What's up with Weight

Highway Information Seminar 2015

Wednesday September 23, 2015

Moderator: David L. Jones SR., Transportation Specialist

OBJECTIVE

- The goal of my presentation is to provide a brief overview on the Truck Weight Study (TWS) program and Weigh-In-Motion (WIM).

Learning Outcome

- Understand History of Truck Weight Study (TWS)
- Explain Mandate for the traffic monitoring program
- Outline Travel Monitoring Analysis System (TMAS) Data Need
- Describe Traffic Monitoring Sensor Technology
- Identify TWS Status & National Loading Trends
- Describe WIM System Deployment
- Observe Research and Future of WIM Program

Participant Introduction

- Name
- Organization and position
- Role/experience in the field of traffic monitoring
- I hope to learn _____ about Weigh-In-Motion (WIM)

FHWA & Weigh-In-Motion

Essentially three distinct eras can be seen:

- 1. The period prior to the Highway Planning Survey (HPS),
- 2. The period of the HPS and the associated use of loadometers
- 3. The present era's Weigh in Motion period.

FHWA & Weigh-In-Motion

The period prior to the Highway Planning Survey (HPS),

- 1831 - Thaddeus Fairbanks
- 1918 - BPRs First Road Test
- 1934 - Hayden-Cartwright Act

The period of the HPS and the associated use of loadometers

- 1939 - Type A Loadometer
- 1942 - Strain Gage Load Cell

FHWA & Weigh-In-Motion

The present era's Weigh in Motion period.

- 1950 - O.K. Norman
- 1955 - AASHO Road Test Approved
- 1967 - Truck Weight Study
- 1971 - TWS Manual
- 1974 - First WIM Conference
- 1985 - Traffic Monitoring Guide
- 1990 - Truck Weight Study Software
- 2013 - Traffic Monitoring Guide (Update)

