

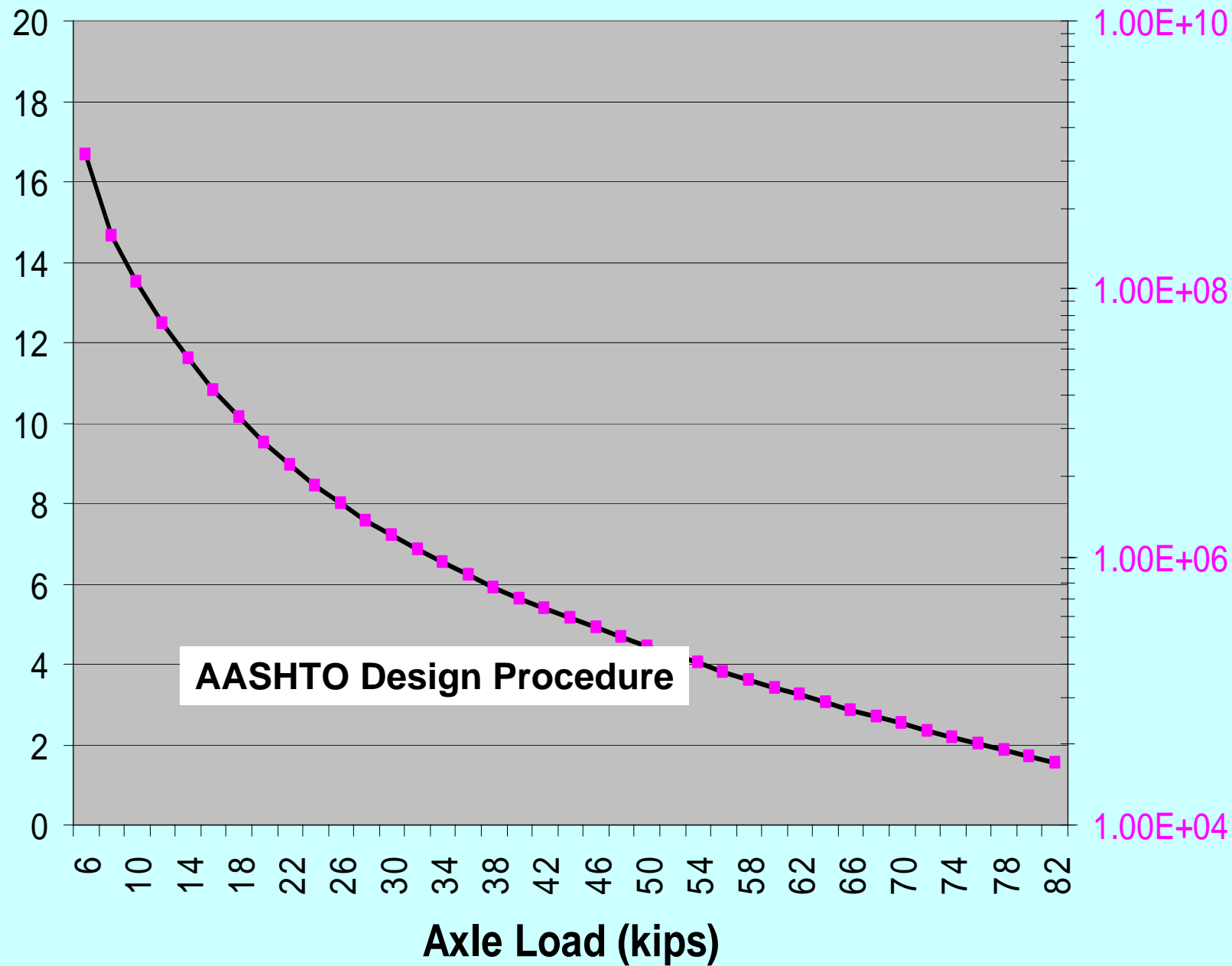
Traffic Characterization with the MEPDG

Chris Wagner, P.E.
FHWA – Resource Center



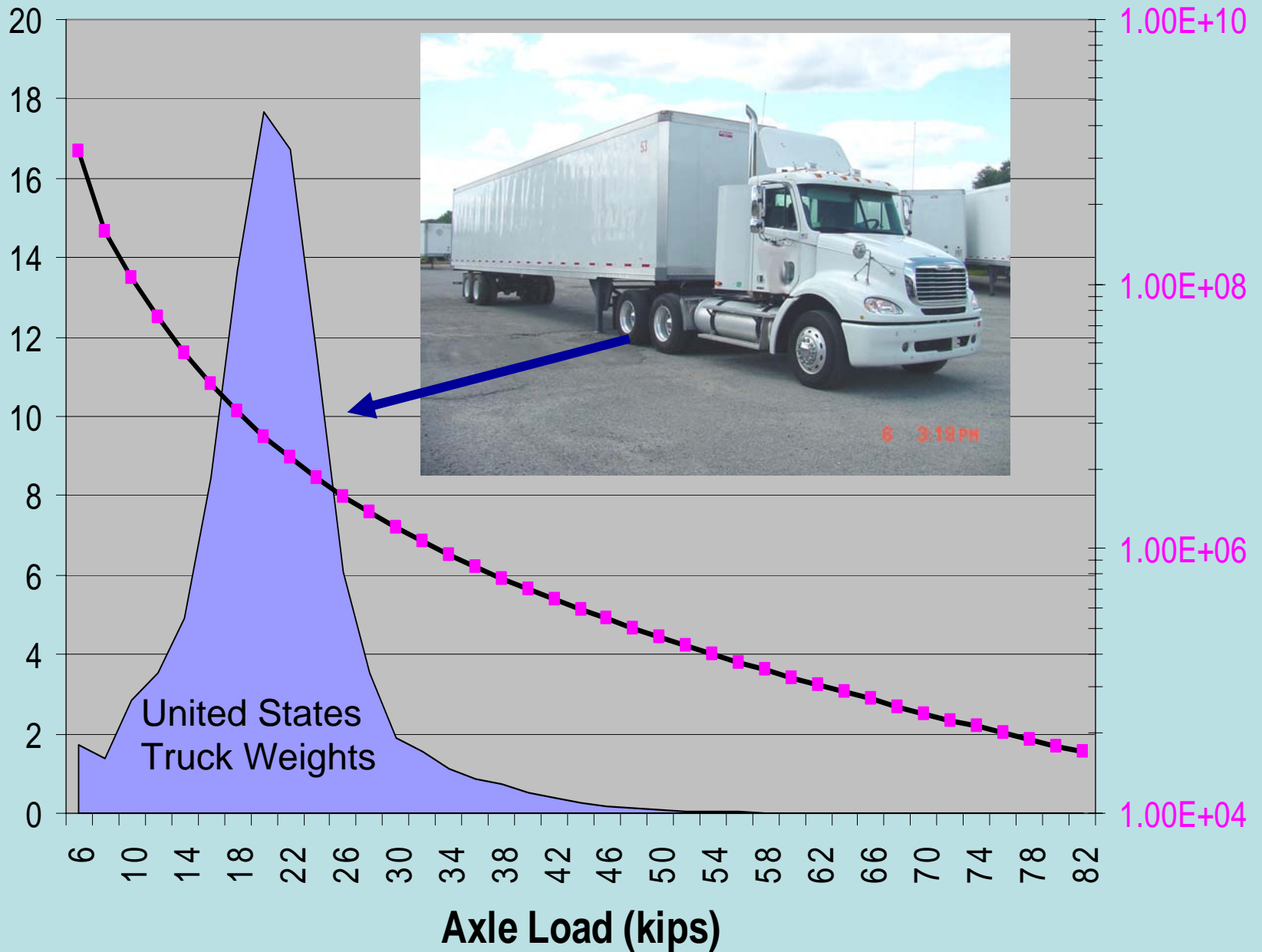
Why is traffic important to pavement design?

