Traffic Characterization with the MEPDG

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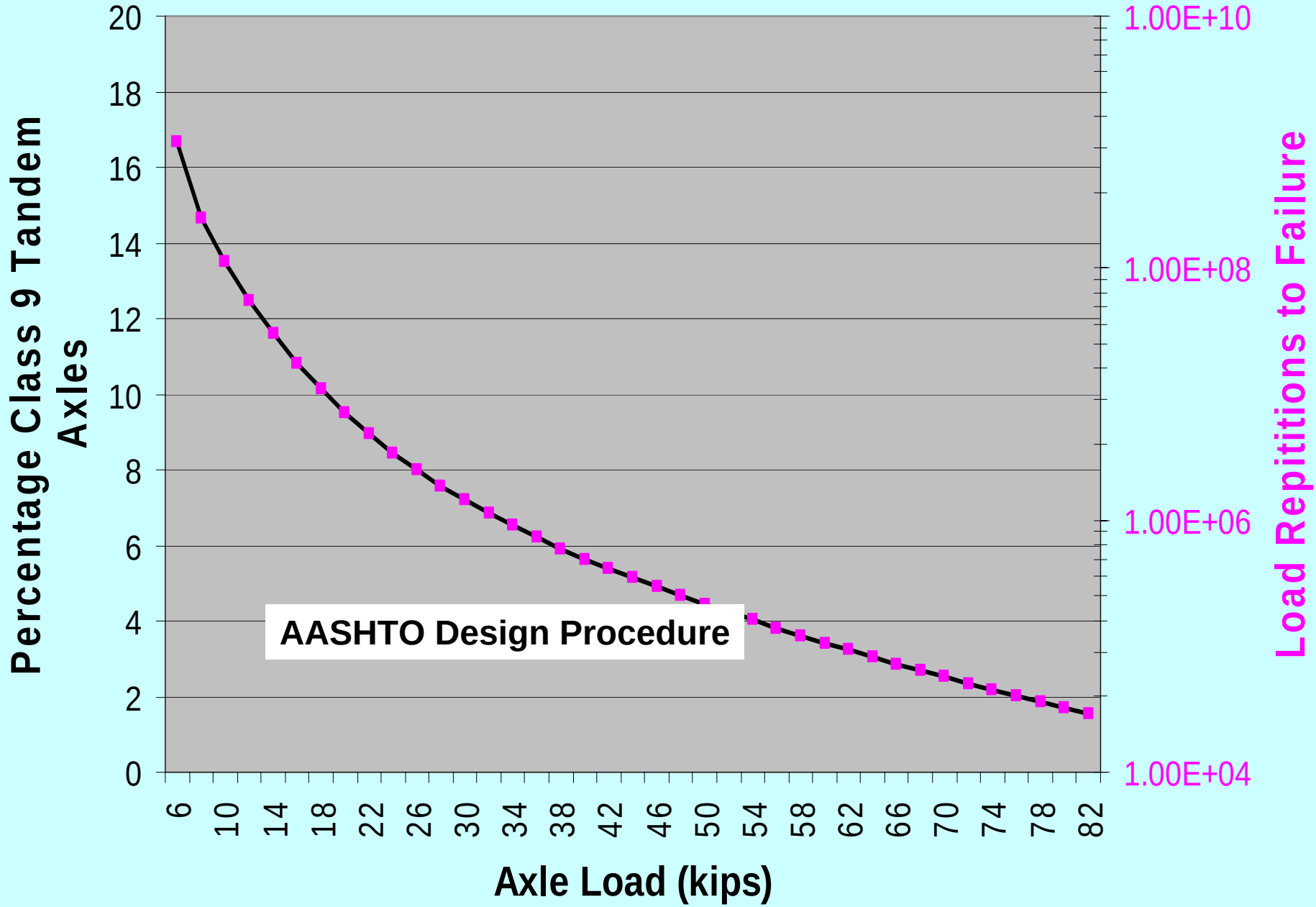
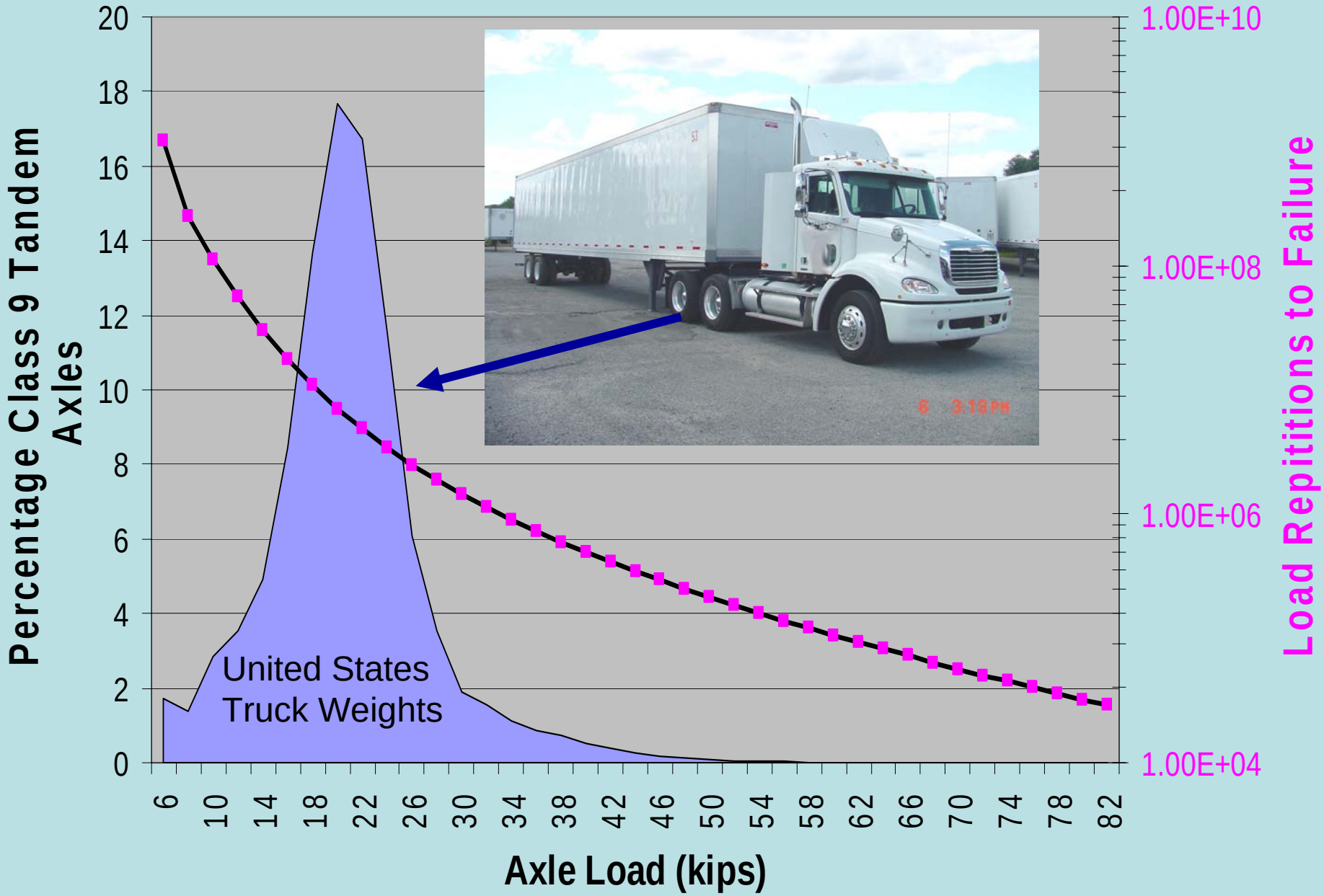
