

UNDERSTANDING THE SIGNIFICANCE OF *AXLE* VERSUS *LENGTH* CLASSIFICATION ON AXLE FACTORS AND THE EFFECT ON AADT TO ENSURE RELIABLE TRAFFIC DATA



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HIGH DESERT TRAFFIC, LLC



DATA MANAGEMENT SECTION

BUREAU OF STATE HIGHWAY PROGRAMS

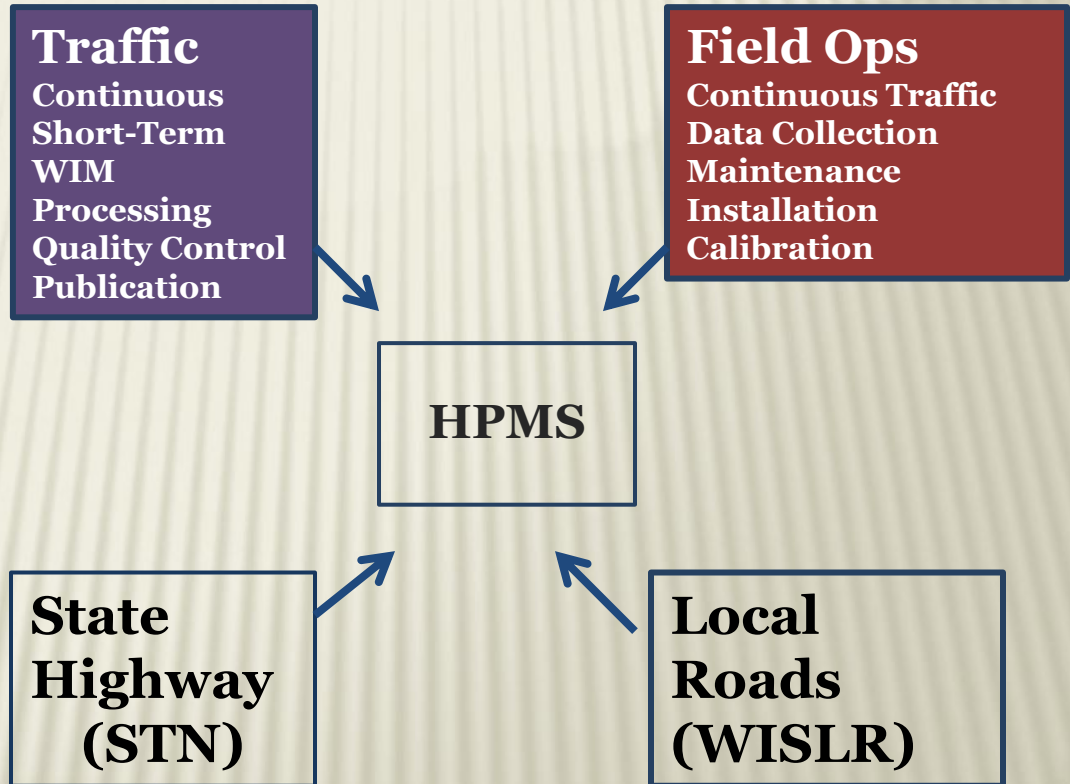
ROADWAY & TRAFFIC DATA PROGRAMS

Administer Statewide Policy and Guidelines for Roadway Data

Meet Federal /State Mandates

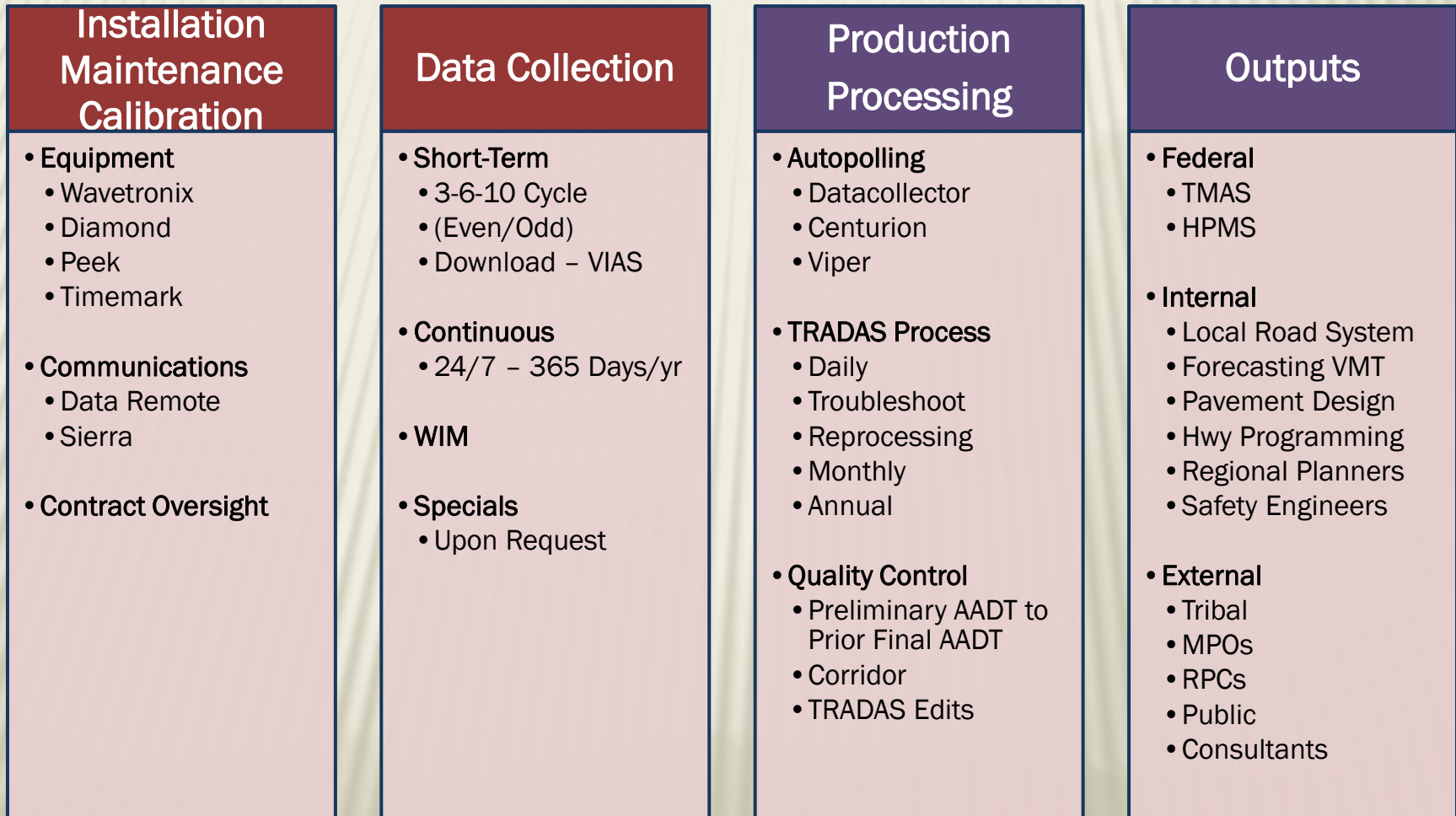
Process | Share Line-work and Data

Submit Roadway Data to Federal Highways

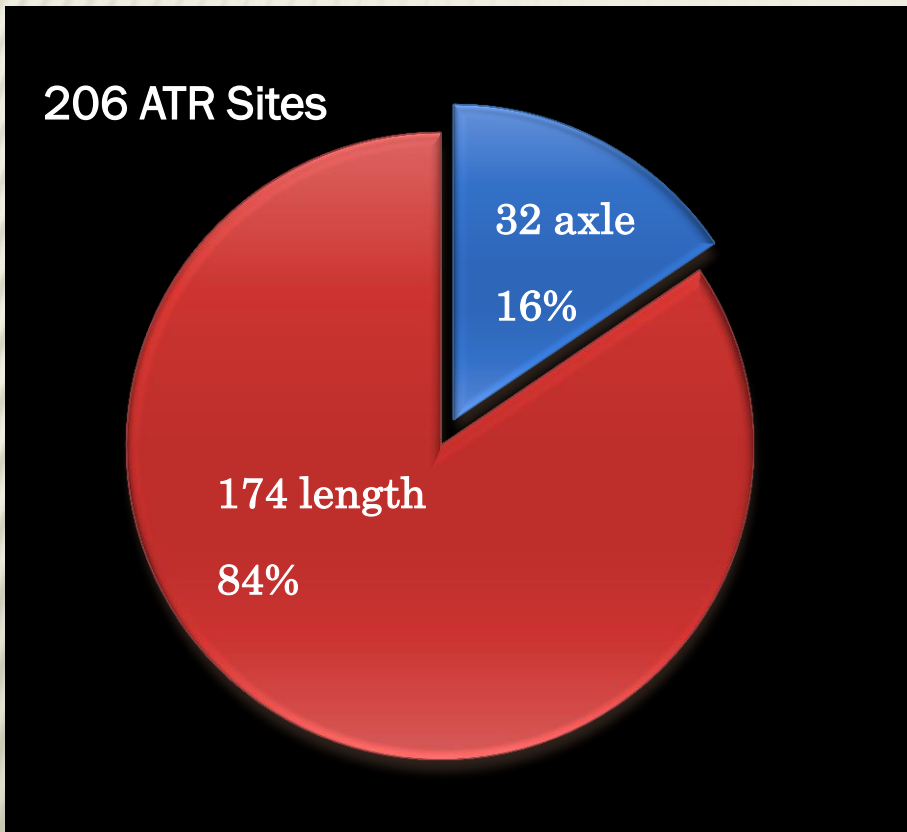


WisDOT TRAFFIC PROGRAM OVERVIEW

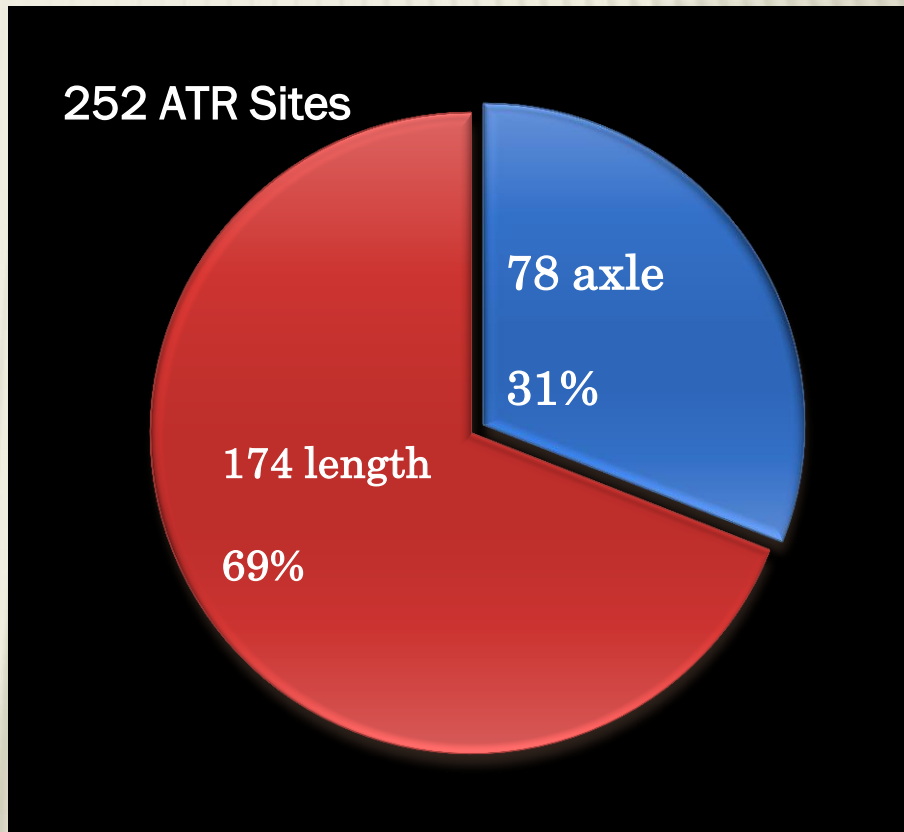
DATA MANAGEMENT SECTION