Percentage Class 9 Tandem
Axles

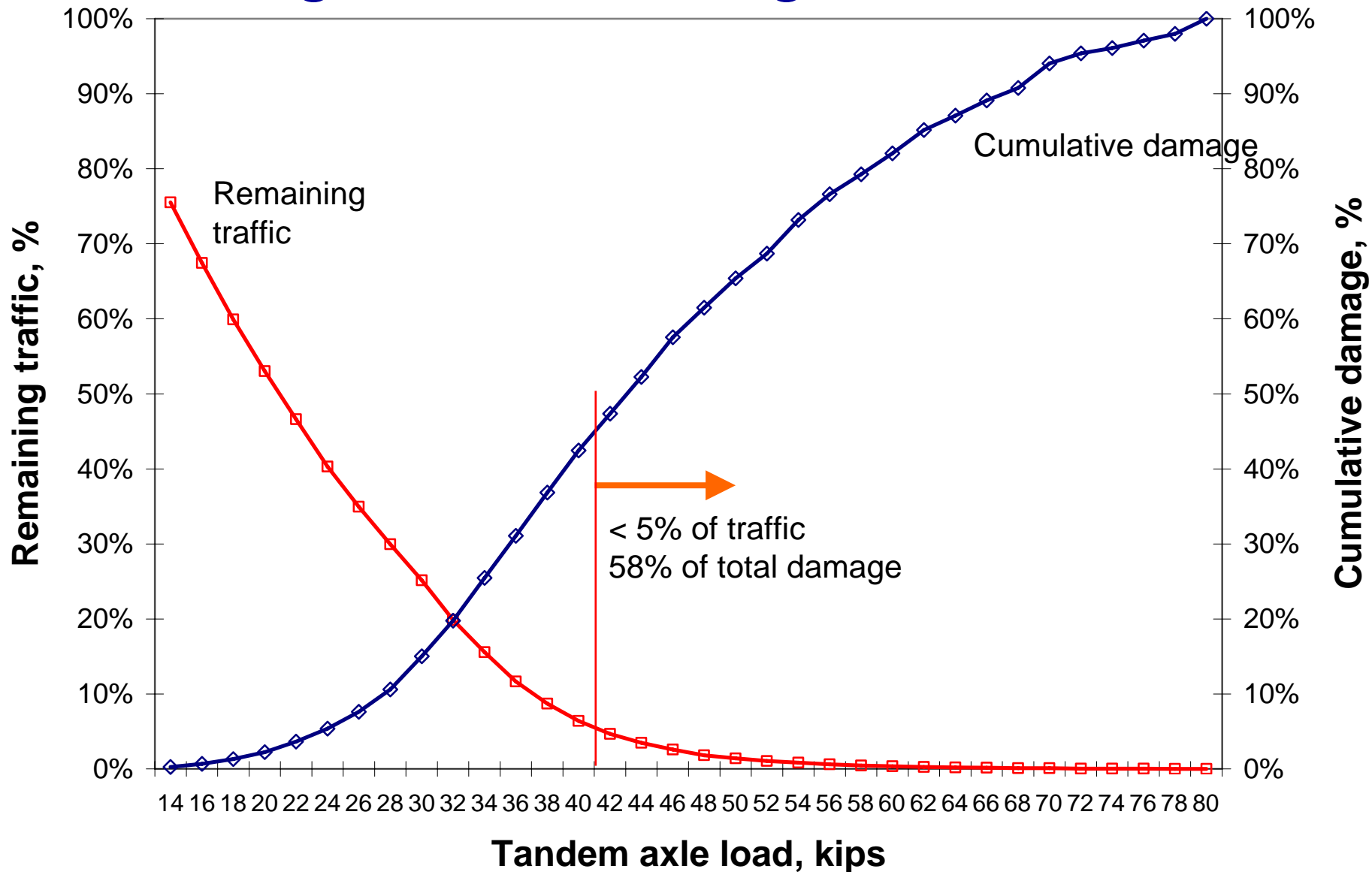


Load Repetitions to Failure

Percentage Class 9 Tandem Axles



Damage vs. axle weight

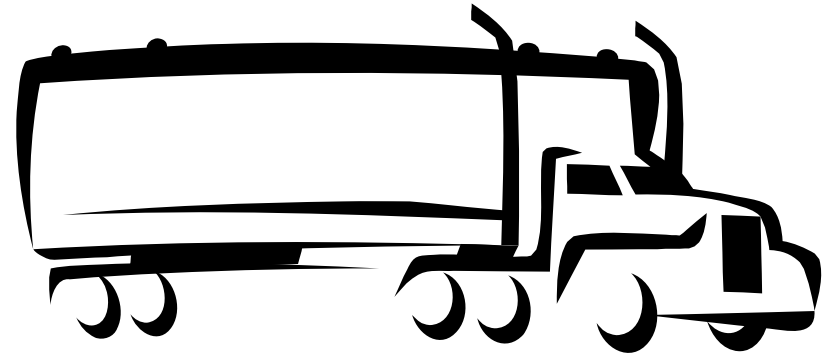


What information do we need ?



Information we need:

