U.S. Department of Transportation
Federal Highway Administration

Highway Information Seminar 2013

Truck Weigh Study & Weigh-In-Motion

Session 5B

Wednesday November 20, 2013
Moderator: David L. Jones Sr. ,Transportation Specialist

OBJECTIVE

- Brief History of Truck Weight Study (TWS)
- Mandate for the traffic monitoring program
- Identify Traffic Monitoring Sensor Technology
- TWS Status & National Loading Trends
- Weigh-In-Motion (WIM) System Deployment
- Future of WIM Program

FHWA & Weigh-In-Motion

- 1831 Thaddeus Fairbanks
- 1918 BPRs First Road Test
- 1934 Hayden-Cartwright Act
- 1939 Type A Loadometer
- 1942 Strain Gage Load Cell
- 1950 O.K. Norman

FHWA & Weigh-In-Motion

- **1955** AASHO Road Test Approved
- **1971** TWS Manual
- **1974** First WIM Conference
- **1985** Traffic Monitoring Guide
- **1990** Truck Weight Study Software
- **2012** Traffic Monitoring Guide (Update)

Federal Legislation Historical Context

23 U.S.C. 303 – Management System

Traffic Monitoring System (TMS) under

- **SAFETEA-LU**
- **TEA-21**
- **ISTEA**

Mandated States to establish a TMS system by 1997 and be operational thereafter.

Current MAP-21 (Public Law 112–102) Traffic Monitoring and Data Legislation

- Section 1105: Apportionment
- Section 1106: National Highway Performance Program
- Section 1112: Highway Safety Improvement Program
- Section 1115: National Freight Policy
- Section 1116: Prioritization of project to improve freight movement
- Section 1120: Projects of national and regional significance

Current Sources of Guidance

- HPMS Field Manual
- AASHTO Guidelines for Traffic Data Programs
- ASTM Standards
- Traffic Monitoring Guide

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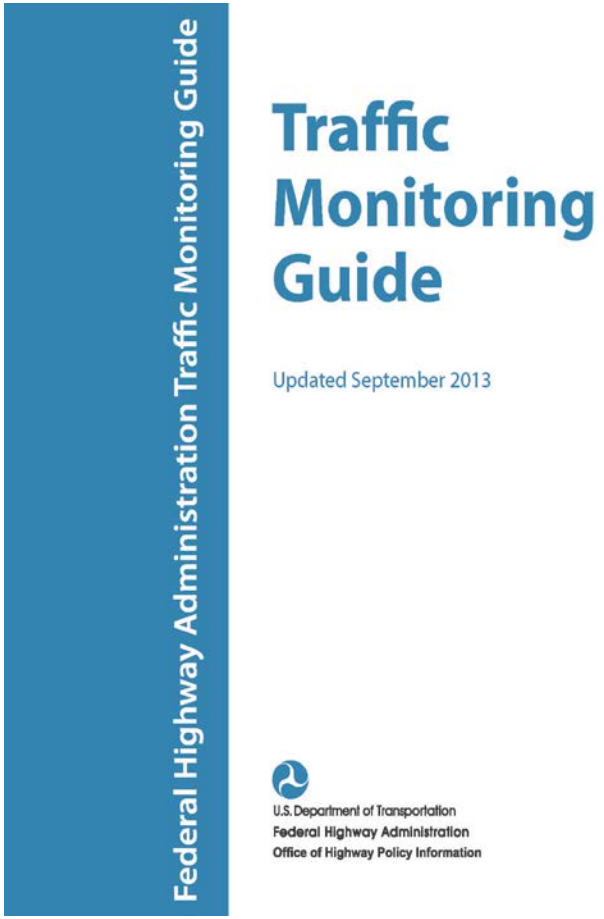
Traffic Monitoring Guide

- Produced by FHWA – 2013 edition
- Offers guidance for agencies responsible for traffic data collection, analysis, and reporting
- Provides a basic common data collection framework for all highway agencies
- A guide to implement federal requirements