Federal Legislation Historical Context

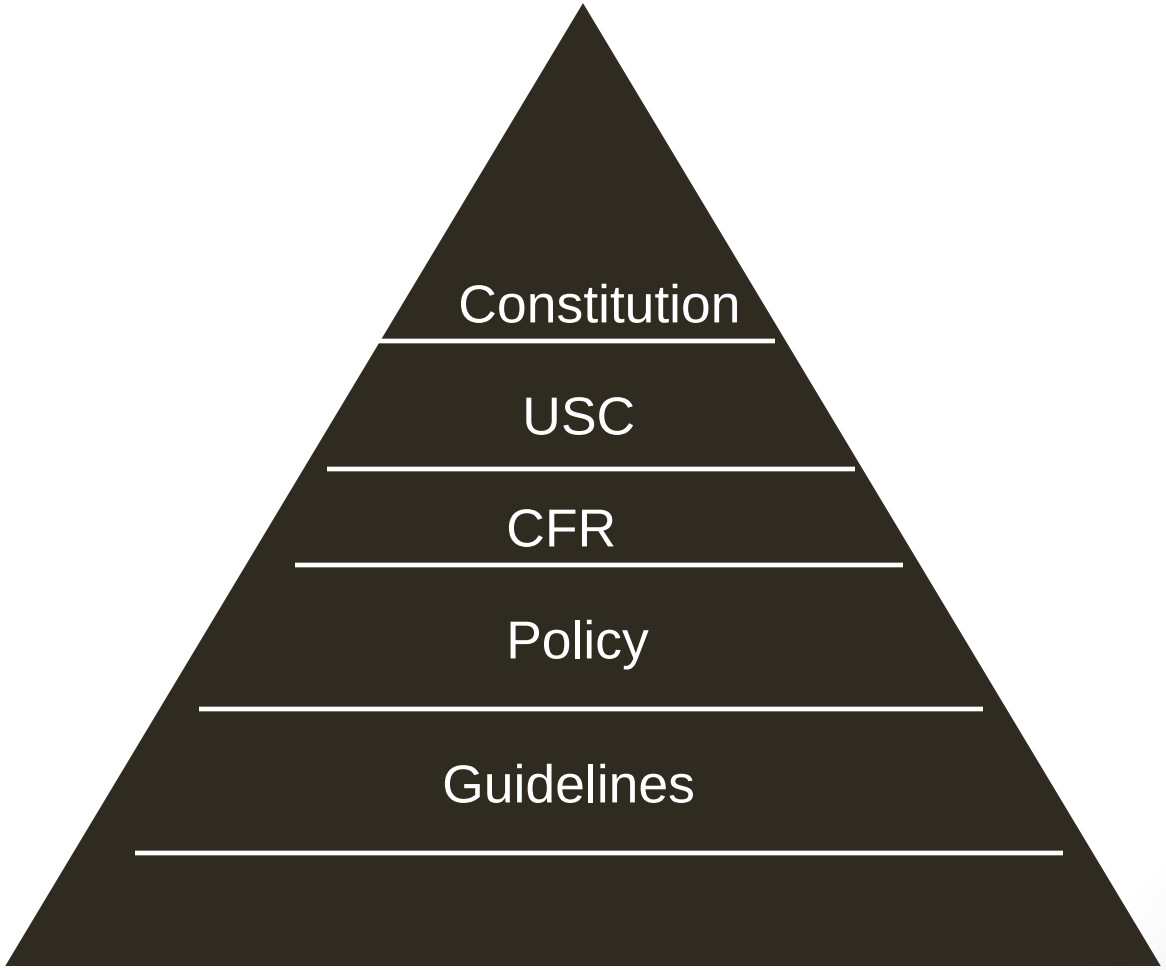
23 U.S.C. 303 – Management System

Traffic Monitoring System (TMS) under

- SAFETEA-LU
- TEA-21
- ISTEA

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

Hierarchy of Our Law



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

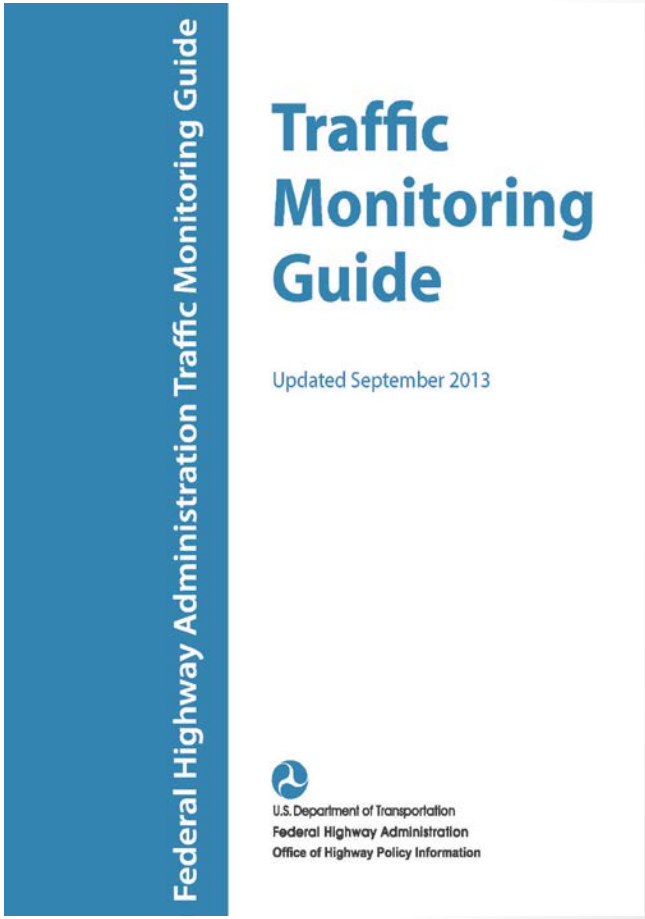
- Section 1105: Apportionment
- Section 1106: National Highway Performance Program
- Section 1112: Highway Safety Improvement Program
- Section 1115: National Freight Policy
- Section 1116: Prioritization of project to improve freight movement
- Section 1120: Projects of national and regional significance