- **Volume**
- **Classification**
- **Weight**

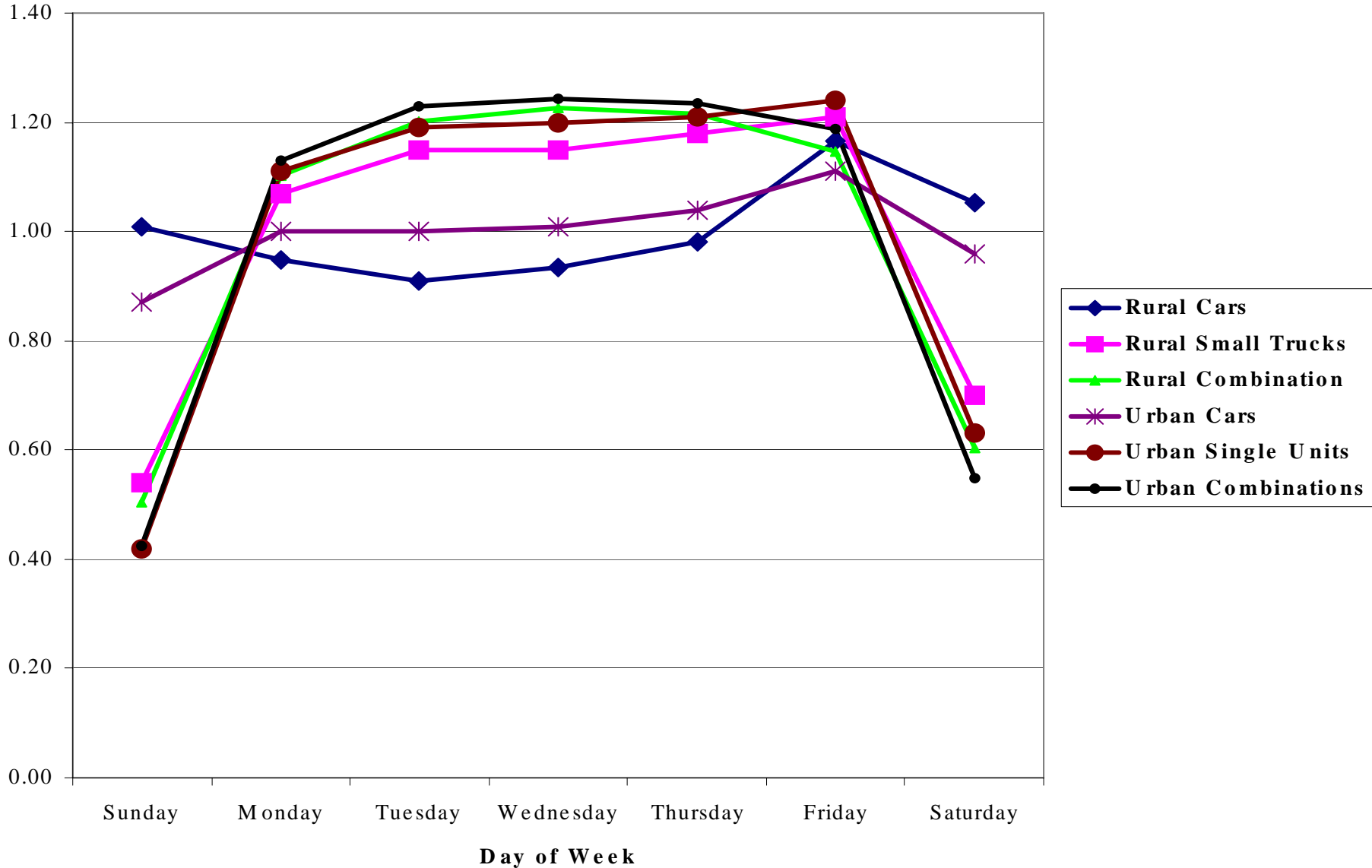


- Design lane only
- Heavy vehicles only

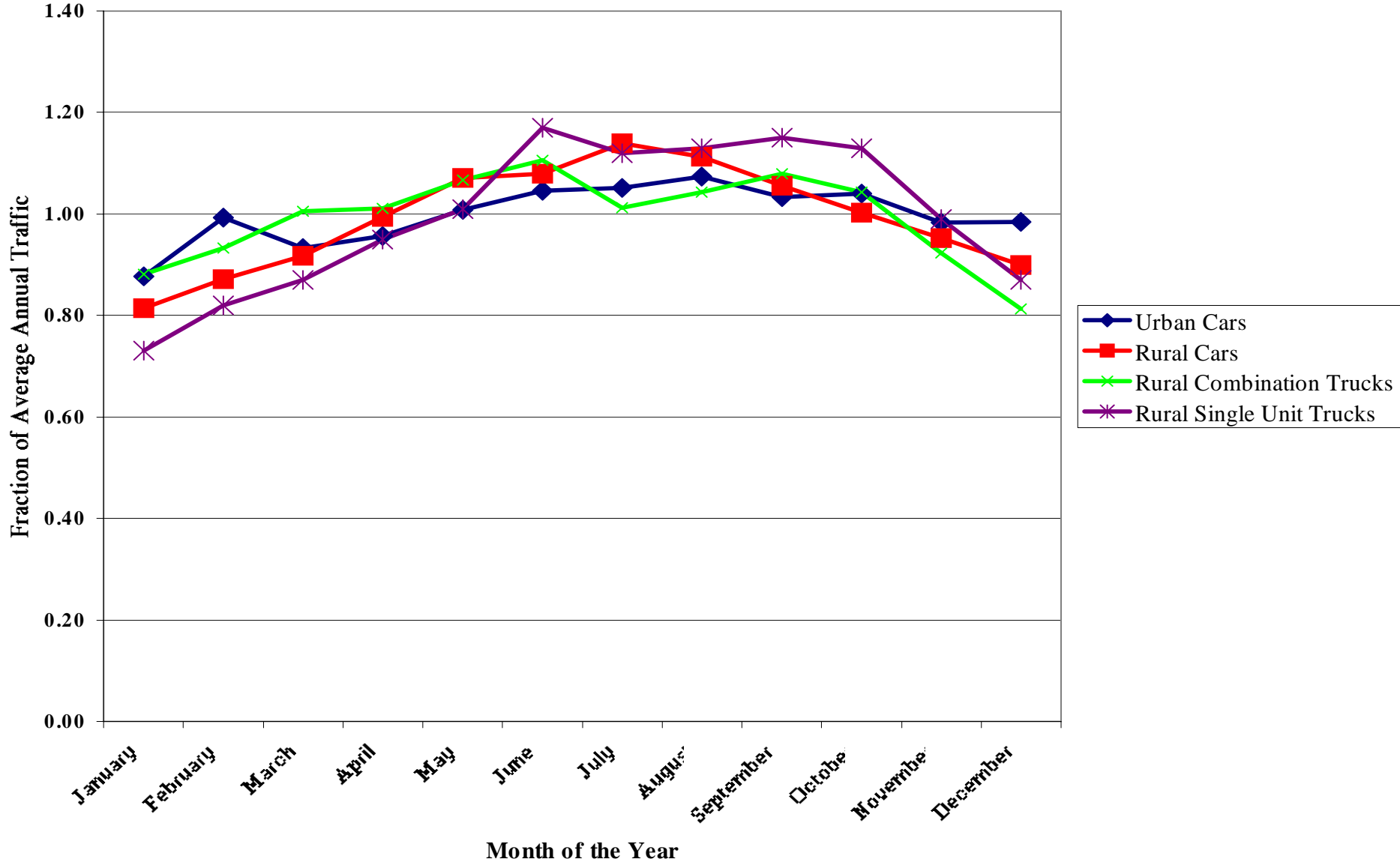
Truck Volume

- Lane Distribution
- Direction Distribution
- Growth Factors
- Seasonal, Hourly factors

Day of Week Truck Volume Variation



Seasonal Truck Volume Variation



Screen Inputs

Traffic [?] [X]

Design Life (years): 20 ...

Opening Date: October, 2006

Initial two-way AADTT: 2600 ...

Number of lanes in design direction: 2

Percent of trucks in design direction (%): 50.0

Percent of trucks in design lane (%): 95.0

Operational speed (mph): 60

Traffic Volume Adjustment Edit

Axle load distribution factor: Edit

General Traffic Inputs Edit

Import/Export

Traffic Growth Compound, 4% ...

Truck Growth

- Monthly
- Traffic Growth
 - By class
 - Linear
 - Compound

Traffic Volume Adjustment Factors

Monthly Adjustment | Vehicle Class Distribution | Hourly Distribution | Traffic Growth Factors

Opening Date:

Design Life (years):

AADTT:

% Traffic Design Direction:

% Traffic Design Lane:

Vehicle-class specific traffic growth

	Rate (%)	Function
Class 4	4	Compound
Class 5	4	Compound
Class 6	4	Compound
Class 7	4	Compound
Class 8	4	Compound
Class 9	4	Compound
Class 10	4	Compound
Class 11	4	Compound
Class 12	4	Compound
Class 13	4	Compound


Default Growth Function

No Growth

Linear Growth

Compound Growth

Default growth rate (%)

 View Growth Plots











Note: Vehicle-class distribution factors are needed to view the effects of traffic growth.