Traffic Monitoring Guide – Contents

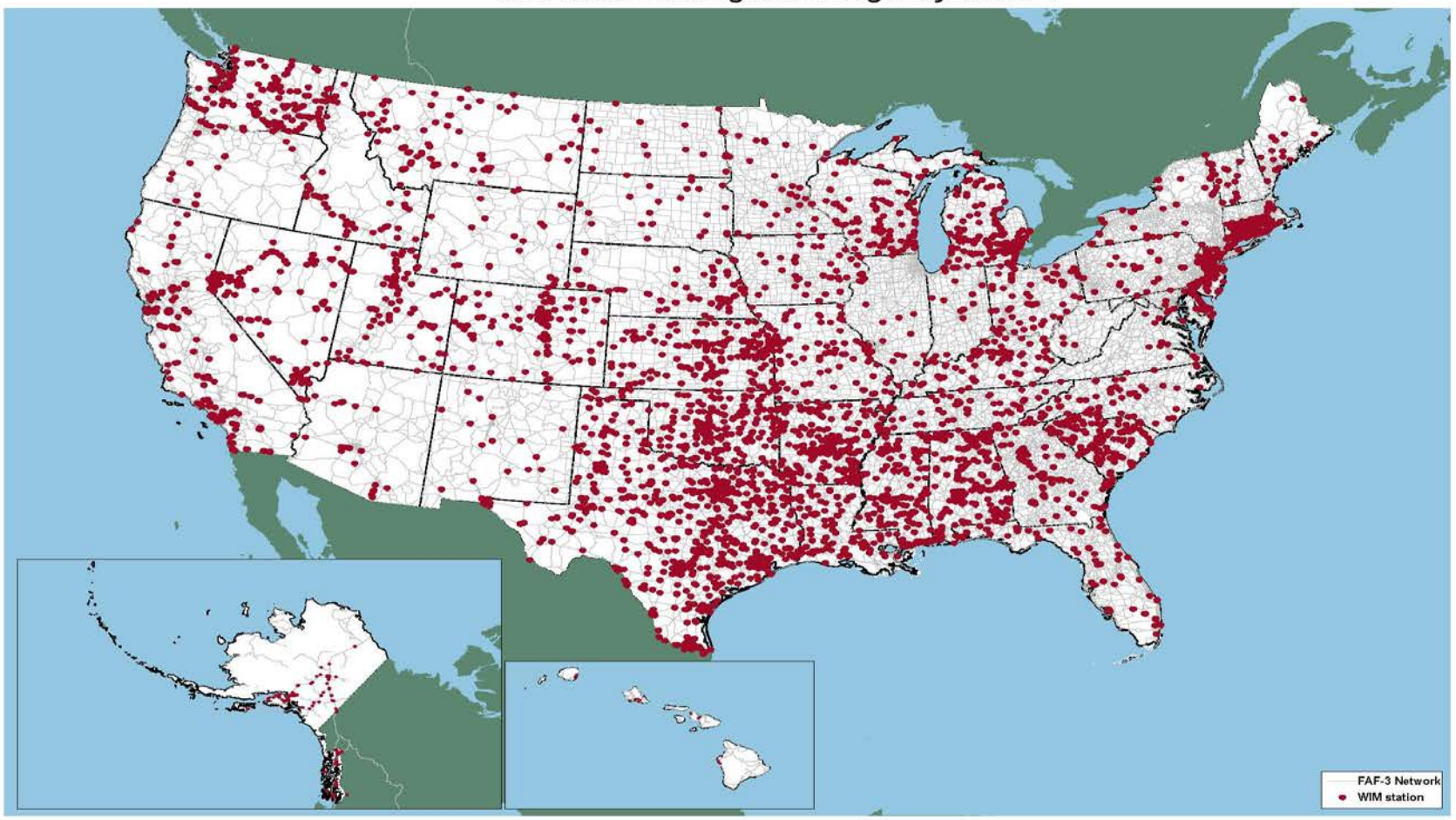
1. Theory, Technology, and Concepts
2. Program – Business Planning and Design NEW!
3. Methodologies
4. Non-Motorized Traffic NEW!
5. Transportation Management and Operations NEW!

Traffic Monitoring Guide – Contents (Con.)

6. HPMS Requirements for Traffic Data
7. Traffic Monitoring Formats Appendices (including many case studies provided mostly by State agencies)