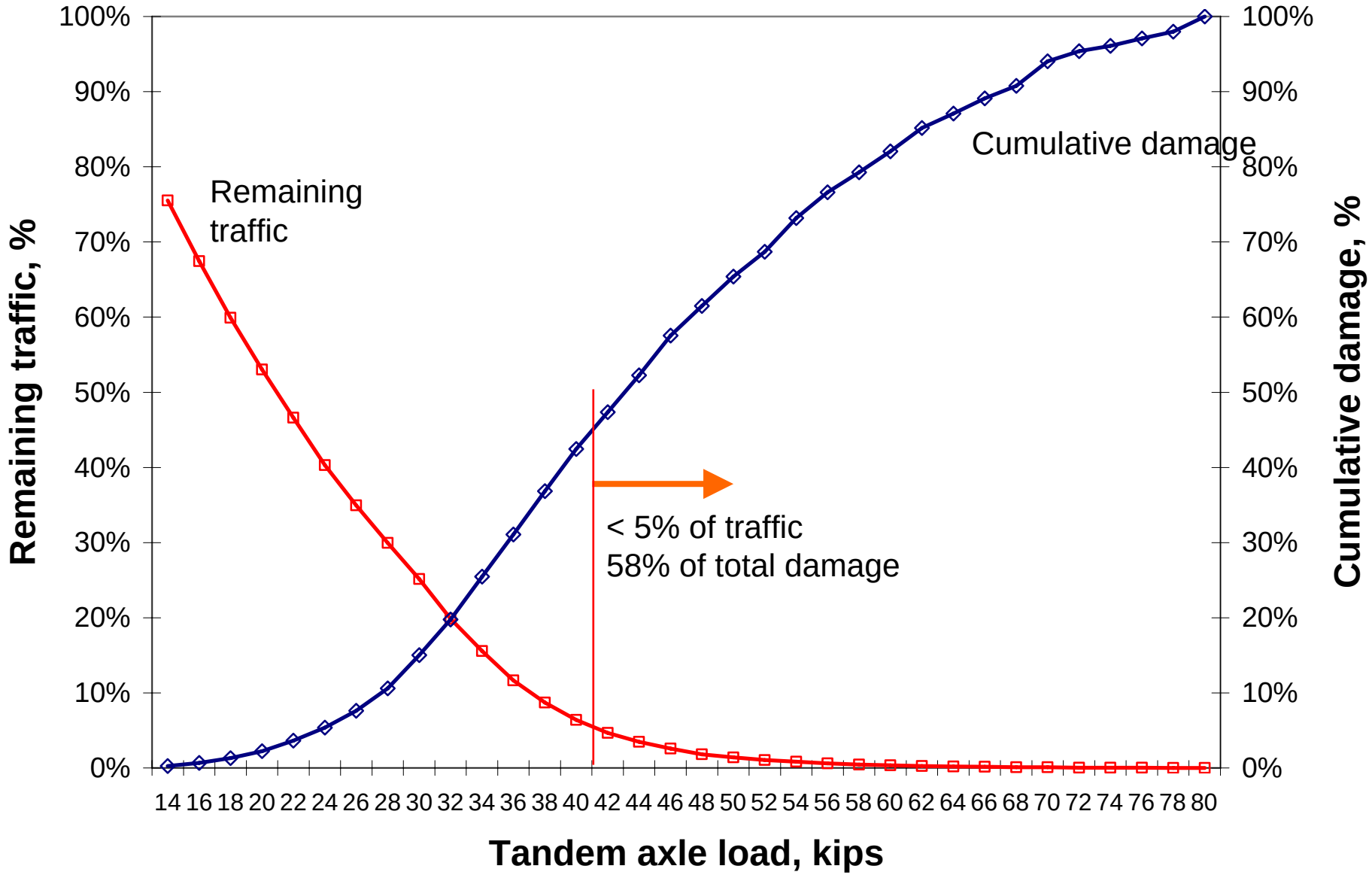
Why is traffic important to pavement design?