Current Sources of Guidance

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

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

6. HPMS Requirements for Traffic Data
7. Traffic Monitoring Formats Appendices

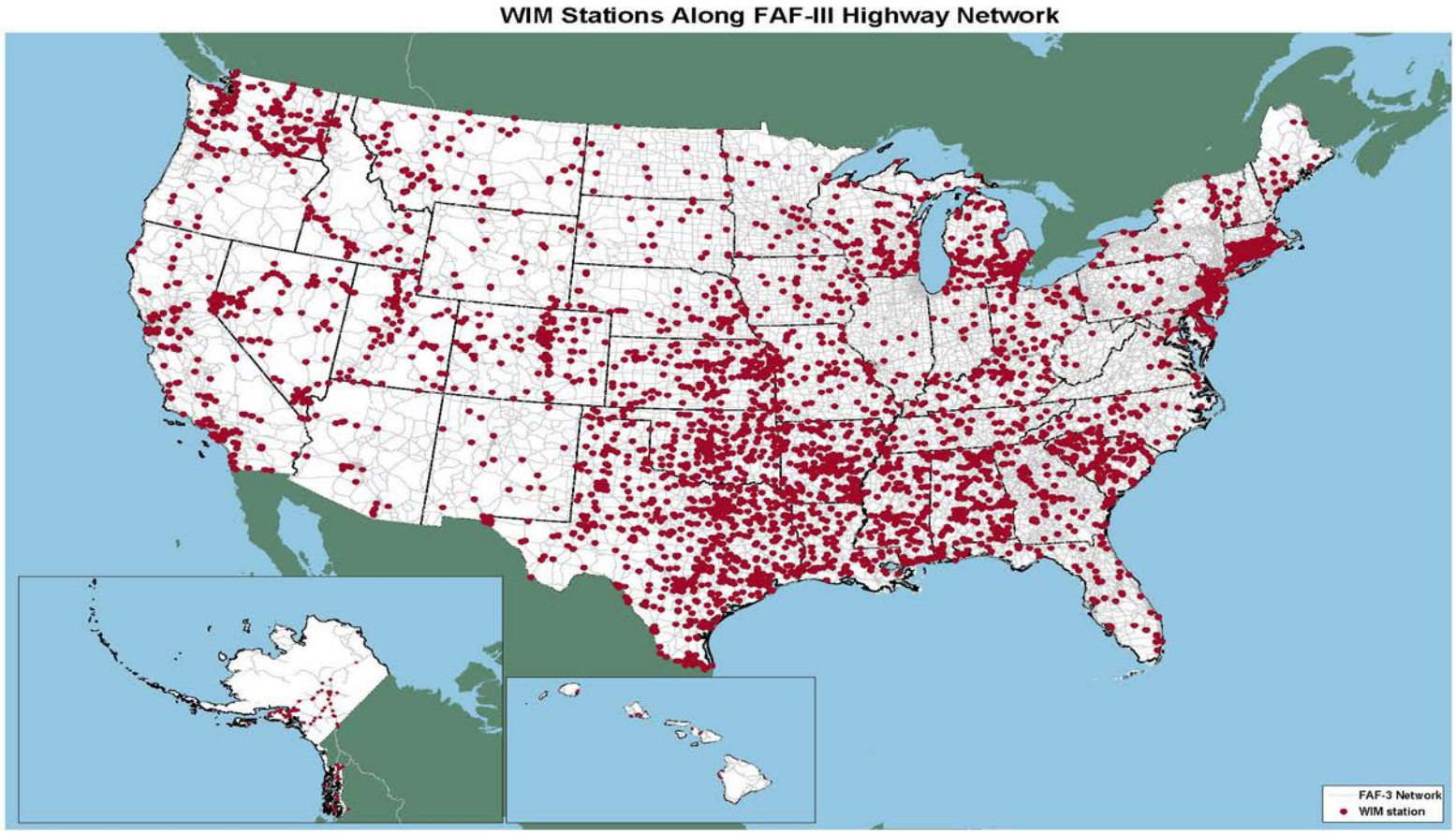
(including many case studies provided mostly by State agencies)