* Updated 2 day NHI TMG Training Course *

Truck Weight Study Status



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

Load Cell Sensor

Bending Plate Sensor

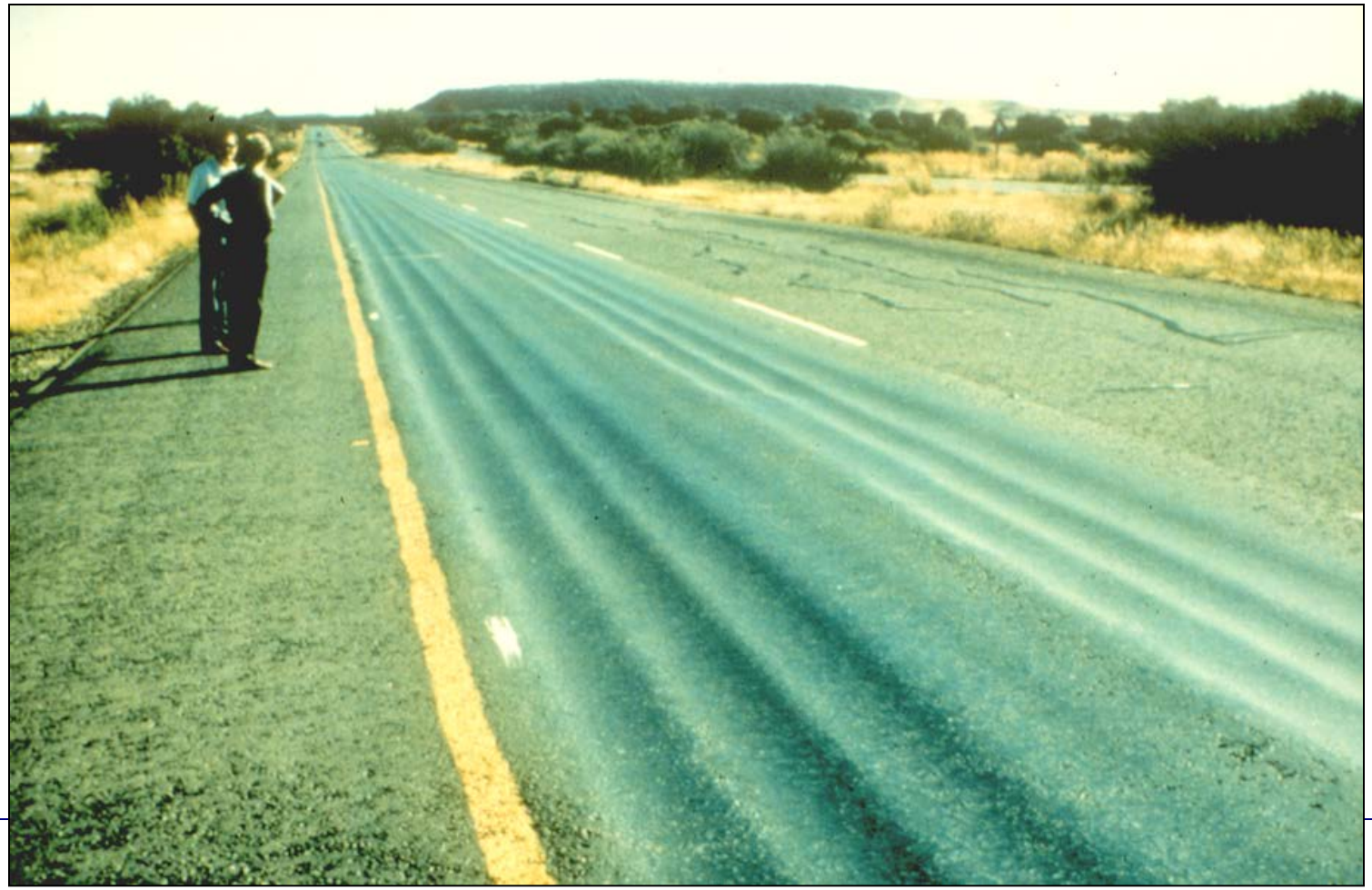
Quartz Sensor

Piezo-Ceramic Sensor

Capacitance Mat

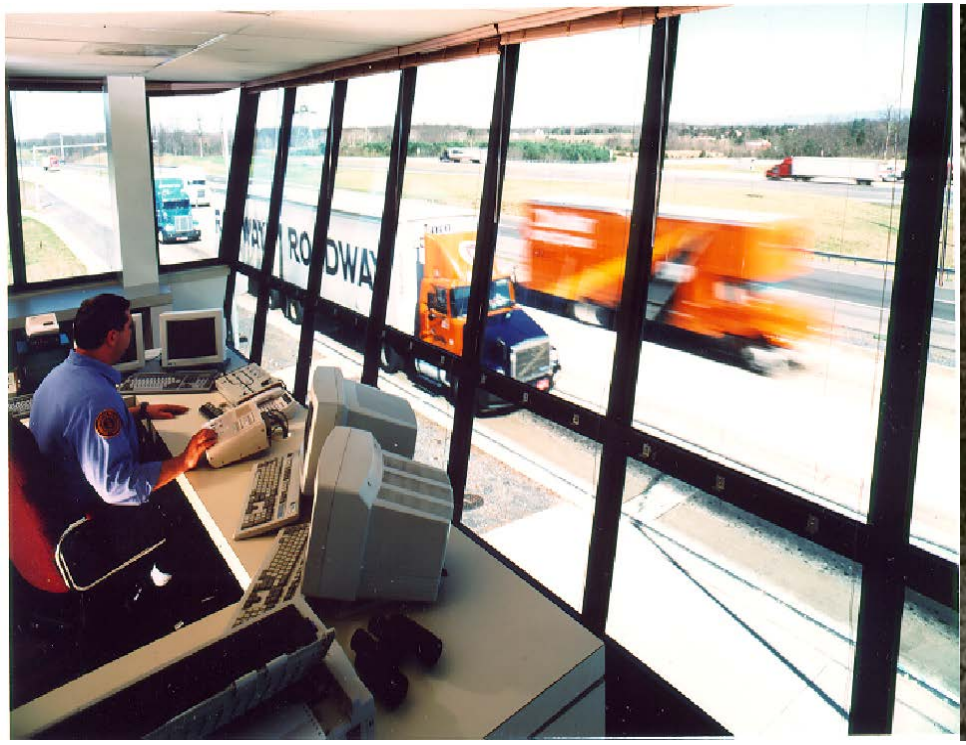
Why Weigh?