Percentage Class 9 Tandem Axles
20
18
16
14
12
10
8
6
4
2
0
1.00E+10
1.00E+08
1.00E+06
1.00E+04
Load Repitions to Failure
AASHTO Design Procedure
6
10
14
18
22
26
30
34
38
42
46
50
54
58
62
66
70
74
78
82
Axle Load (kips)


Percentage Class 9 Tandem Axles
20
18
16
14
12
10
8
6
4
2
0
United States
Truck Weights
6
10
14
18
22
26
30
34
38
42
46
50
54
58
62
66
70
74
78
82
Axle Load (kips)
1.00E+10
1.00E+08
1.00E+06
1.00E+04
Load Repititions to Failure

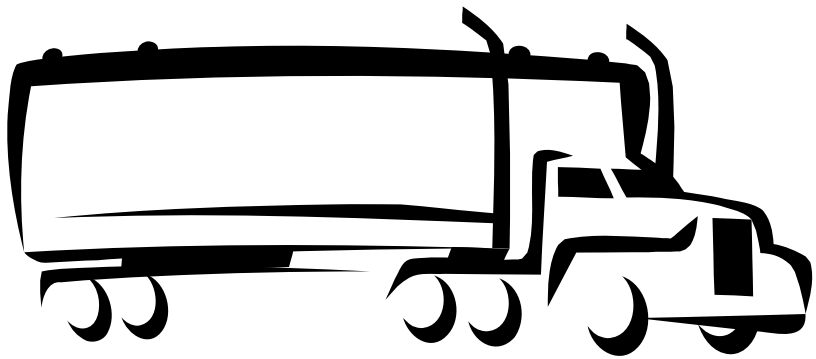
Damage vs. axle weight



What information do we need ?

Information we need:

