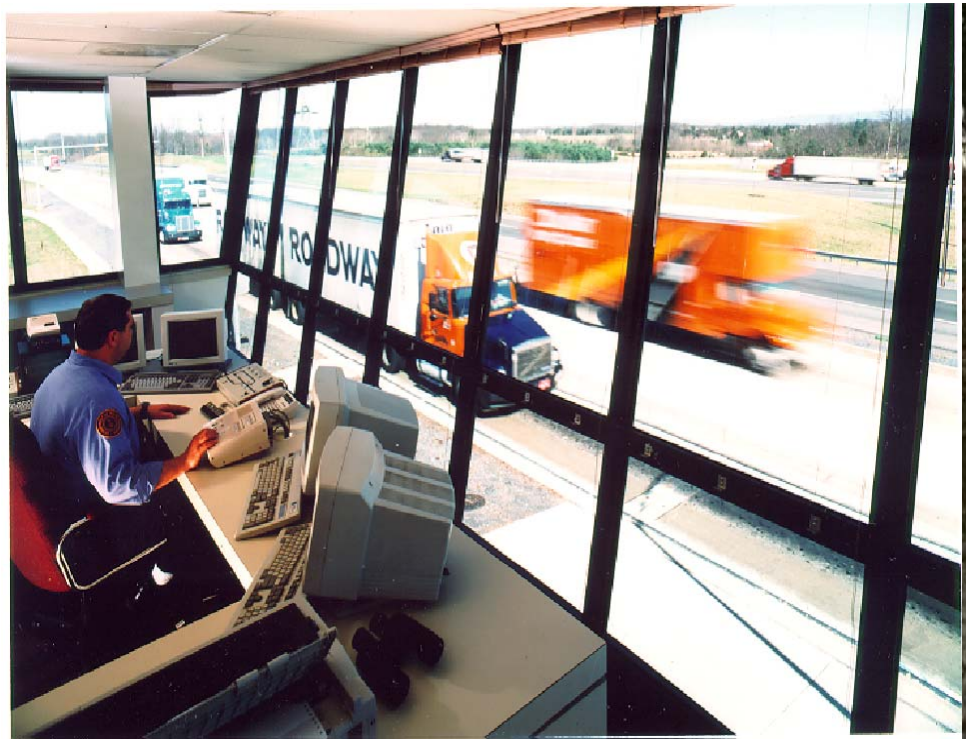
- **Pavement Design / Maintenance**
- **Bridge Design / Loading**
- **Enforcement**



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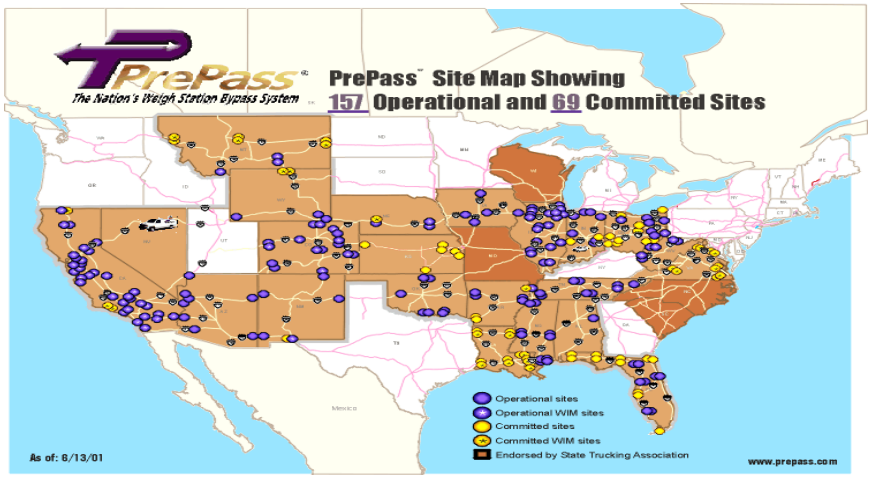
- **Pavement Design / Maintenance**
- **Bridge Design / Loading**
- **Enforcement**
- **Research**

LTPP

- **Pavement Design / Maintenance**
- **Bridge Design / Loading**
- **Enforcement**
- **Research**
- **Taxation & Administration**



