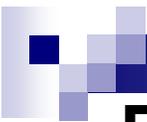


# Axle and Length Classification Steven Jessberger

Federal Highway Administration  
2011 Highway Information Seminar



# Presentation Acronyms

- AASHTO – American Association of State Highway Transportation Officials
- ASTM – American Society of Testing and Materials
- AVC – Automatic Vehicle Classifier (class)
- ATR – Automatic Traffic Recorder (volume)
- DOW – Day of Week
- FHWA – Federal Highway Administration
- HPMS – Highway Performance Monitoring System
- HVTIS – Heavy Vehicle Travel Information System
- LTPP – Long Term Pavement Performance (SHRP)
- MEPDG – Mechanistic Empirical Pavement Design Guide
- NCHRP – National Cooperative Highway Research Program
- OD – Origin and Destination
- TMAS – Travel Monitoring Analysis System
- TVT – Traffic Volume Trends
- TMG – Traffic Monitoring Guide
- UPACS – User Profile and Access Control System



# Getting Results - 4 Steps

- Construction of the site
- Support/Maintenance
- Processing of the data
- Reporting of the Information



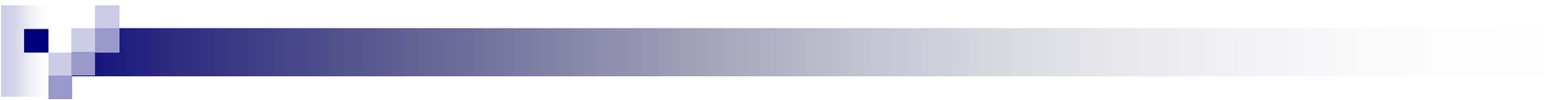
# Class – 2001 TMG

- Classification counts – why do them?
- 25% - 30% of volume counts should be class
  - Coverage counts
  - Highway links
  - Annualized data
- Length classification



# Classification Counts

- TMAS version 2.0 will accept all class data on a per site basis for each month.
- TMAS 2.0 will replace the HVTIS in 2012
- TMG formats for class data (C-card)
- State specific axle class algorithm
  - Verify what you are using
  - Calibrate your classtree algorithms
  - LTPP classtree research



# Axle Classtree Exercise Review

- Why check your classification algorithm?
- Why is it so important to make sure your classification data is accurate?
- What can FHWA do to help?
  
- Motorcycle array and helpful ideas to improve this type of data.



# Axle Class Factoring

## ■ Factoring for Trucks

- Variability by DOW and month of year
- Improves reporting on trucks for:
  - HPMS
  - Freight Movements
  - Pavement Designs

## ■ Factoring for Motorcycles

- Correct for the weekday portable counts
- Correct for the month of year variance
- Use processes and collection methods that correctly classifies motorcycles



# Vehicle Length Class Data

- Flexibility
- Dual loops – last longer
- Allows for non-intrusive technologies
  - Side fire technology
  - Over head technology
  - Under the road technology
- All States are welcome to join the FHWA sponsored pooled funds
- Test and verify your bins