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

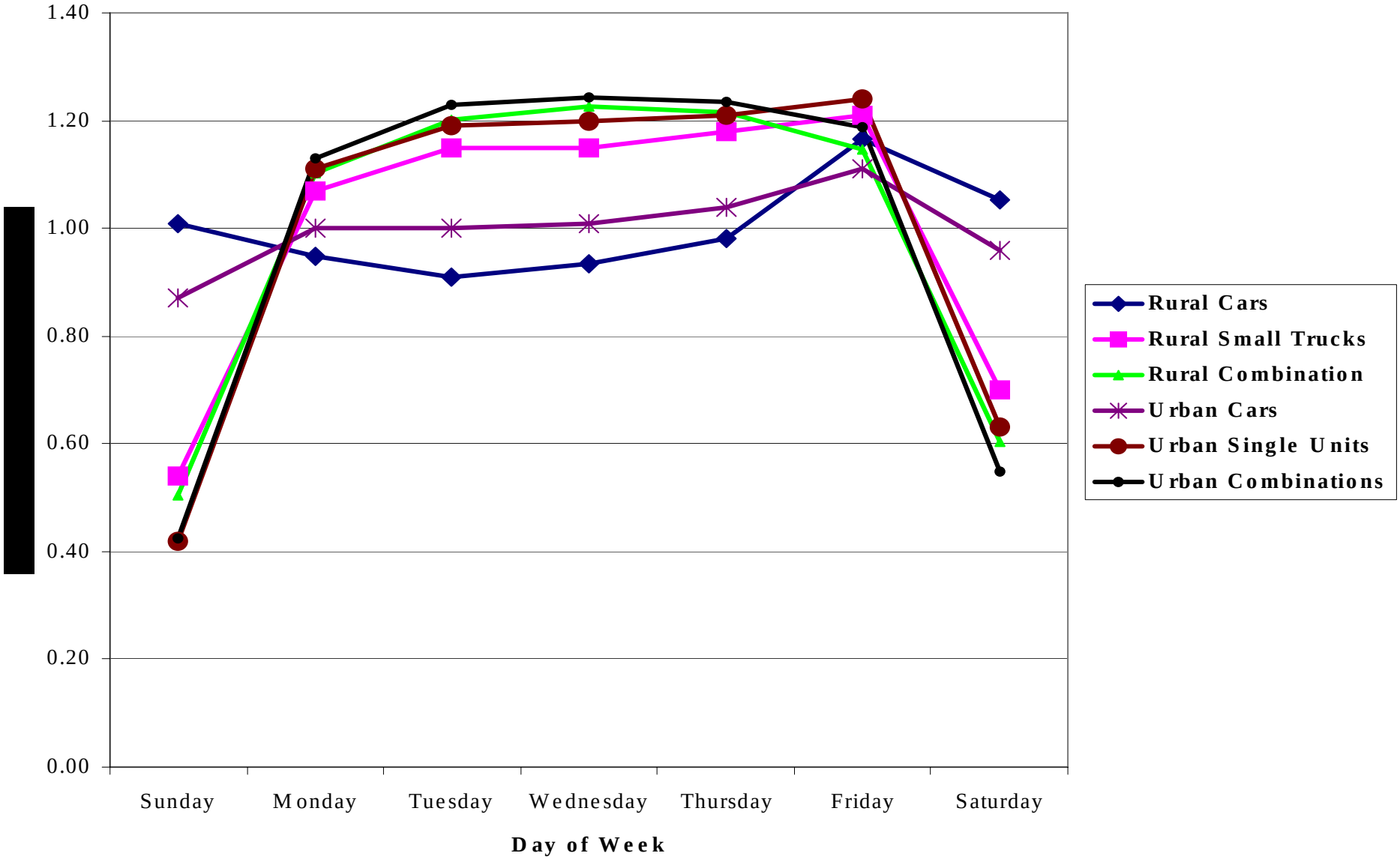


- Design lane only