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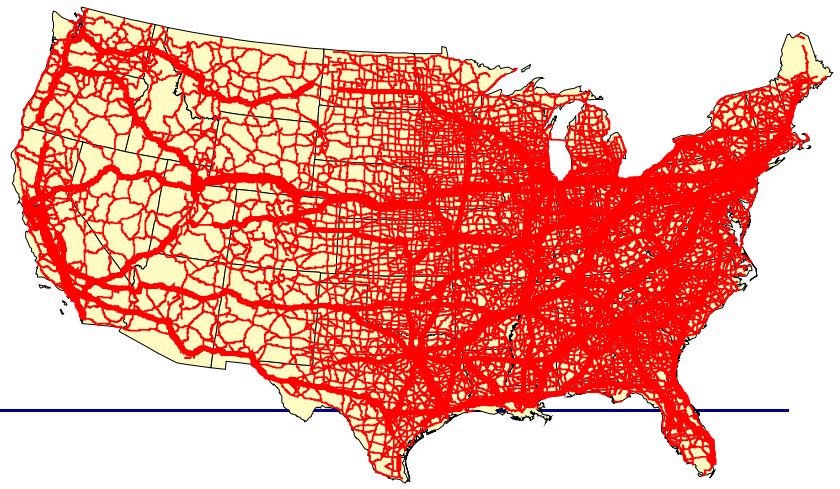
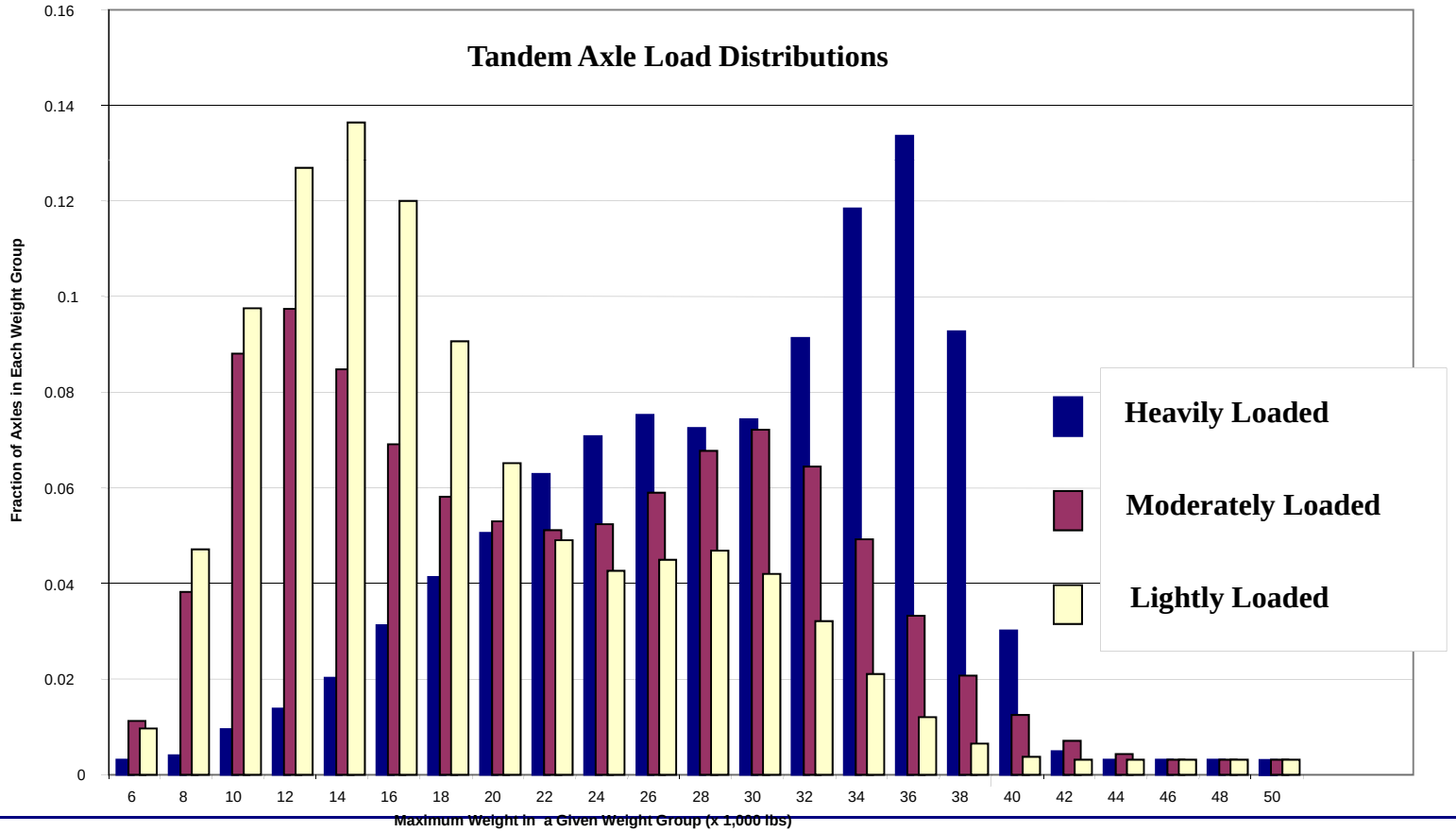
- **Pavement Design / Maintenance**
- **Bridge Design / Loading**
- **Enforcement**
- **Research**
- **Taxation & Administration**
- **Freight Movement**



Why Weigh in Motion?