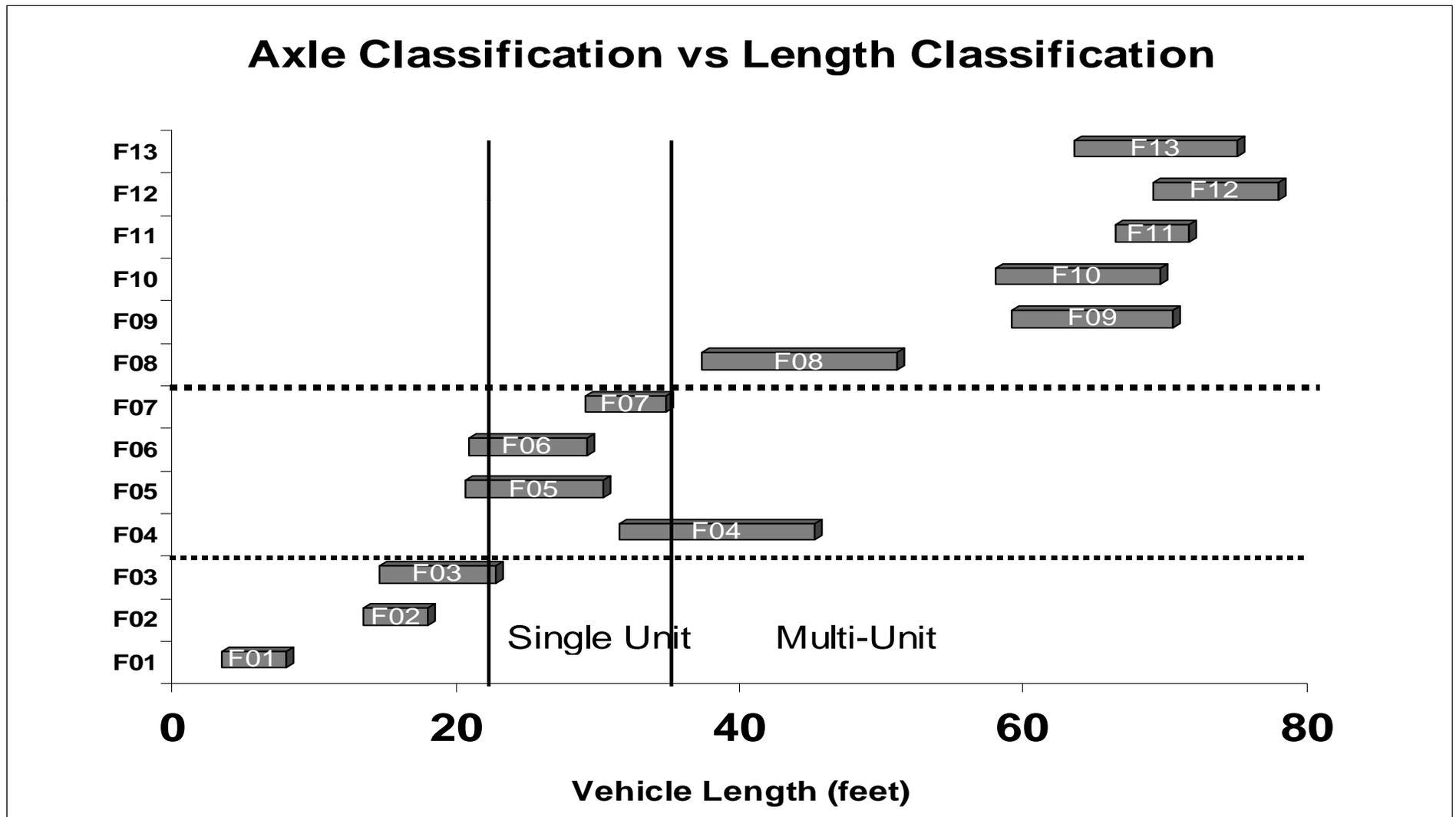


# Vehicle Length Class Data

- Calibrate your sites
- Test and verify your bins
  - Variances for length used in classes 2-3 bin  
**18', 19.5', 20', 21', 21.8' and 22.5'** What do you use?
  - Example of possible bins:
    - Bin 1 class 1
    - Bin 2 classes 2-3
    - Bin 3 classes 4-7
    - Bin 4 classes 8-10
    - Bin 5 classes 11-13

# Vehicle Length Class

Example of length class vs. axle class





# Traffic Data Research

- Pooled Funds

- Non-Intrusive Technologies Phase III

- <http://www.pooledfund.org/projectdetails.asp?id=398&status=4>

- Loop/Length Based Vehicle Classification

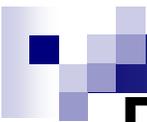
- <http://www.pooledfund.org/projectdetails.asp?id=416&status=4>

- LTPP Pooled Fund and Falcon Work

- NCHRP (motorcycle, trucks...)

- High Resolution Detectors

- State Research - what are you doing?



# Research Documents

## FHWA – Office of Policy Information

[Quick Find Data](#) *(Tables from Highway Statistics, tables VM-1, VM-2)*

### Publications and Reports

- [Accuracy of Traffic Monitoring Equipment](#)
- [Analysis of Vehicle Classification and Truck Weight Data of the New England States](#)
- [Archive and Use of ITS-Generated Data](#)
- [Case Studies of Traffic Monitoring Programs in Large Urban Areas \[PDF\]](#)
- [Commodity Flow Survey](#)

[more...](#)

### Outside Sources

[North American Travel Monitoring Exposition and Conference  
\(NATMEC 2010\)](#)

[North American Travel Monitoring Conference and Exposition  
\(NATMEC 2008\)](#)

[North American Travel Monitoring Exposition and Conference  
\(NATMEC 2006\)](#)

# Research Documents

## FHWA – Community of Practice



Highway Community EXchange  
Federal Highway Administration

Select A Topic...