CURRENT VIEW OF AXLE TO LENGTH PERCENT COMPARISON



2016 AXLE TO LENGTH PERCENT COMPARISON



WisDOT CONTINUOUS COUNT PROGRAM

AXLE TO LENGTH COST COMPARISON

Average COST Install New 4-lane Site					
Type of Station	Contract Install	Materials	Recorder	Total	Net Difference
Axle	\$24,000	\$ 9,000	\$ 2,200	\$ 35,200	\$ 16,900
Length	\$7,000	\$ 5,900	\$ 5,400	\$ 18,300	

Average REPAIR COST 4-lane Site					
Type of Station	Contract Maint	Materials	Total	Net Difference	TOTAL NET DIFF Install + Maint Per Site
Axle	\$21,500	\$ 3,600	\$ 25,100	\$ 24,350	\$41,250
Length	\$500	\$ 250	\$ 750		

Axle

- ❑ Higher resolution (MC, Cars, Pickups, etc)
- ❑ Higher installation and maintenance costs
 - Lane closures

Length

- ❑ Lower resolution (Passenger, Single-Unit, Combos)
- ❑ Lower installation and maintenance costs
 - Non-intrusive technologies reduce costs

WHY CONTINUE LENGTH (NON-INTRUSIVE)

Taking into account **Traffic Data Value to Stakeholders, Cost, & Safety** of installation and maintenance for staff, WisDOT wants to *leverage length based classification data*

Hire industry expert analyze the millions of traffic data records, understands traffic data and its nuances....



HIGH DESERT TRAFFIC, LLC

LJ Wilkinson, President

STUDY QUESTIONS

- ❑ How do **factors derived from length classification** differ from those **derived from axle classification**?

- ❑ What is the **overall affect on AADT using length** as a source of axle factors?