http://www.fhwa.dot.gov/policyinformation/tmguide/

* Updated 2 day NHI TMG Training Course *

http://www.nhi.fhwa.dot.gov/downloads/catalog/FHWA-NHI-151050.pdf

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

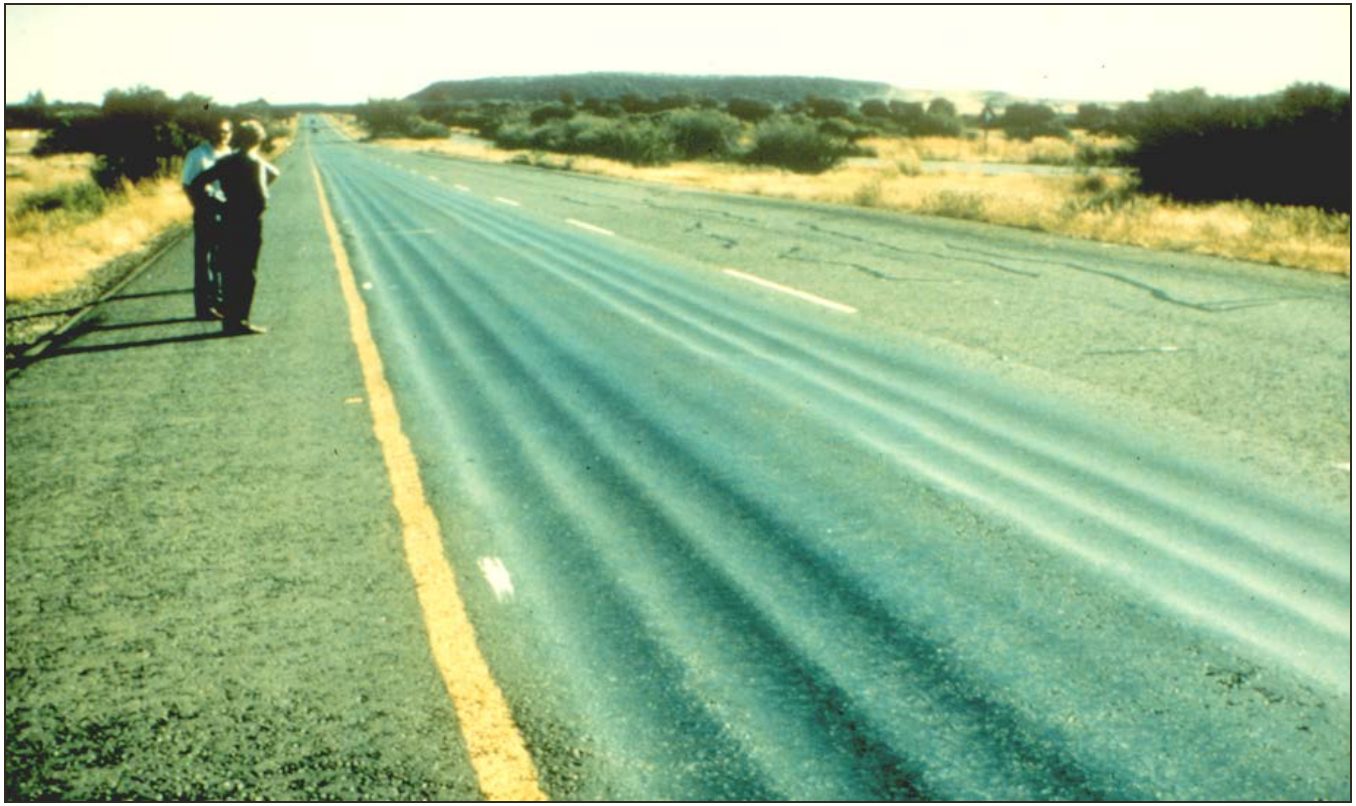
Bending Plate

Quartz-
Piezo Ceramic

Capacitance Mat

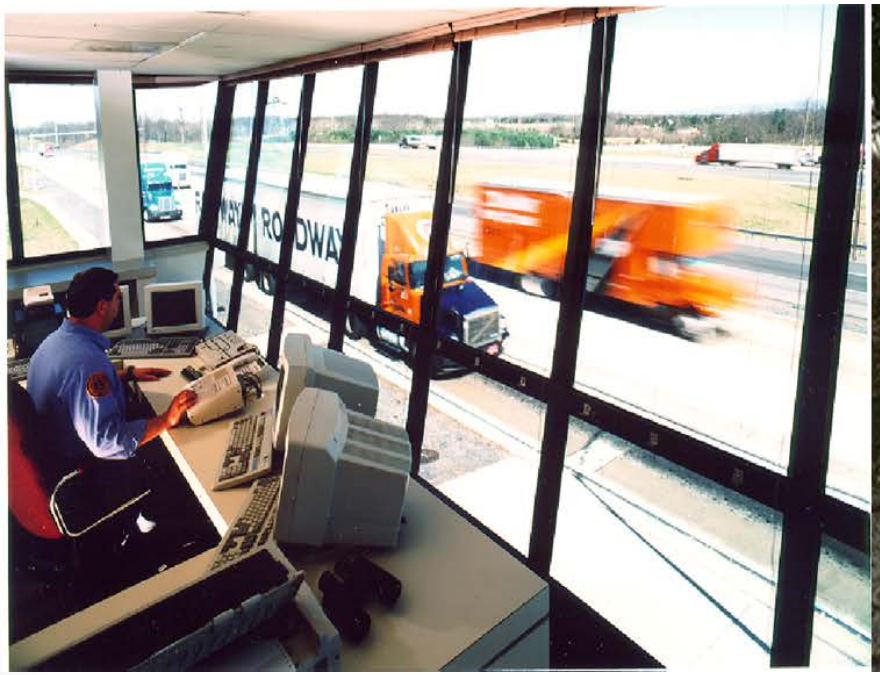
Why Weigh?

Pavement Design / Maintenance



Bridge Design / Loading

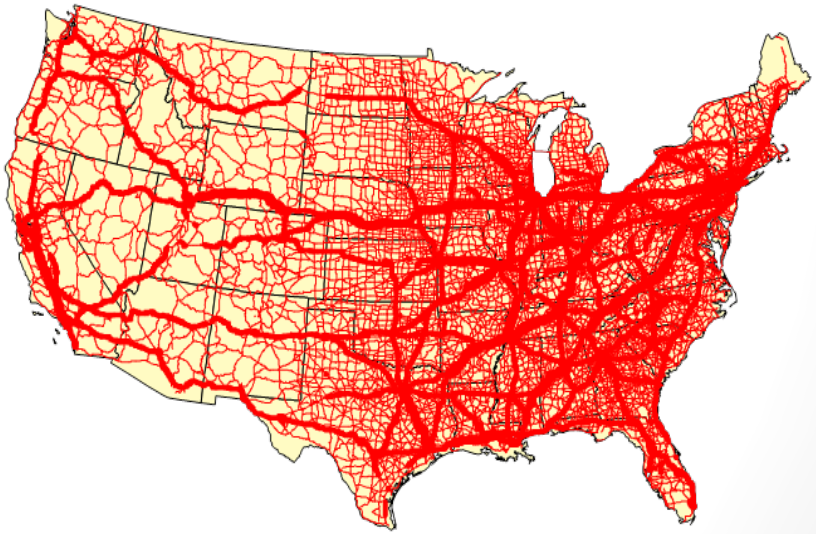
Enforcement



Research

LONG-TERM PAVEMENT PERFORMANCE
Knowledge into Action... Performance Data for Pavement Innovation
AASHTO
TRB
DATA BASE
MATERIALS
DRAINAGE
FORENSICS
TRAFFIC