FHWA Knowledge Tools

Travel Monitoring



[Home](#)



[What's New](#)



[e-Mail Notification](#)

[FHWA](#) > [Knowledge Communities](#) > [Highway CommunityExchange](#) > [Travel Monitoring](#)

Welcome to the Federal Highway Administration Travel Monitoring Community of Practice. This site is dedicated to the open exchange of information and knowledge on all things related to the collection, editing, analysis, and archiving of traffic volume, vehicle classification and weigh-in-motion data. This forum allows anyone interested in highway travel monitoring to interact on any travel data issues and to assist others in acquiring knowledge from a forum of professionals. Since this site allows the contribution of thoughts and ideas in an open forum, content found in the Group Discussions may not necessarily reflect the opinion or policy of the FHWA. For further information, contact Tianjia Tang, 202-366-0160, [tianjia.tang@dot.gov](mailto:tianjia.tang@dot.gov).

[Discussion](#)

[Reference](#)

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[streeteramet traffic counter user's manual \(no responses\) 11/11/2009](#) --- [Chuck k](#)

[Seasonal and Axle adjustment factors \(2 responses\) 10/27/2009](#) --- [Mark Sabin](#)

[August 2009 Traffic Volume Trends \(no responses\) 10/22/2009](#) --- [Steven Jessberger](#)

[Off System Traffic Data Collectopr for HPMS \(1 response\) 10/08/2009](#) --- [Stephen Tate](#)

[ATR communications \(2 responses\) 9/28/2009](#) --- [Melissa Brown](#)

[July 2009 Traffic Volume Trends Report \(no responses\) 9/23/2009](#) --- [Steven Jessberger](#)

[June 2009 Traffic Volume Trends Report \(no responses\) 8/21/2009](#) --- [Steven Jessberger](#)

[weblink for NATMEC 2010 \(no responses\) 8/20/2009](#) --- [HarshadDesai](#)



# Standards

- FHWA - Traffic Monitoring Guide
- FHWA – HPMS Field Manual
- ASTM documents related to classification counts
  - 1957-04 Installing & Using Pneumatic Tubes with Roadway Traffic Counters and Classifiers
  - 2300-06 Highway Traffic Monitoring Devices
  - 2415-05 Installing Piezoelectric Highway Traffic Sensors
  - 2467-05 Developing Axle Count Adjustment Factors
  - 2468-05 Metadata to Support Archived Data Management Systems
  - 2532-06 Evaluating Performance of Highway Traffic Monitoring Devices
- AASHTO
  - Loop Detector Handbook 2006
  - Guidelines for Traffic Data Programs 2009
  - WIM Successful Practices 1997



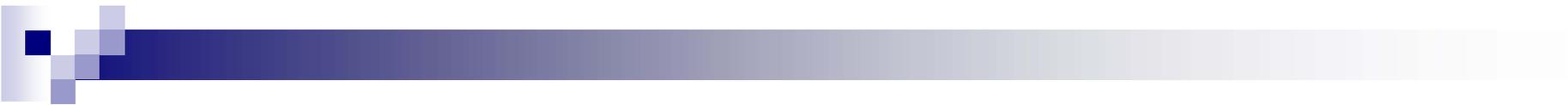
# MEPDG Required Class Inputs

- Level 1 Design
  - Site specific class data (continuous or 4 seasons)
- Level 2 Design
  - Regional class data (continuous or 4 seasons)
- Level 3 Design
  - National class data (system defaults)



# How to improve your class data?

- Full width axle sensors (motorcycles)
  - road tubes
  - Piezo
- Axle Sensors as primary sensor for class sites
- Length can detect motorcycles as bin 1
- More class sites for proper factoring
- Class data QC (TMAS/LTPP/Pooled Fund)
- Collect per vehicle format records (Idaho)
- Calibrated your class algorithm(s) - 2011 State Survey
- By lane class checks – done daily
- Calibrate class sites annually



# State/Vendor Best Practices

- What practices have you experienced that others could benefit from?
  
- What problems have you encountered that need to be dealt with?



# Inductive Signature Technology

- Axle class with loops only
- Re-identification of vehicles
- Calibration transfer between sites
- Characteristics of Traffic Stream transfer between sites for:
  - OD studies – freight movement and loadings
  - Improved Pavement Designs
  - Travel Times
  - Model Inputs for Travel Patterns
  - Improved Safety



# Questions??

## **FHWA – Headquarters**

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