Vehicle Classification



Monthly Adjustment Vehicle Class Distribution

AADTT distribution by vehicle class

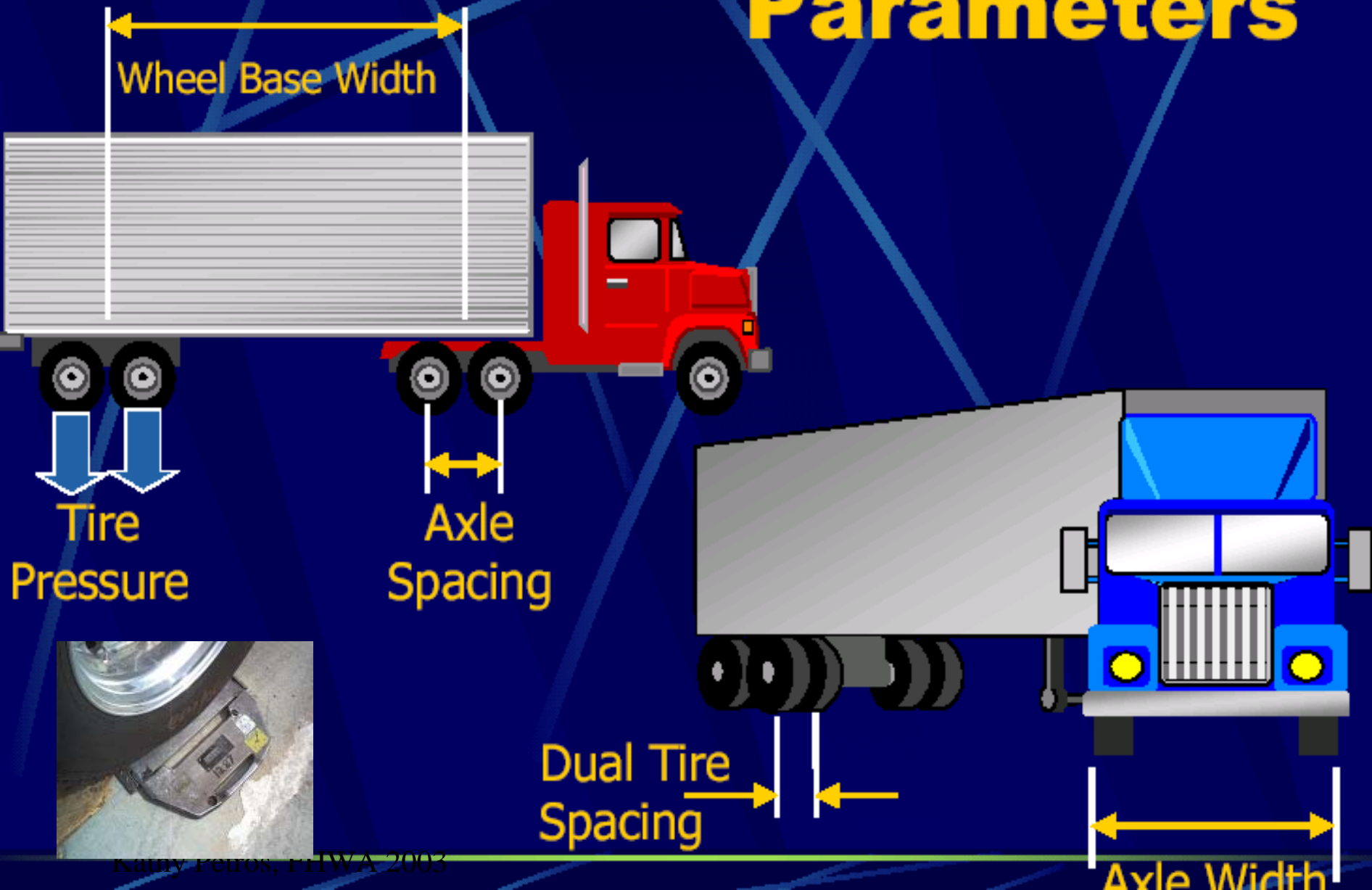
Class 4	1.8	
Class 5	24.6	
Class 6	7.6	
Class 7	0.5	
Class 8	5.0	
Class 9	31.3	
Class 10	9.8	
Class 11	0.8	
Class 12	3.3	
Class 13	15.3	
Total	100.0	