- **Pavement Design / Maintenance**



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

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

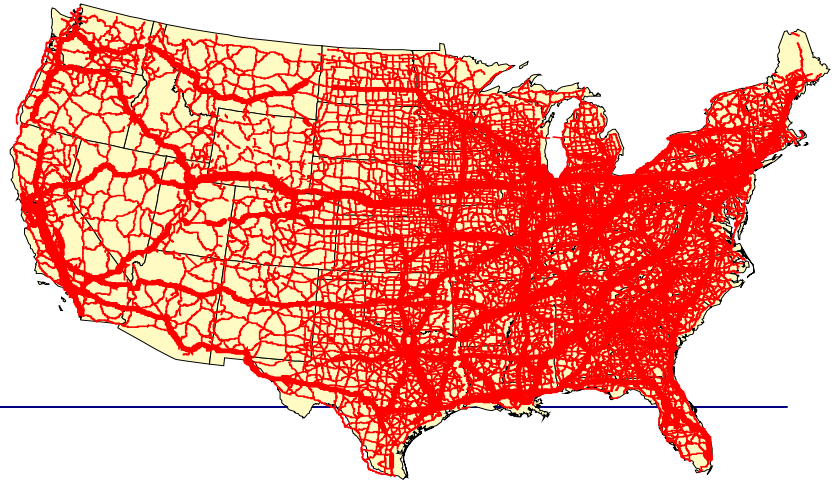


- Pavement Design / Maintenance
- Bridge Design / Loading
- Enforcement
- Research

LTPP

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

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

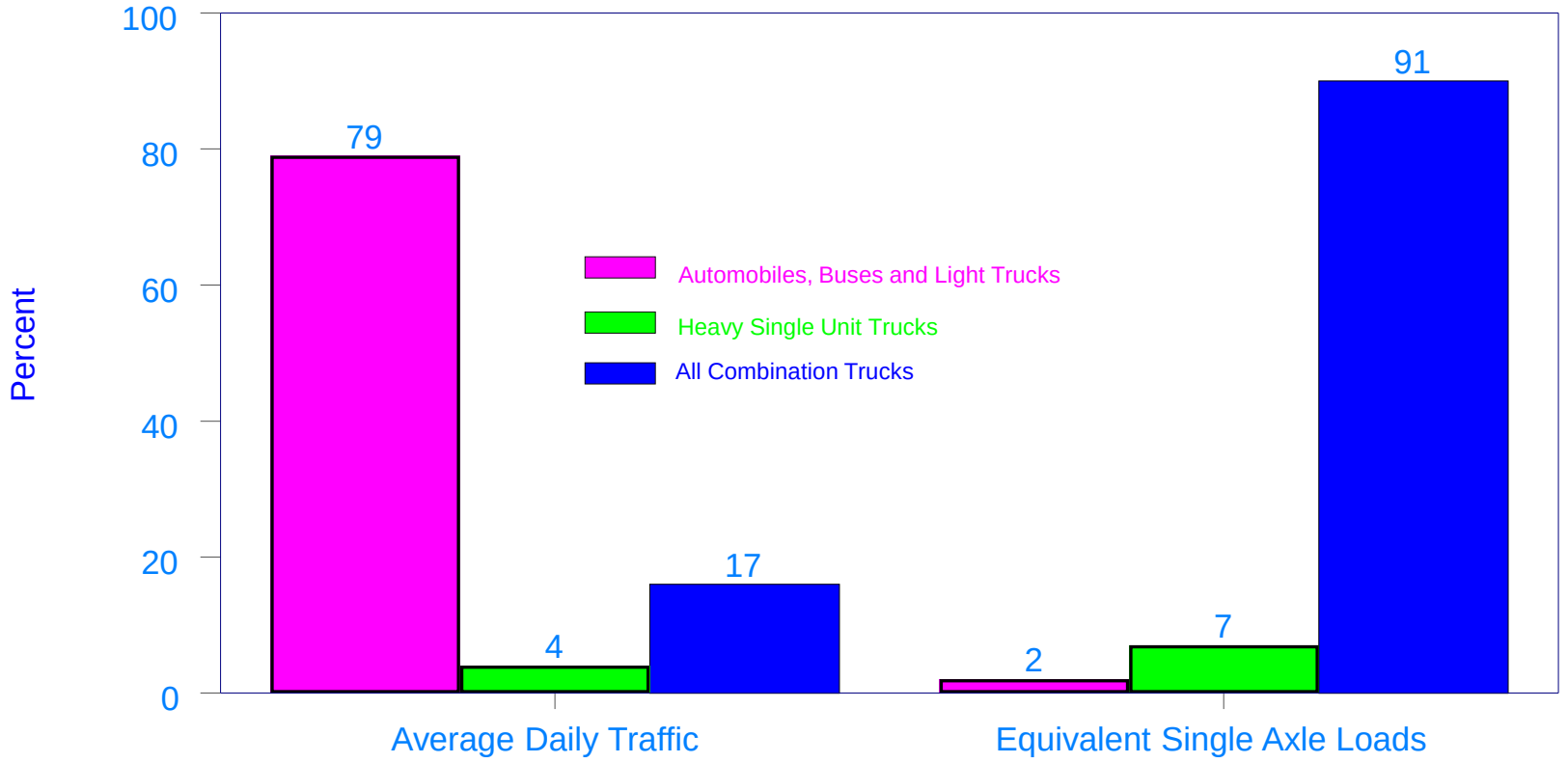


Why Weigh in Motion?