- Heavy vehicles only

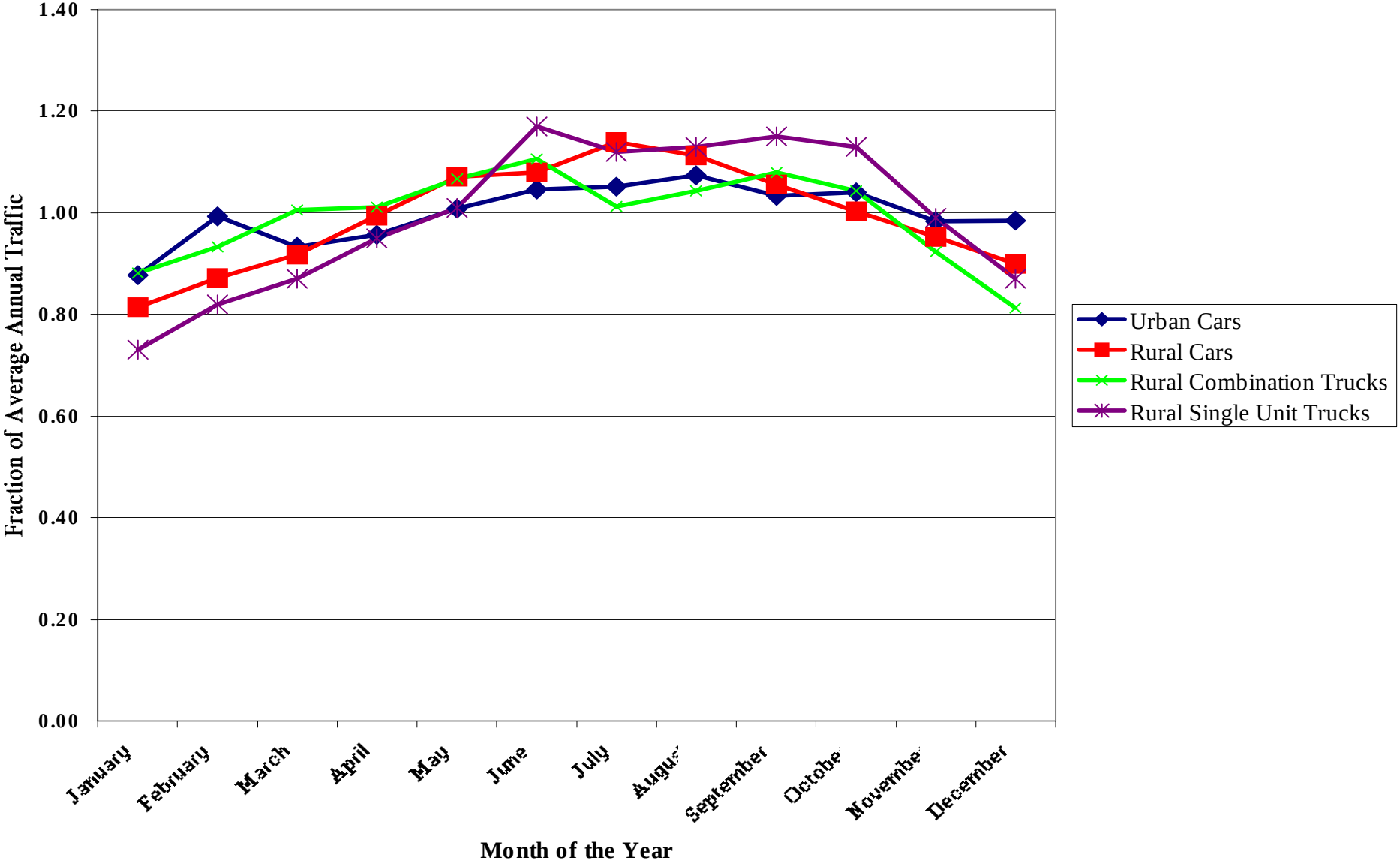
Truck Volume

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