Note: AA

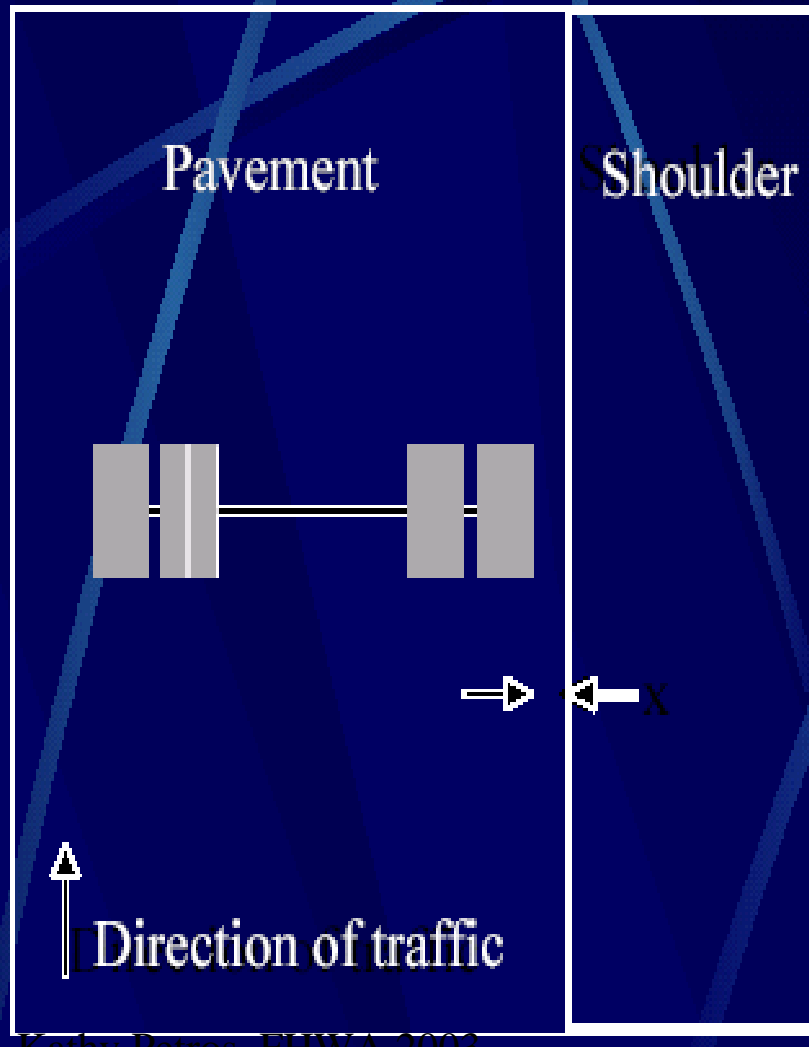
Vehicle Class Distribution

- 13 FHWA Classifications
- Only concerned with trucks

Axle Configuration Parameters



Traffic Wander



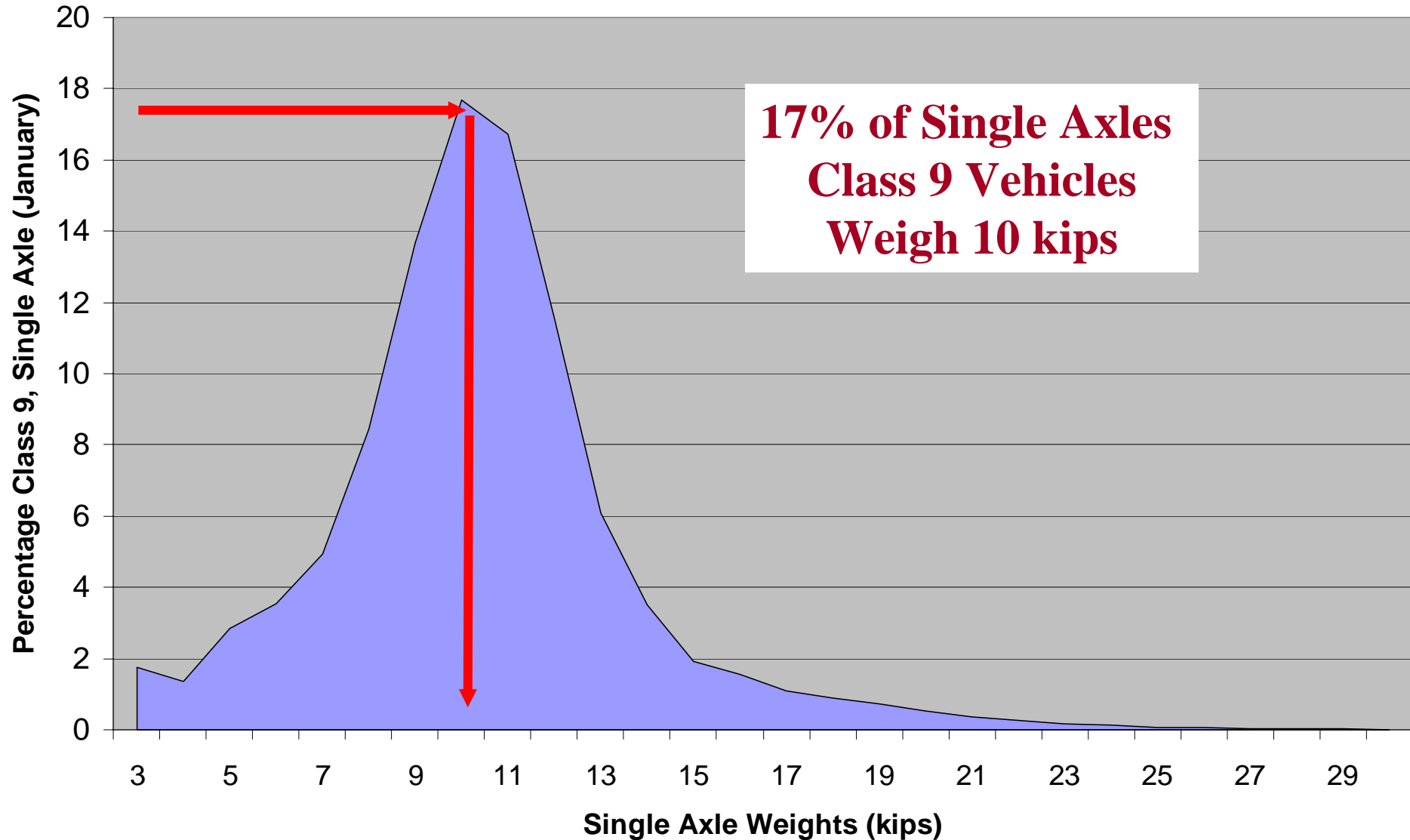
Used to calculate pavement responses & the number of axle load applications over a point for predicting distress & performance.

- Mean wheel location = 18 in.
- Standard deviation = 10 in.
- Design lane width.