- Traffic Stream
- Use of the Highway System

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



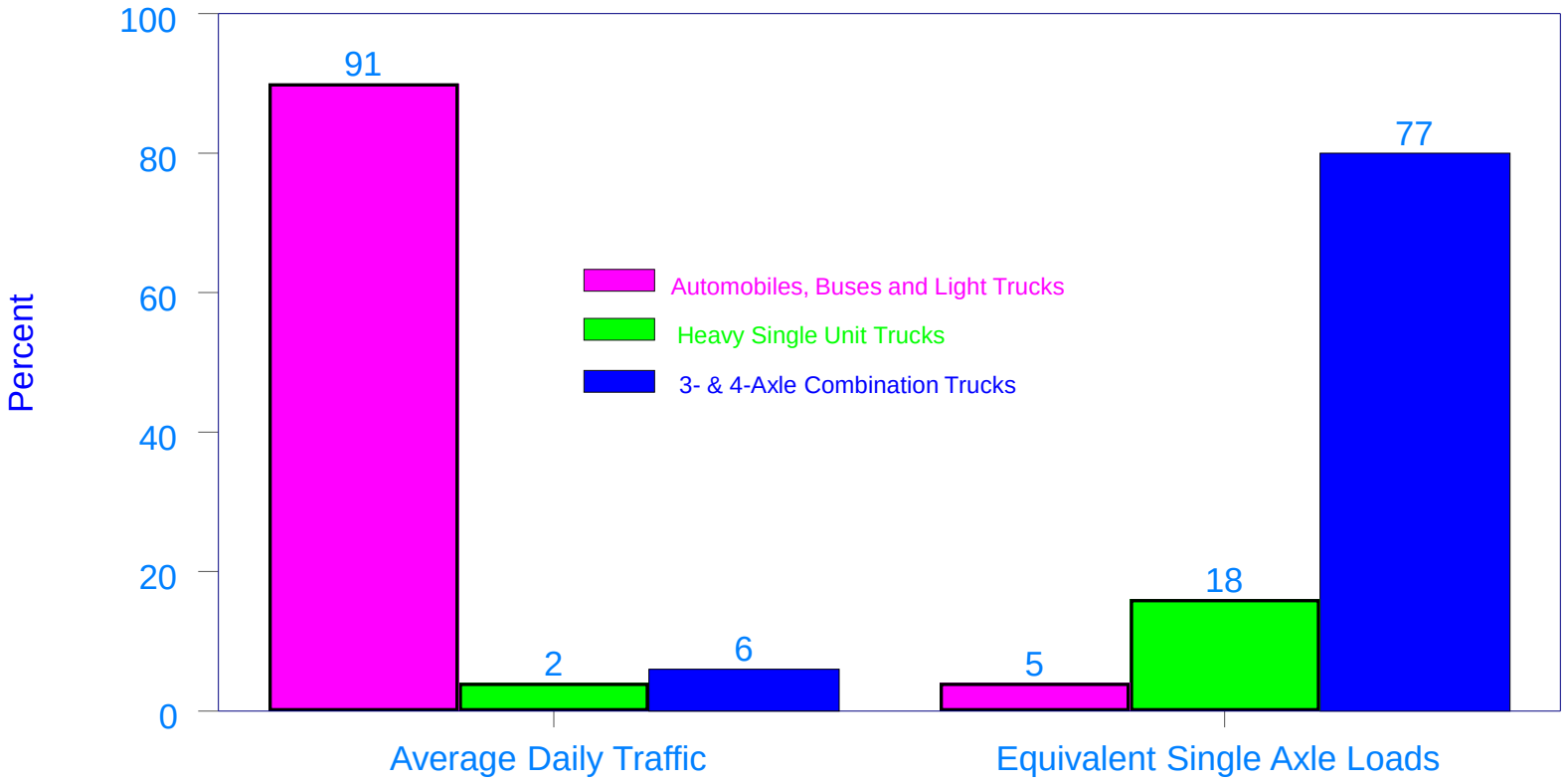
1Equivalent axle loads provide a means of measuring vehicle wear on pavements by relating them to an 80 kilonewton (18,000 pound) single axle load.

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.)