ADDITIONAL QUESTIONS

- Is creating **axle factors from length data** a valid use of length data?
- What is **required to generate accurate axle factors using length data?**
- Is the **back-end cost worth the front-end savings?**

RESEARCH ACTIVITIES

- ❑ **Stability of number of axles per bin**
 - Does the number of axles per bin vary greatly by location?
 - By year?
- ❑ **Correlation of Axle Classification Bins to Length Bins**
 - Does the correlation change dramatically across the state?
 - Does it change over time?

GUIDANCE FOR CLASSIFICATION DATA SOURCES

2001 Traffic Monitoring Guide

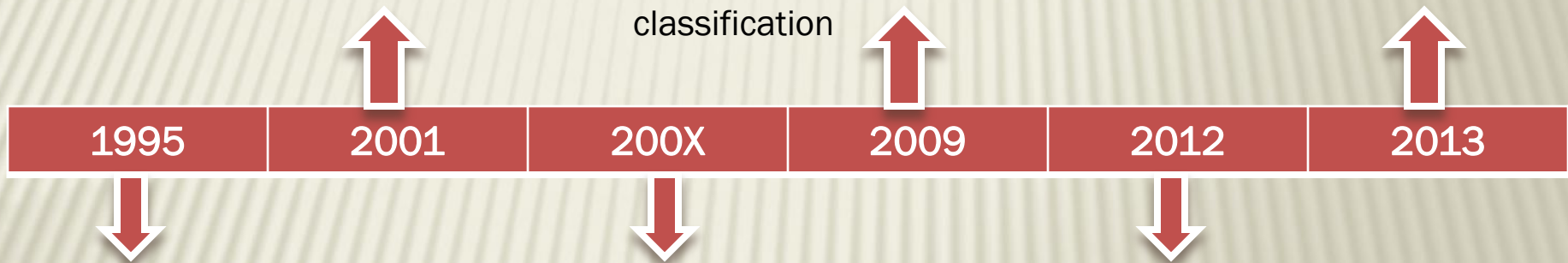
- Length is used for Federal Reporting (C-record)