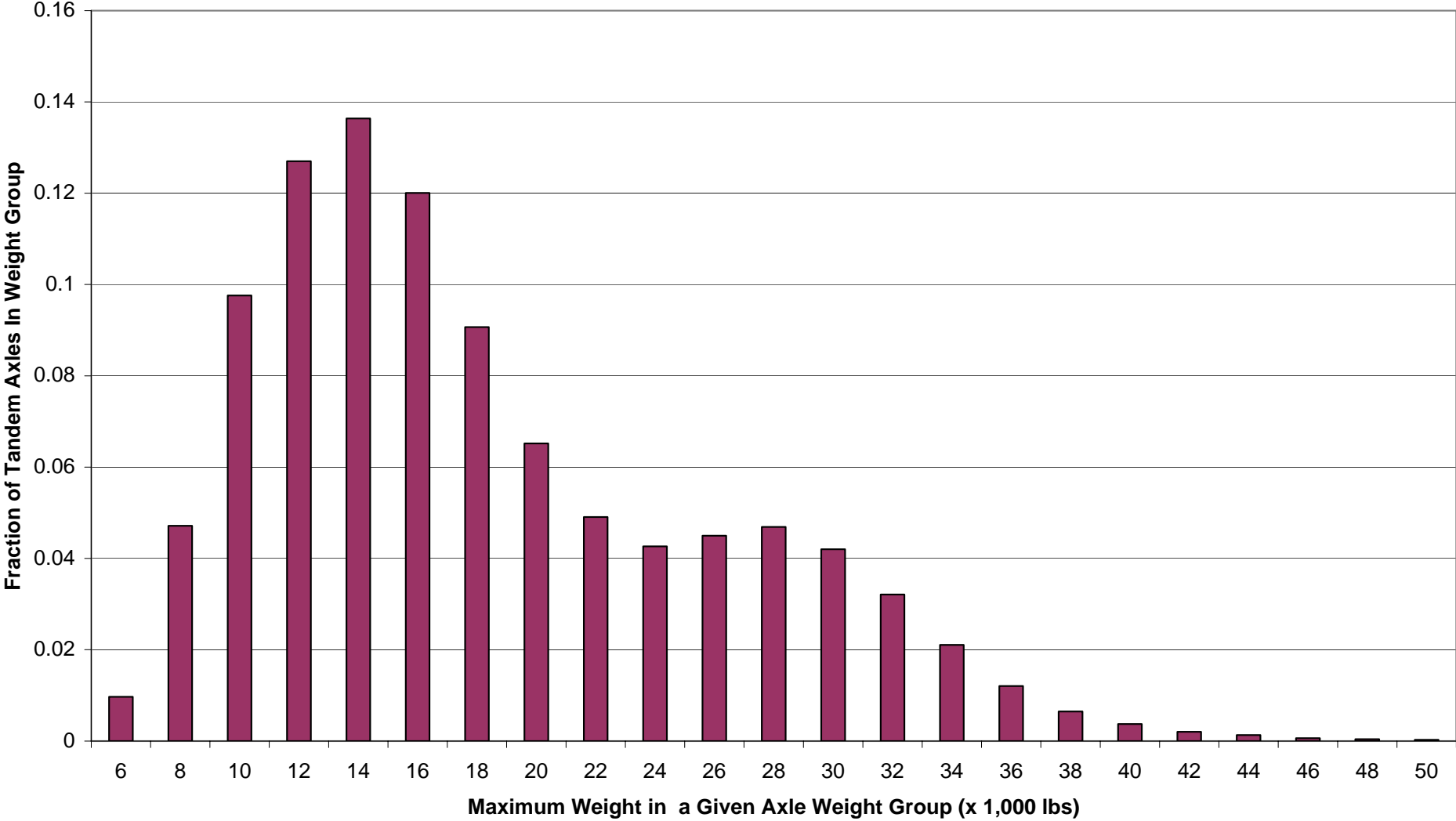
Vehicle Weight



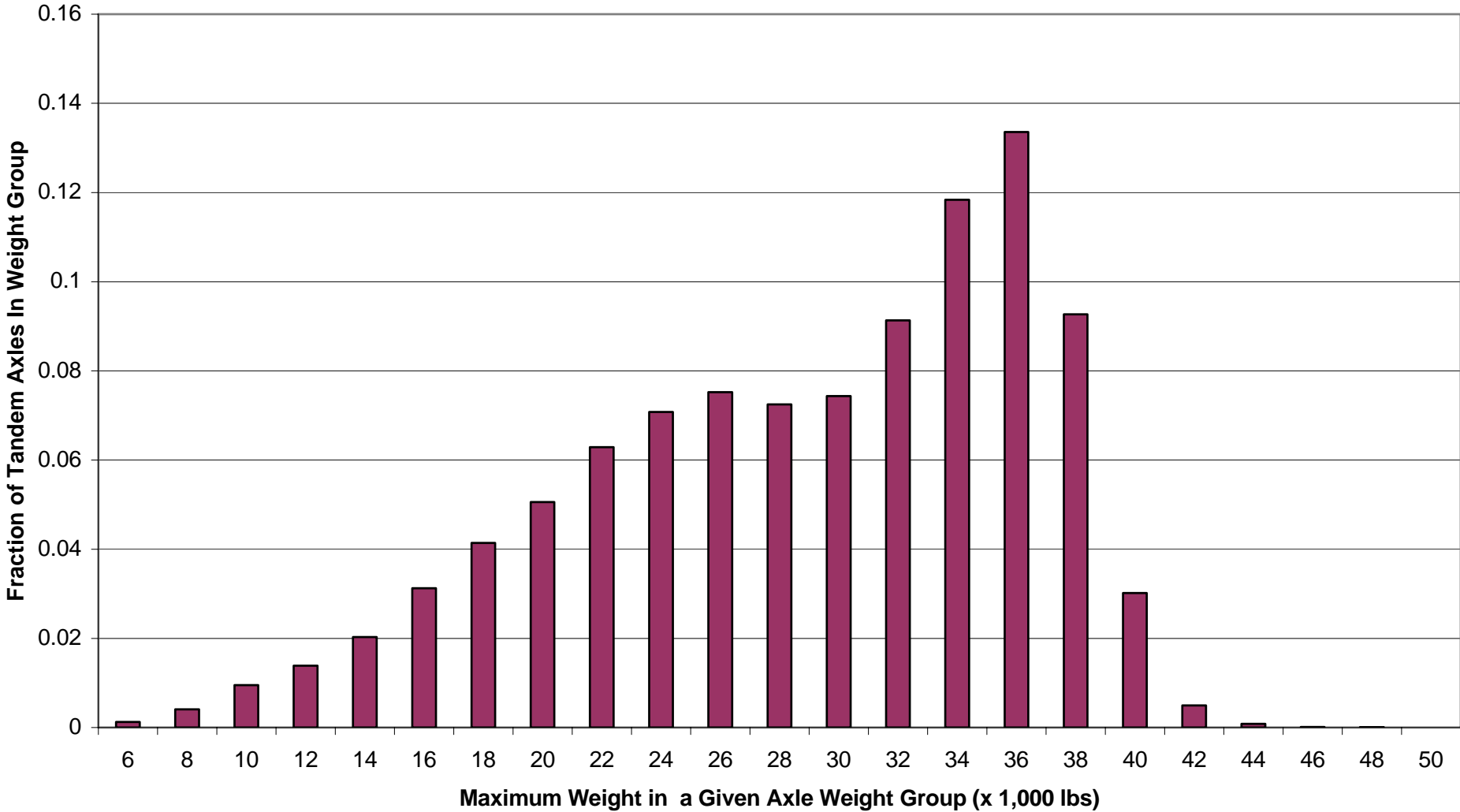
Vehicle Weight (Axle Load Spectra)