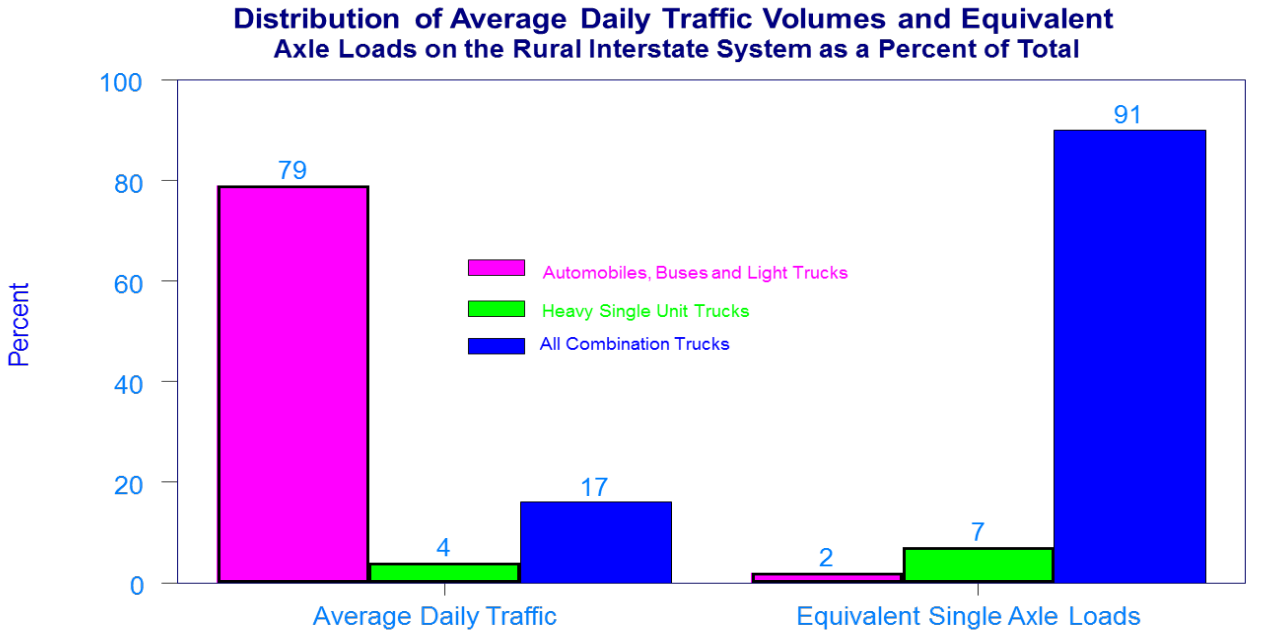
Taxation & Administration Freight Movement



Why Weigh in Motion?

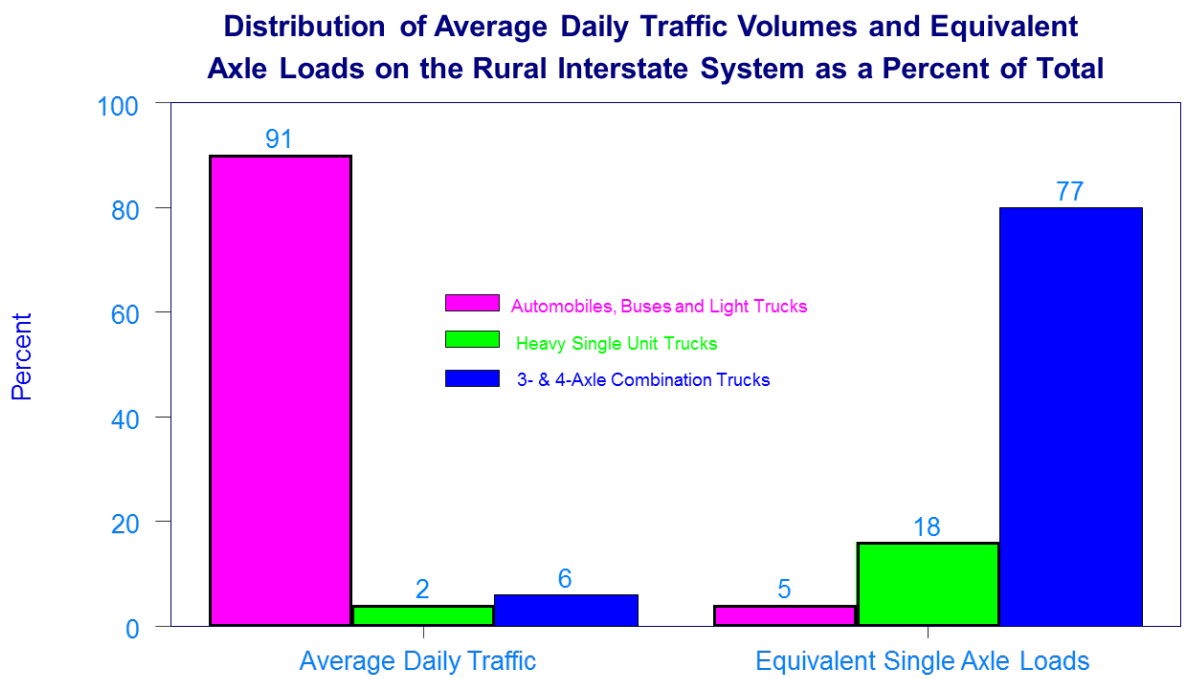
- Traffic Stream
- Use of the Highway System