2009 AASHTO Guidelines for Traffic Data Programs

- Emphasis on axle-based classification

2013 Traffic Monitoring Guide

- Emphasis on axle-based classification and WIM



1995 Traffic Monitoring Guide and before

- Only axle-based classification
- Length was not used for Federal Reporting (4-card)

200X MEPDG

- Emphasis on WIM data and axle-based classification

2012 Loop and Length Based Pooled Fund Study

TPF 5-192

Technical Advisory Committee

- Alaska
- Colorado
- Connecticut
- Florida
- Idaho
- Illinois
- Michigan
- **Minnesota (lead State)**
- New York
- Ohio
- Pennsylvania
- Texas
- Washington
- **Wisconsin**
- Wyoming
- * FHWA
- * SRF Consulting

TECHNOLOGY

Setup

Binning Schemes

Quality Control

LOOP AND LENGTH BASED VEHICLE CLASSIFICATION

WHAT ARE AXLE FACTORS AND WHY DO WE CARE?

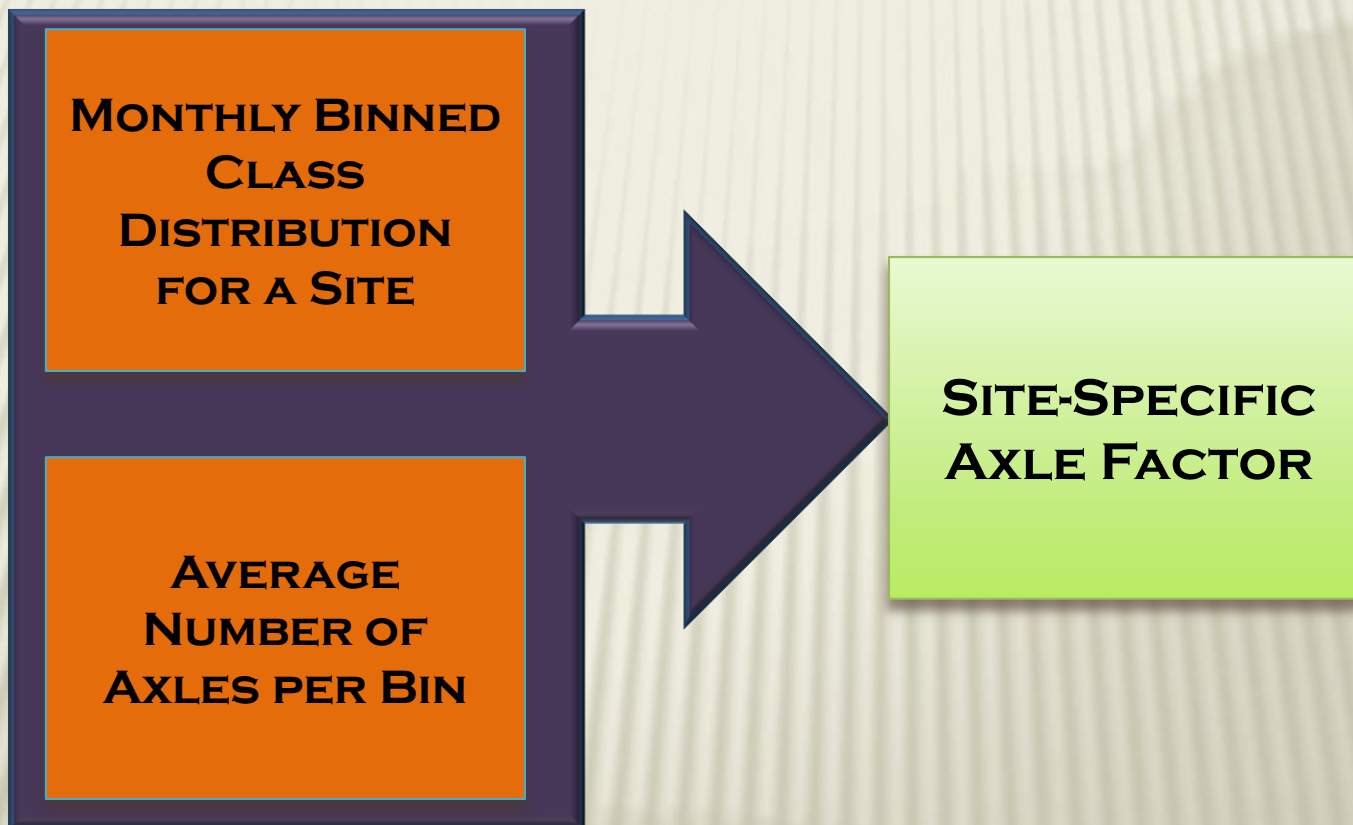


- Most **ECONOMICAL** way to count the majority of the system
- Tubes **COUNT AXLES**—not vehicles
- An **AXLE FACTOR IS USED TO CONVERT FROM AXLES TO VEHICLES**