Tandem Axle Load Distribution Lightly Loaded Trucks



Tandem Axle Load Distribution Heavily Loaded Trucks



ESAL Comparison

Lightly Loaded = 0.186 (flexible)

Moderately Loaded = 0.355

Heavily Loaded = 0.666

Conclusion:

**Not knowing the loaded/unloaded
condition can equal a 3X error in life
expectancy**

MEPDG Input screen

Axle Load Distribution Factors [?] [X]

Axle Load Distribution

Level 1: Site Specific

Level 2: Regional

Level 3: Default

View

Cumulative Distribution

Distribution

Axle Types

Single Axle

Tandem Axle

Tridem Axle

Quad Axle

Axle Factors by Axle Type

	Season	Veh. Class	Total	3000	4000	5000	6000	7000
	January	4	100.00	1.8	0.96	2.91	3.99	6.8
	January	5	100.00	10.05	13.21	16.42	10.61	9.22
	January	6	100.00	2.47	1.78	3.45	3.95	6.7
	January	7	100.00	2.14	0.55	2.42	2.7	3.21
	January	8	100.00	11.65	5.37	7.84	6.99	7.99
	January	9	100.00	1.74	1.37	2.84	3.53	4.93
	January	10	100.00	3.64	1.24	2.36	3.38	5.18
	January	11	100.00	3.55	2.91	5.19	5.27	6.32
	January	12	100.00	6.68	2.29	4.87	5.86	5.97
	January	13	100.00	8.88	2.67	3.81	5.23	6.03
	February	4	100.00	1.8	0.96	2.91	3.99	6.8

[<] [OK] [Cancel] [>]

Tools to gather Volume, Weight and Classification Data ?

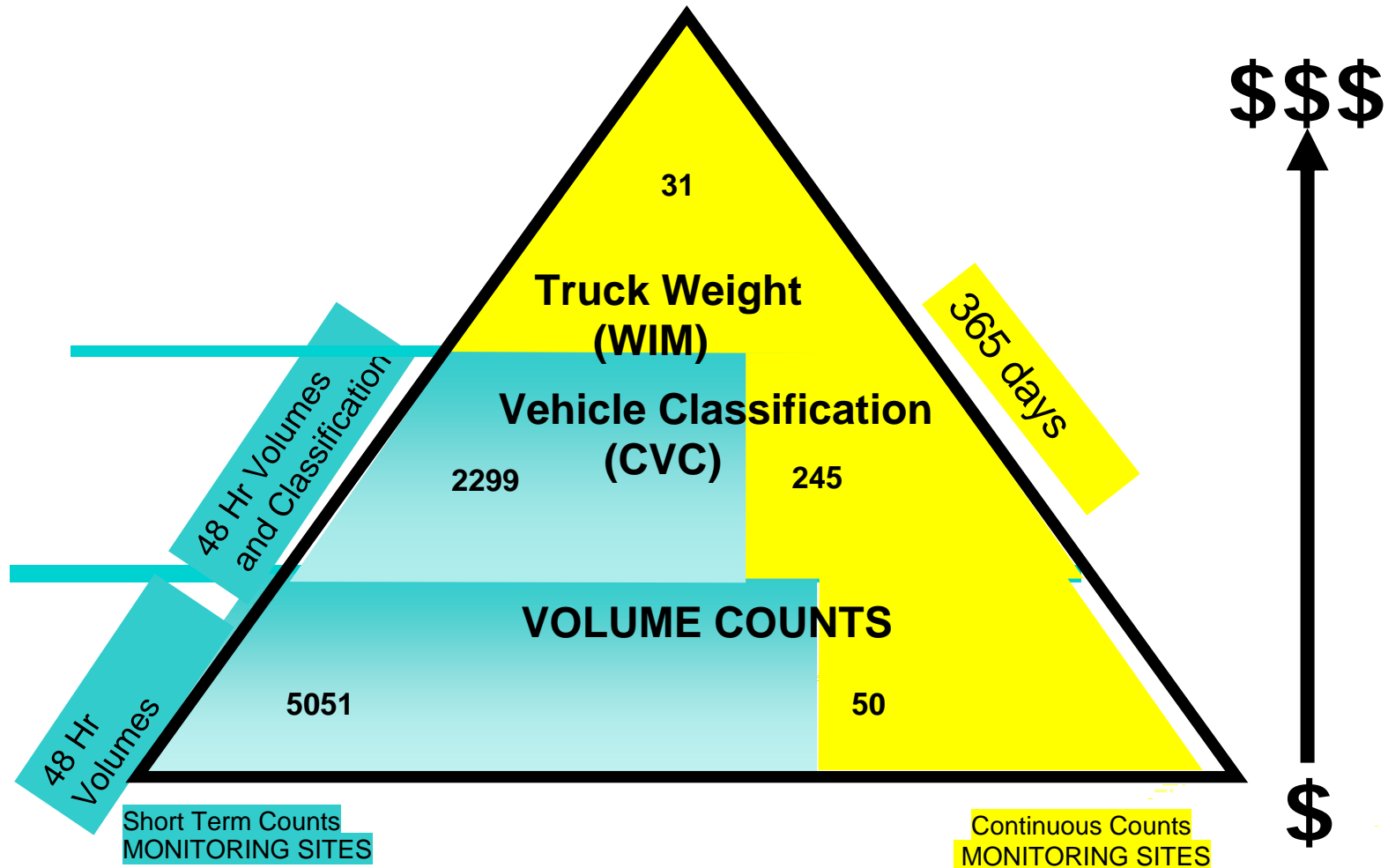
Tube counters



Weigh in Motion Station



Data Collection Framework



Key Fact

A small amount of good data is better than a large amount of poor quality data.....

Typically only 25% of WIM data is has been found to contain quality data.

Focus

- Information on most prevalent vehicles
- Overweight, permit vehicles
- Make it practical for design
 - Catalog traffic files

Questions ???