Rural Interstate Travel by Vehicle Type



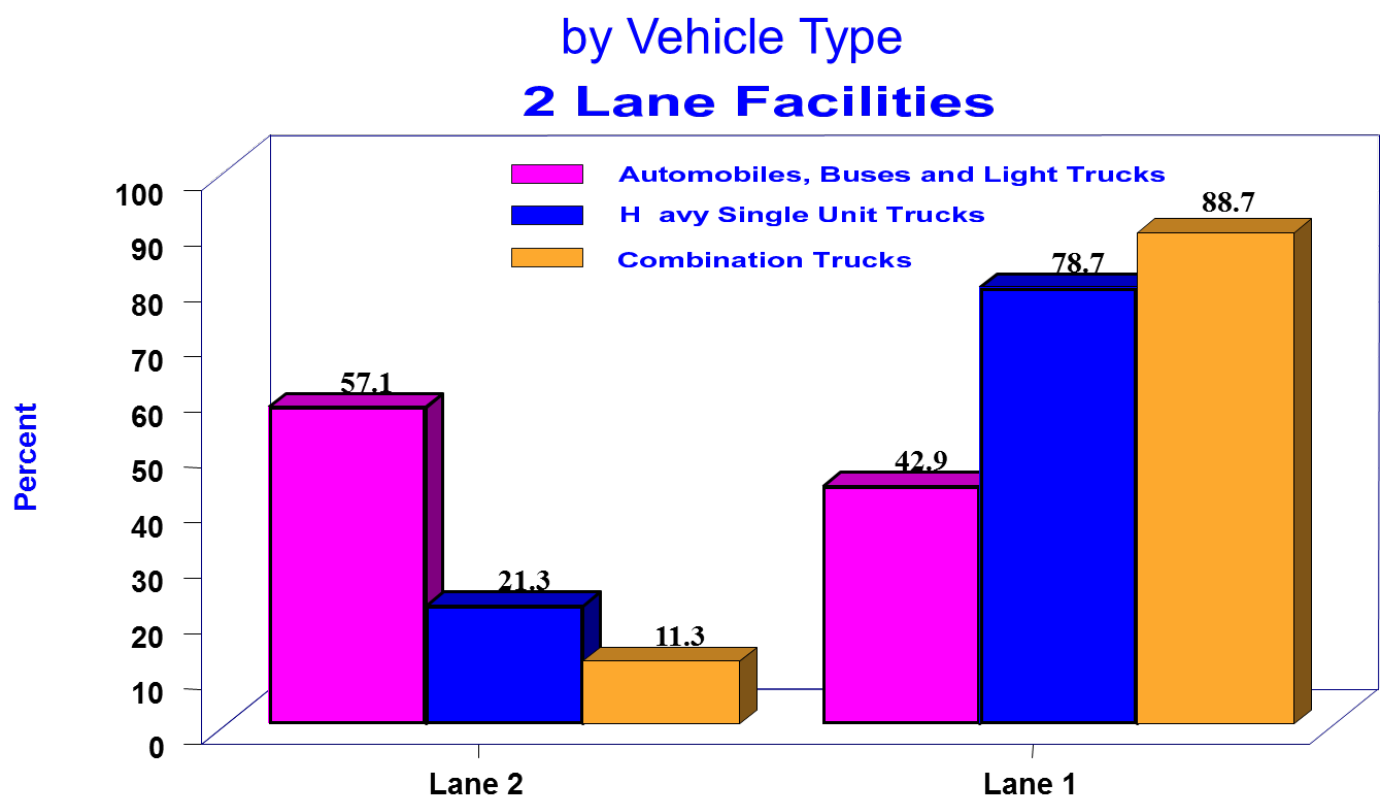
1 Equivalent axle loads provide a means of measuring vehicle wear on pavements by relating them to an 80 kilonewton (18,000 pound) single axle load.
2 All 2-axle, 4-tire trucks. Includes pickup trucks, panel trucks, vans and other vehicles (such as campers, motor homes, etc.)
3 All vehicles on a single 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



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.)