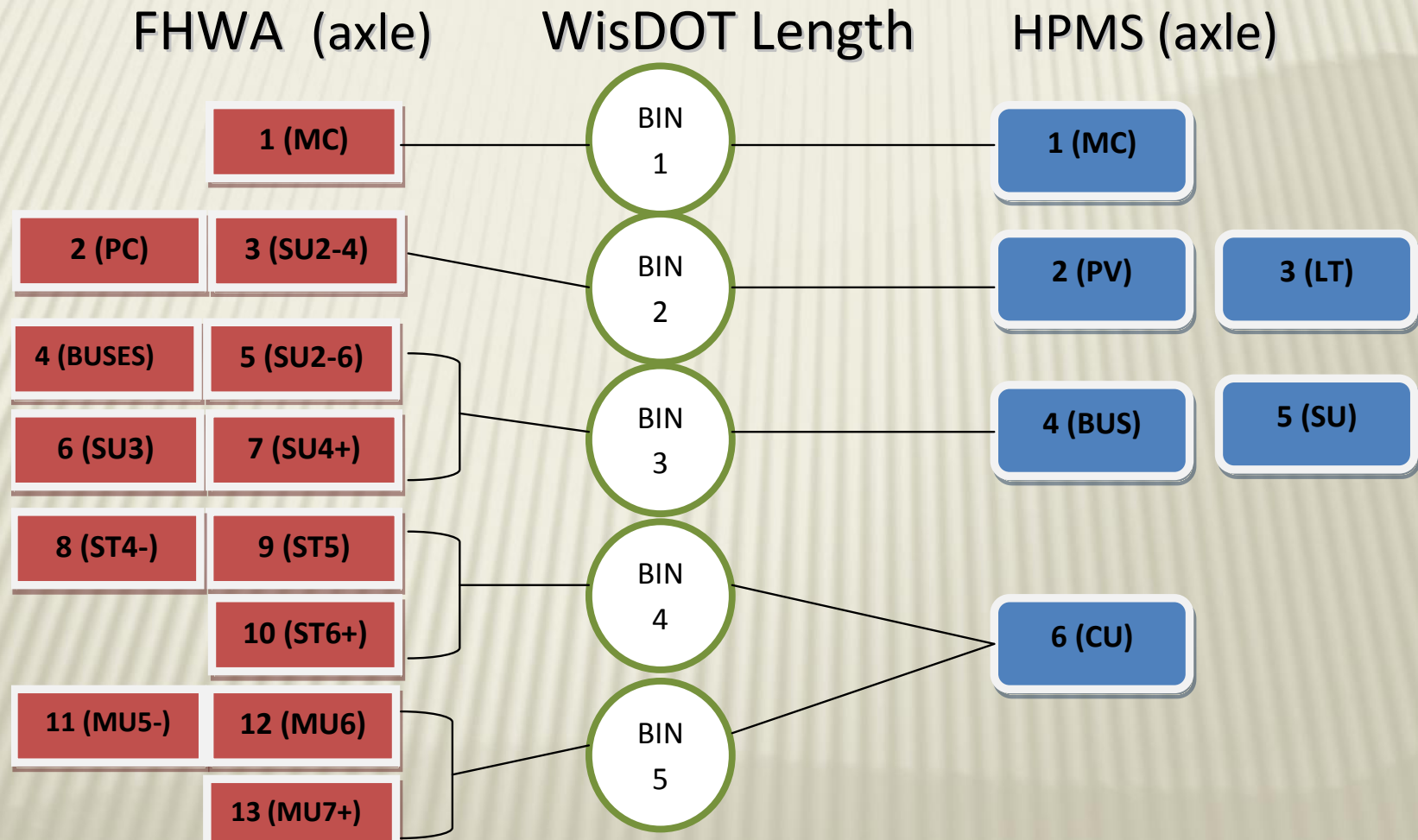


THE SINGLE-TUBE COUNT

AXLE FACTOR CALCULATION



WISDOT CONTINUOUS AXLE & LENGTH SCHEMES



DATA REQUIRED TO ESTIMATE NUMBER OF AXLES PER BIN

□ **PVR Data!**

- **Weigh-in-Motion** sites are, traditionally, the primary source of **PVR** data
- **Short-term PVR** supplies well-needed quality control to the process
- A growing number of **Continuous Classifiers** in Wisconsin will be generating **PVR**
 - All vehicles versus classes 4 and above?

RESULTS

□ **Number of axles per bin**

- When collapsed into 4 bins (combining combo bins), little geographic variation
- We did see variation across years

□ **Correlation of Axle Classification to Length Classification**

- Little variation across the state or across years

ADDITIONAL QUESTIONS ANSWERED

- ❑ **IS CREATING AXLE FACTORS FROM LENGTH DATA A VALID USE OF LENGTH DATA?**
 - Yes, but additional work is needed on the back-end to keep on top of changing truck traffic patterns.
- ❑ **WHAT IS REQUIRED TO GENERATE ACCURATE AXLE FACTORS USING LENGTH DATA?**
 - PVR Data
- ❑ **IS THE BACK-END COST WORTH THE FRONT-END SAVINGS?**
 - In WisDOT's case: yes. The large pool of existing length-based classifiers makes this a valuable source of axle factor inputs.