Urban 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



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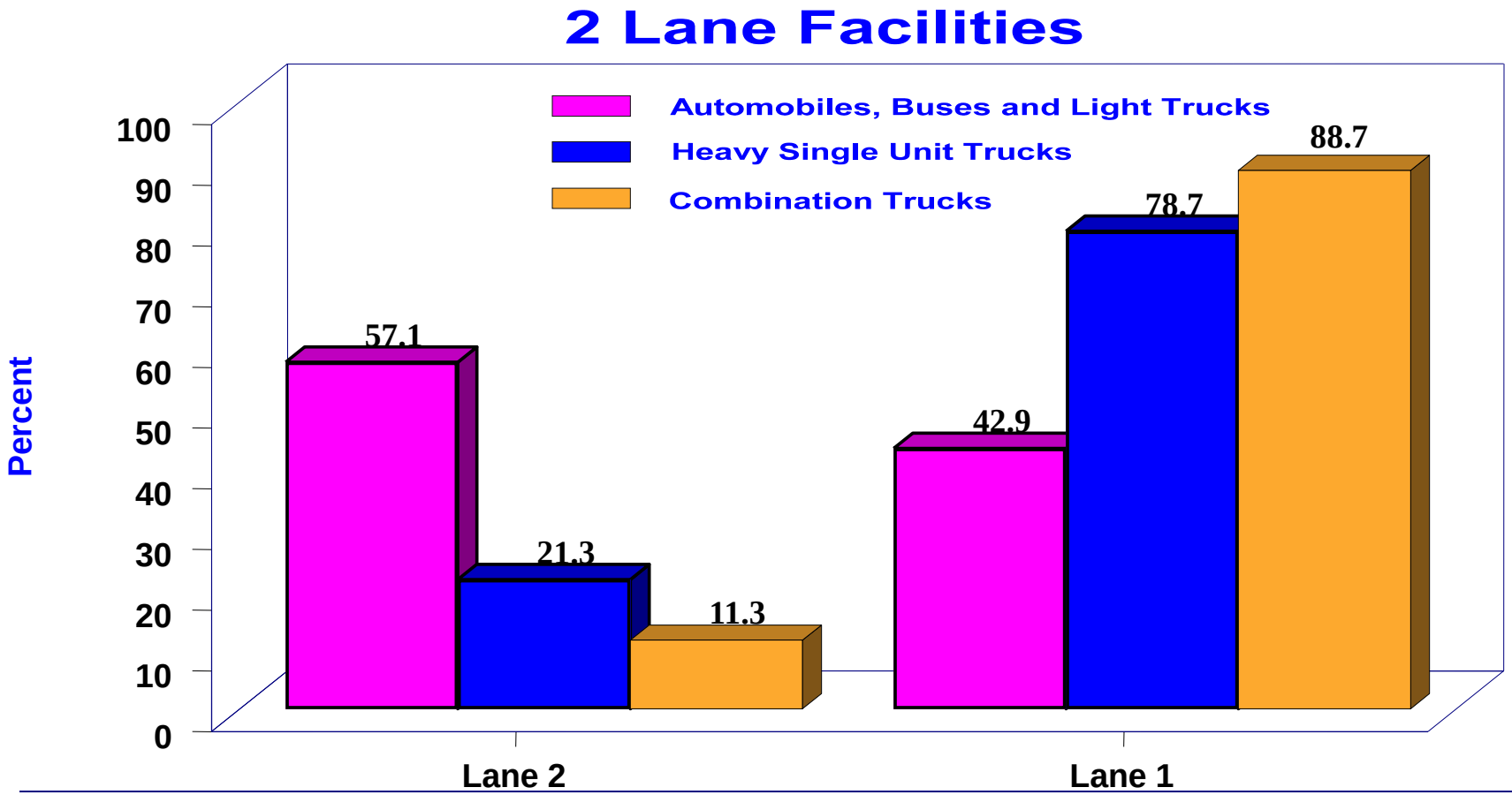
Distribution of Vehicle Travel by Lane
by Vehicle Type



Source: VTRIS Truck Weight Study

W-Tables

- W-1 Weigh Station Characteristic
- W-2 Comparison of Weighed VS Counted
- W-3 Average Empty, Loaded and Cargo Weights
- W-4 Equivalency Factors
- W-5 Gross Vehicle Weights
- W-6 Overweight Vehicle Report
- W-7 Distribution of Overweight Vehicles

https://fhwaapps.fhwa.dot.gov/vtris-wp/

Creating & Maintaining WIM Program

Step 1. Review existing Data Collection

Step 2. Develop An Inventory Of Available Weight Data Collection Locations And Equipment

Step 3. Determine The Roadway Groups To Be Monitored

Step 4. Establish Roadway Weight Groups Testing the Quality of Selected Truck Weight Groups Determining the Precision of Estimates from Truck Weight Groups