Distribution of Vehicle Travel by Lane



Source: VTRIS Truck Weight Study

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: 3-36

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)	

Figure: 3-12 **Section: 3.2.4** **Page:3-49**

Define truck weight roadway groups

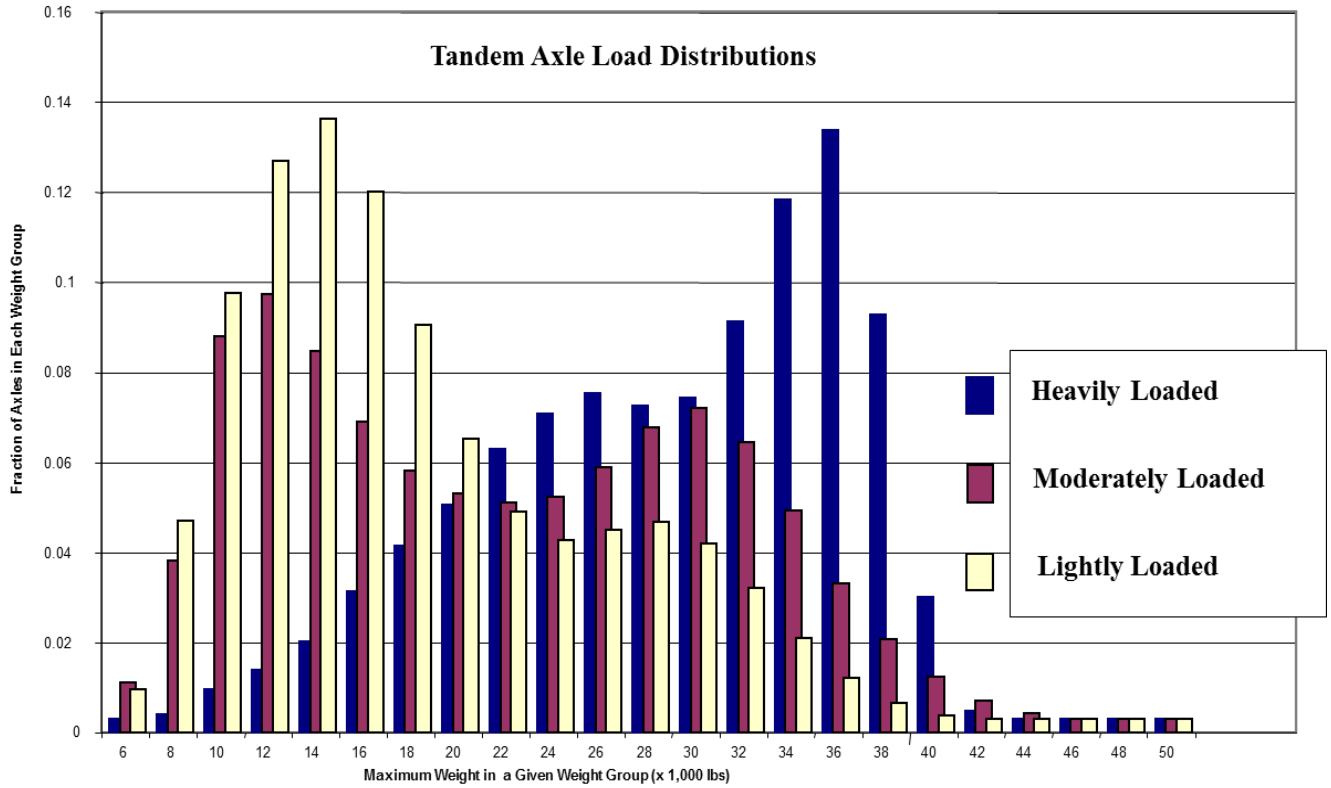


Figure: 3-11 **Section: 3.2.4** **Page:3-45**

Why Weigh?