STUDY QUESTIONS ANSWERED

- ❑ **HOW DO FACTORS DERIVED FROM LENGTH CLASSIFICATION DIFFER FROM THOSE DERIVED FROM AXLE CLASSIFICATION?**
 - Length-driven axle factors have more variability associated with them because of the changing number of axles per bin over time.
- ❑ **WHAT IS THE OVERALL EFFECT ON AADT USING LENGTH AS A SOURCE OF AXLE FACTORS?**
 - With a supplemental program of PVR-generating axle-classifiers and appropriate back-end processes to measure changes in the average number of axles per bin, length classification can be used as a valid source of axle factor input.

STEPS FOR DATA ACCURACY AND RELIABILITY

4. Implement 3-yr rolling average to smooth high-low years

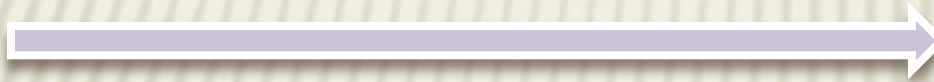
3. Continue analysis

- Analyze PVR data to fine tune length-to-axle classification
- Review existing continuous count program annually



2. Increase Axle to Length Ratio

- By 2016 31% Axle / 69% Length Ratio



Note: 2013 TMC publication excellent resource

1. More PVR data

- Start with 1 PVR per factor group (*additional storage required*)

IN CLOSING

QUESTIONS . . .

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