Step 5. Determine The Appropriate Number Of Weight Data Collection Locations

Creating & Maintaining WIM Program

Step 6. Determine the Number of Days that Should be Counted at a Given WIM Site

Step 7. Select WIM Sites

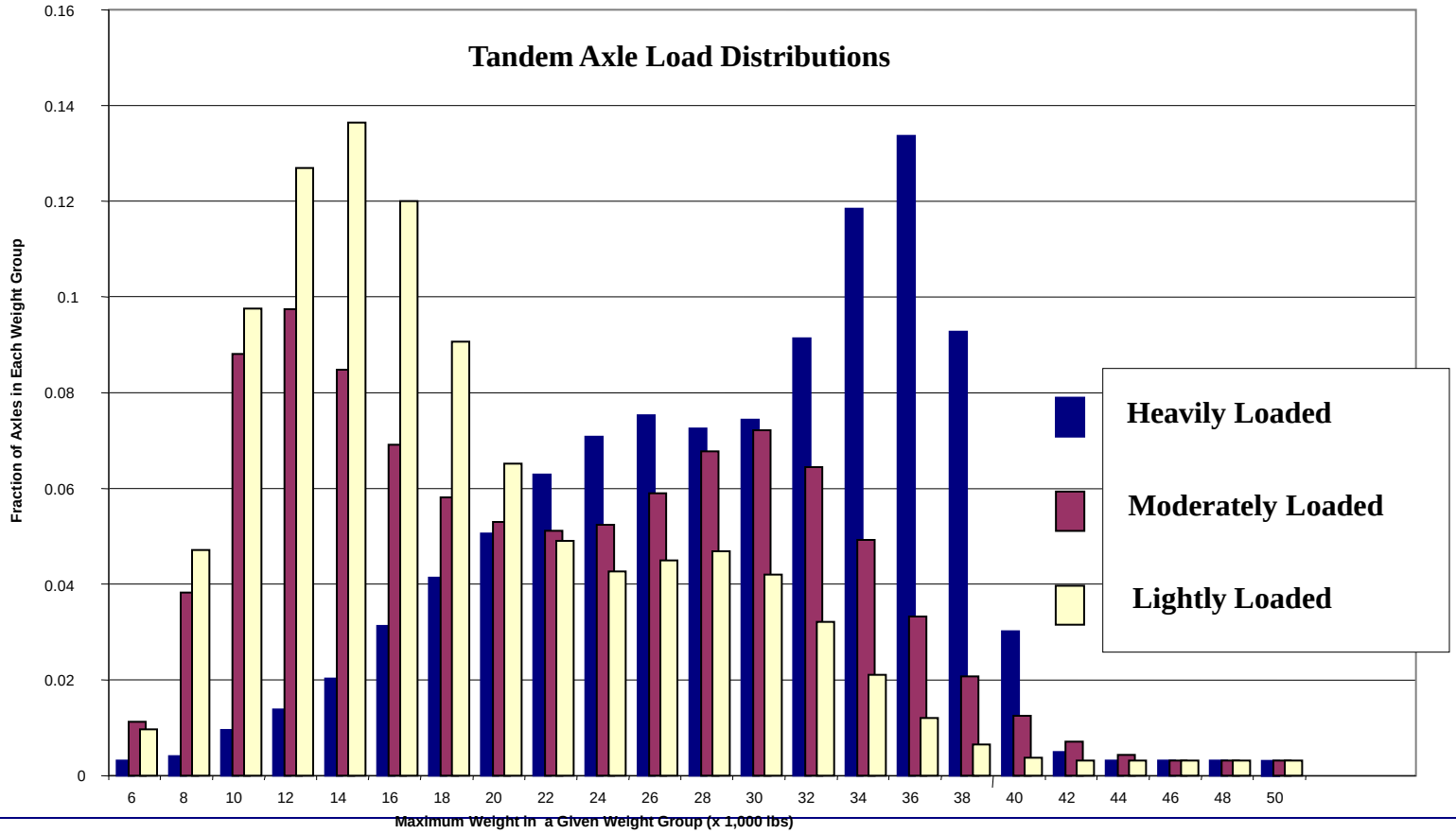
Step 8. Integrate the WIM Sites with the Remaining Count Program

Figure: 3-9

Section: 3.2.4

Page: 3-39

A. Define truck weight roadway groups



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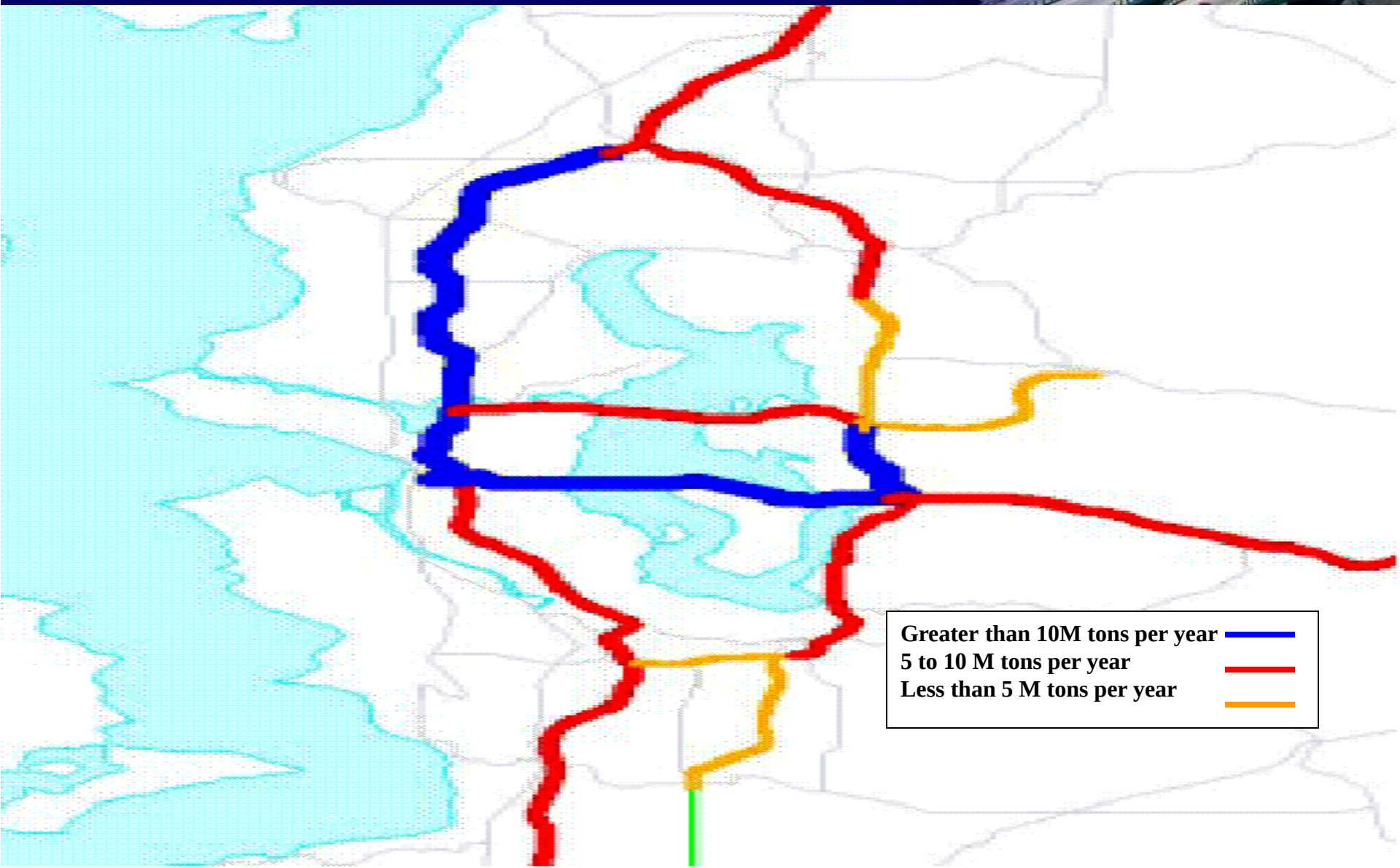