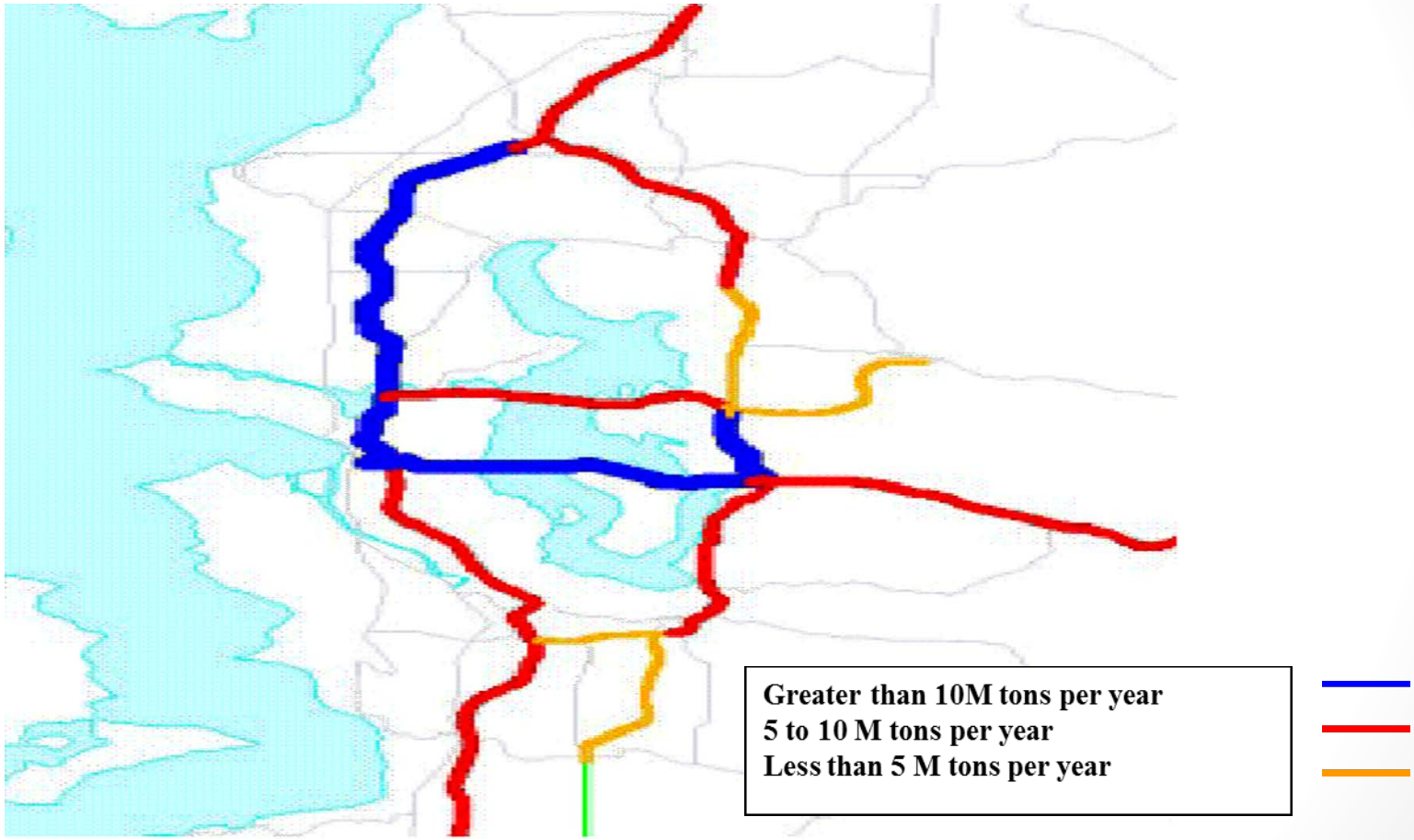


Figure: 3-10 **Section: 3.2.4** **Page:3-41**

B. Six sites within each group

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)	

Section: 3.2.4 Page:3-52

C. One Continuous WIM within group

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

Section: 3.2.4 Page:3-57

D. Calibrate, Calibrate, Calibrate

Section: 3.2.4 Page:3-51

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/

WIM's Future Role

Travel Monitoring Analysis System (TMAS)

- Traffic Volume Trends (by type)
- GIS
- Freight Management
- Safety

"THE EASY BUTTON"

WIM Upload

WEIGHT UPLOAD STEPS:

1. Upload Station (WIM station)
2. Fix any errors if occurred, then Submit to FHWA for review
3. Wait for FHWA Accept Station Upload
4. After accept , Station will be stored in National database.
5. If Station file is upload already for the current year, skip step # 1 to 4
6. Upload Weight file (W-Card)
7. Resolve National Duplicates (if there is any)

WIM Upload

REVIEW BATCH

1. Review Station Summary, by clicking the Station link
2. Review SAWA summary report, by clicking the SAWA link
3. Review Rejected export (if there are any rejected records)
4. Revalidate the station, if needed. Please see Weight parameter section to create a weight parameter
5. Click on “next step”, to go to Submit batch screen

SUBMIT BATCH

1. Click on “Submit/Discard” button to go Submit Page
2. Wait for HQ user to accept Weight data
3. Email will be sent to the user to inform the accept process is completed.

WIM Upload

HISTORICAL DATA CHECK

1. 3 consecutive month's for the same year & same state weight data needed to verify historical data
2. Upload first month data (complete above mentioned weight upload steps)
3. Wait for HQ user to accept first month's data
4. Upload second month data (complete above mentioned weight upload steps)
5. Check any caution flags at Station summary report at Review batch screen
6. Wait for HQ user to accept second month's data
7. Upload third month data (complete above mentioned weight upload steps)

WIM Upload

HISTORICAL DATA CHECK

8. Go to review page, check any caution flags at station summary report at review batch screen. Since previous 2 months has been accepted by HQ user, historical check caution flag will not appear at station summary screen

WEIGHT PARAMETER STEPS

1. Go to Station Parameter screen of weight module type
2. Select the state
3. System Parameter will be prepopulated in the screen
4. Make changes to the parameter
5. Click “save & close”
6. Now Parameter status is “Ready to Submit”
7. Click on Submit button to send parameter to HQ user for approval
8. Parameters which hold the status “Need FHWA review” or “Approved” can be used for weight revalidation.

Federal Highway Administration is on Facebook and YouTube

The Office Highway Policy Information Websites

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

http://www.fhwa.dot.gov/policyinformation/index.cfm

Questions and Comments

Thank You !

David L. Jones Sr
1200 New Jersey Ave. SE
USDOT FHWA HQ, Room E83-420
Washington DC 20590
202-366-5053
djones@dot.gov