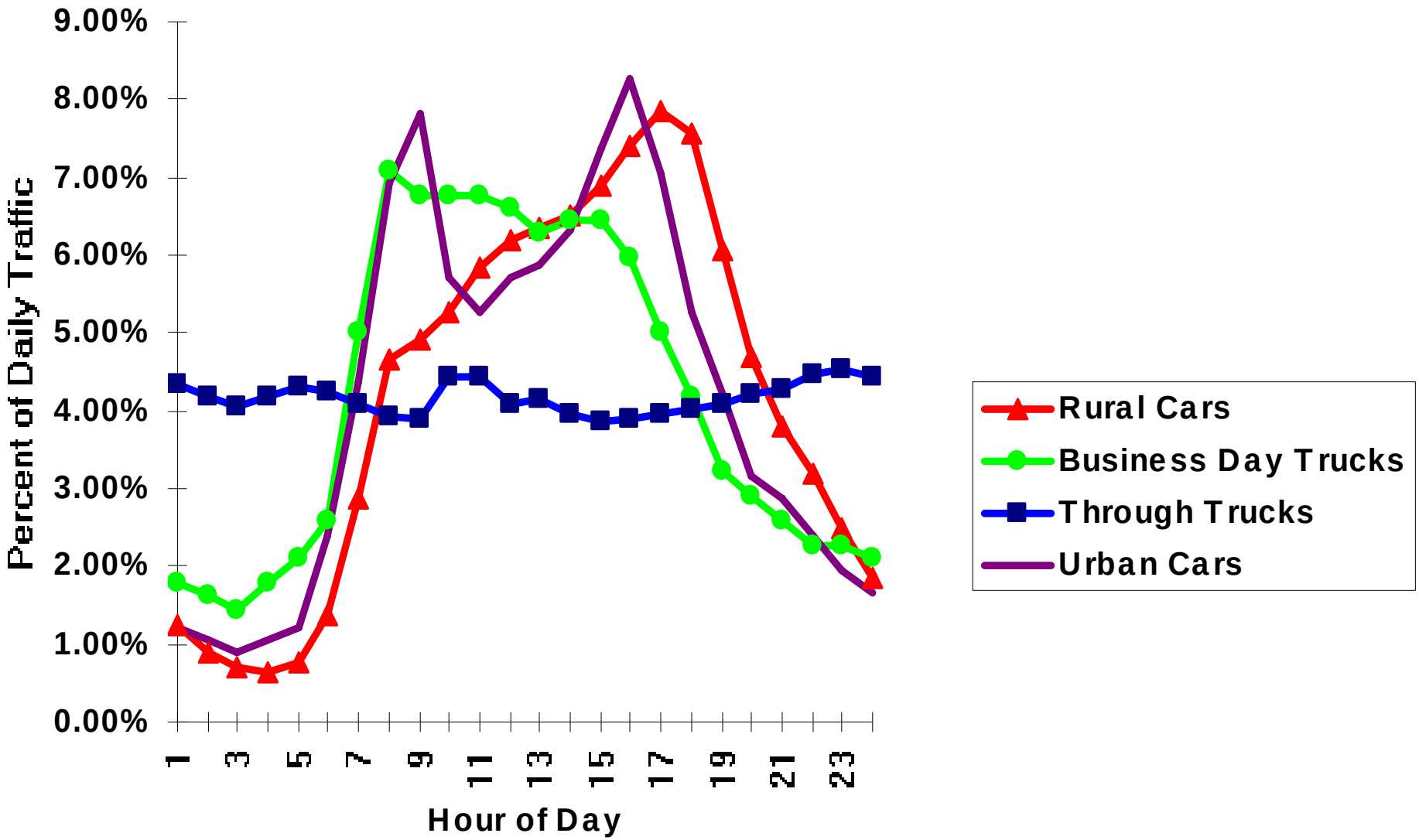
Day of Week Truck Volume Variation



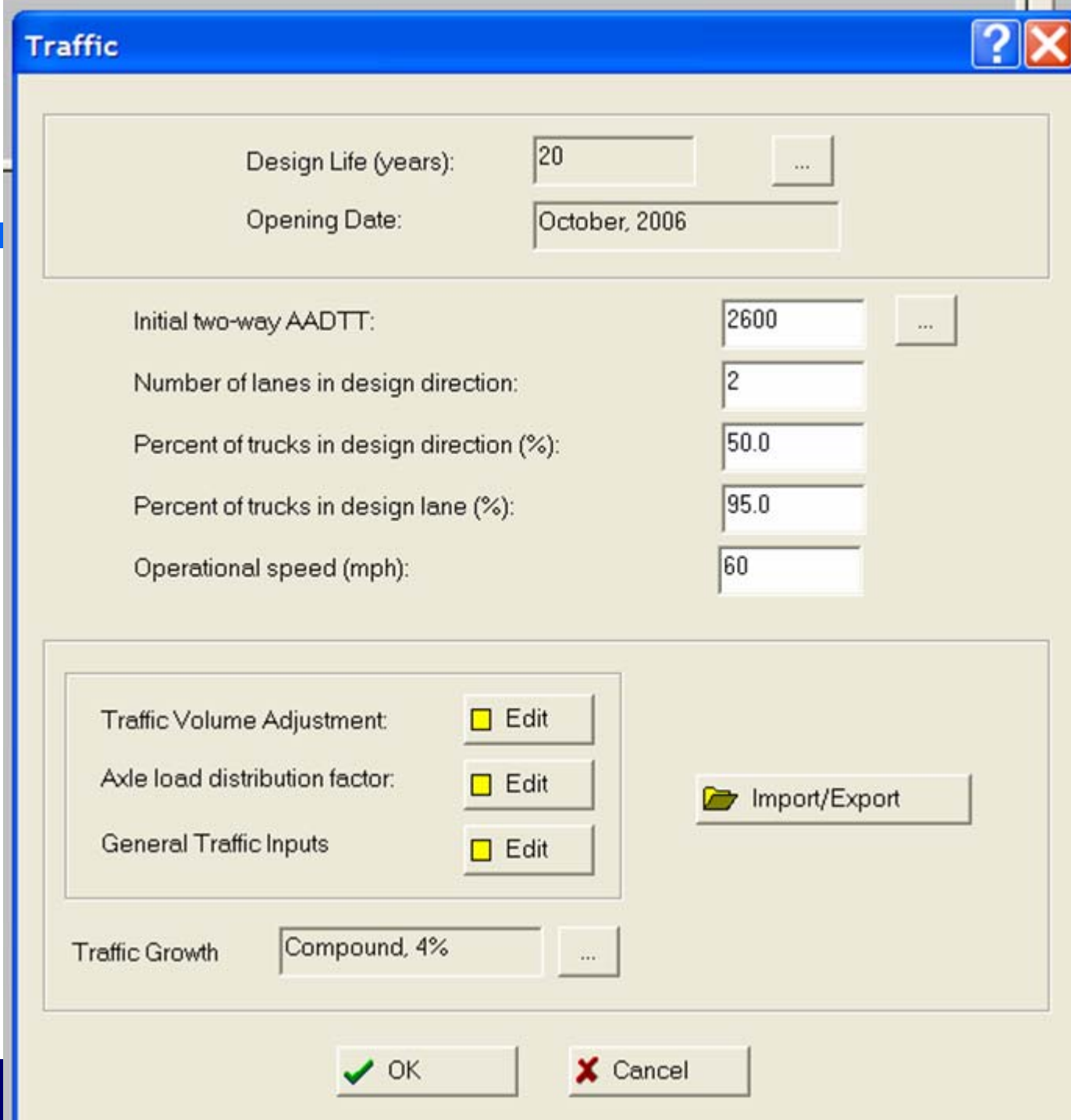