- **Traffic Stream**
- **Use of the Highway System**

A. Define truck weight roadway groups



A. Define truck weight roadway groups

Rural	Urban
Interstate and arterial major through-truck routes	Interstate and arterial major through-truck routes
Interstate and arterial major truck routes	Interstate and arterial major truck routes
Other roads (e.g., regional agricultural roads) with little through traffic	Other roads (e.g., regional agricultural roads) with little through traffic
Interstate and other freeways serving primarily local truck traffic	Interstate and other freeways serving primarily local truck traffic
Special cases (e.g., recreational, ports)	

A. Define truck weight roadway groups

B. 6 sites / group

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A. Define truck weight roadway groups

B. 6 sites / group

C. One continuous WIM within group

Capture day-of-week and seasonal changes within each group

A. Define truck weight roadway groups

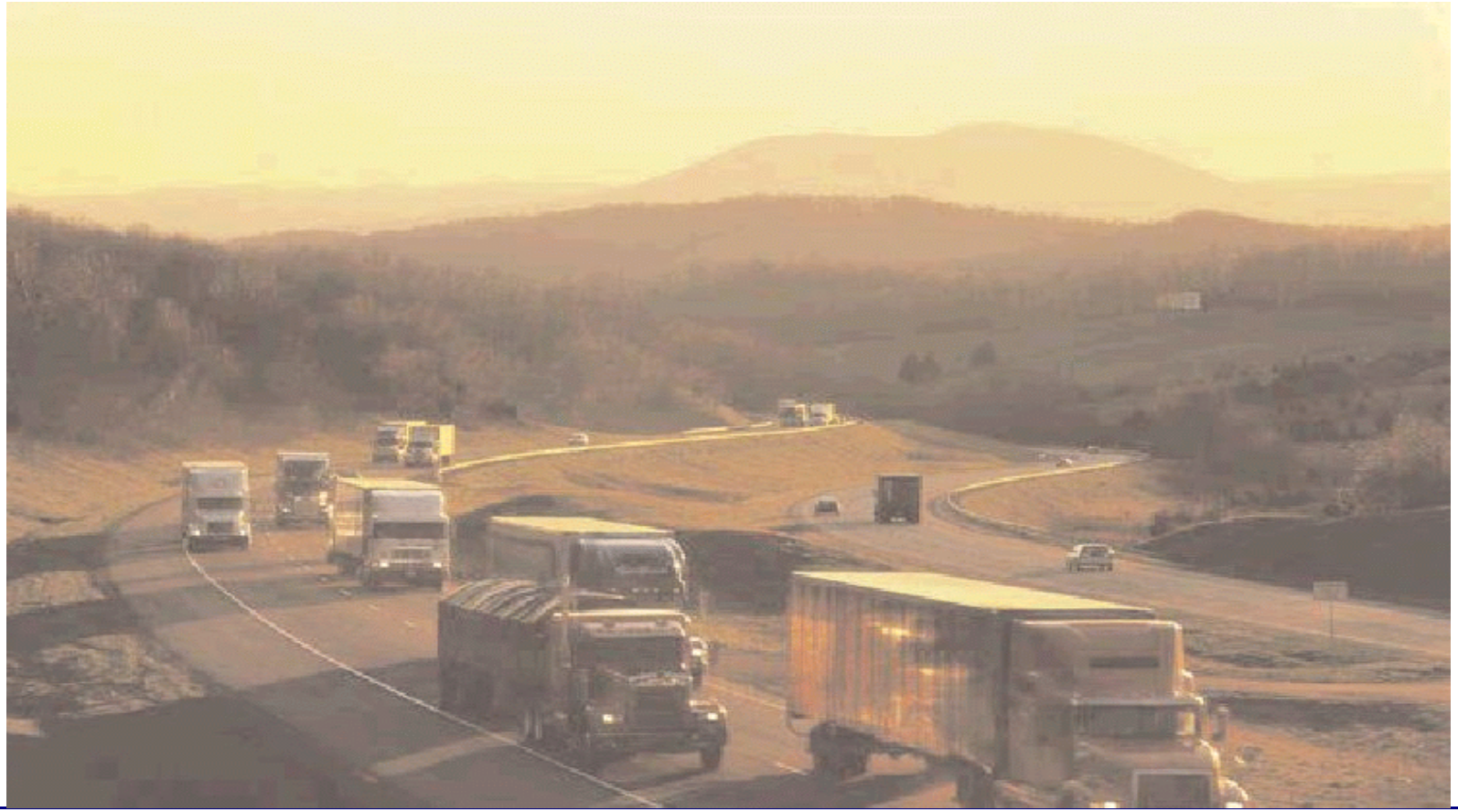
B. 6 sites / group

C. One continuous WIM within group

Capture day-of-week and seasonal changes within each group

D. Calibrate, Calibrate, Calibrate

WIM's Future Role



Travel Monitoring Analysis System

- National estimates of heavy vehicle highway travel on a monthly basis
- National estimates of axle loadings and highway ton-miles of freight moved each month, and
- Highway specific estimates of truck volumes and loadings

Travel Monitoring Analysis System

- **Traffic Volume Trends**
- **GIS**
- **Freight Management**
- **Safety**

“THE EASY BUTTON”

THANK YOU !

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