A. Define truck weight roadway groups

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

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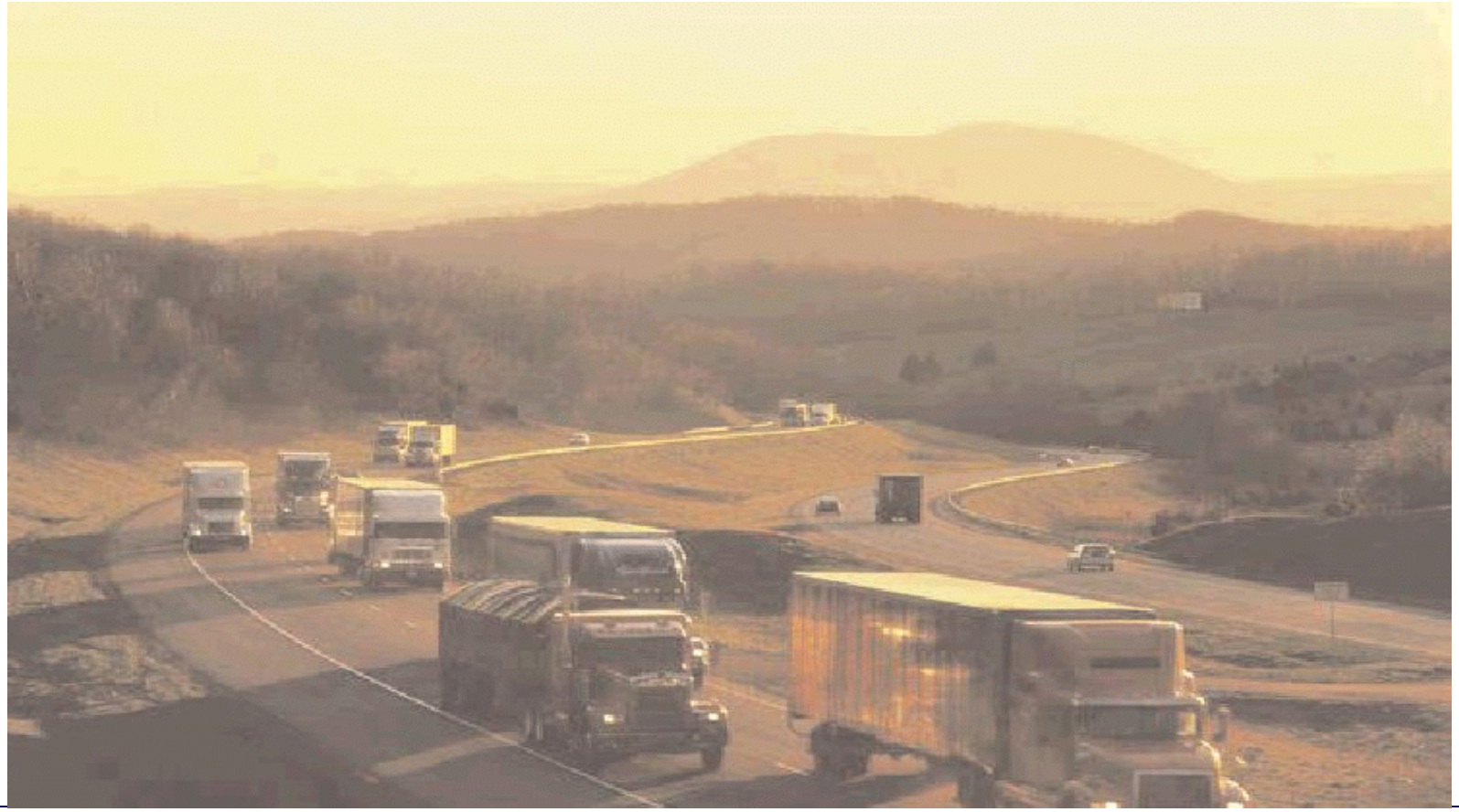
B. 6 sites / group

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

- Traffic Volume Trends
- GIS
- Freight Management
- Safety

"THE EASY BUTTON"

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THANK YOU !

David L. Jones Sr.
djones@dot.gov