Seasonal Truck Volume Variation



Time of Day Truck Volume Variation

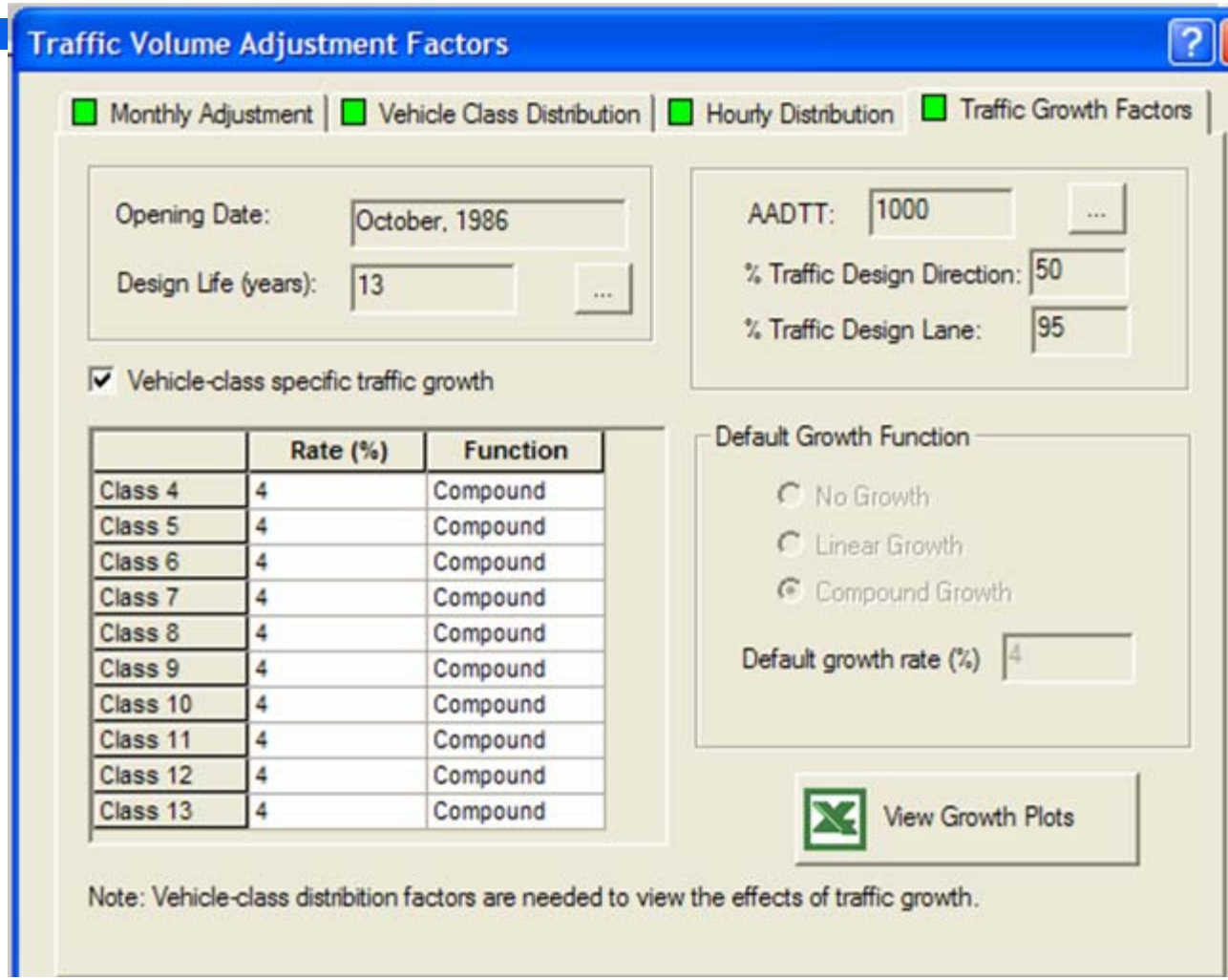


Screen Inputs



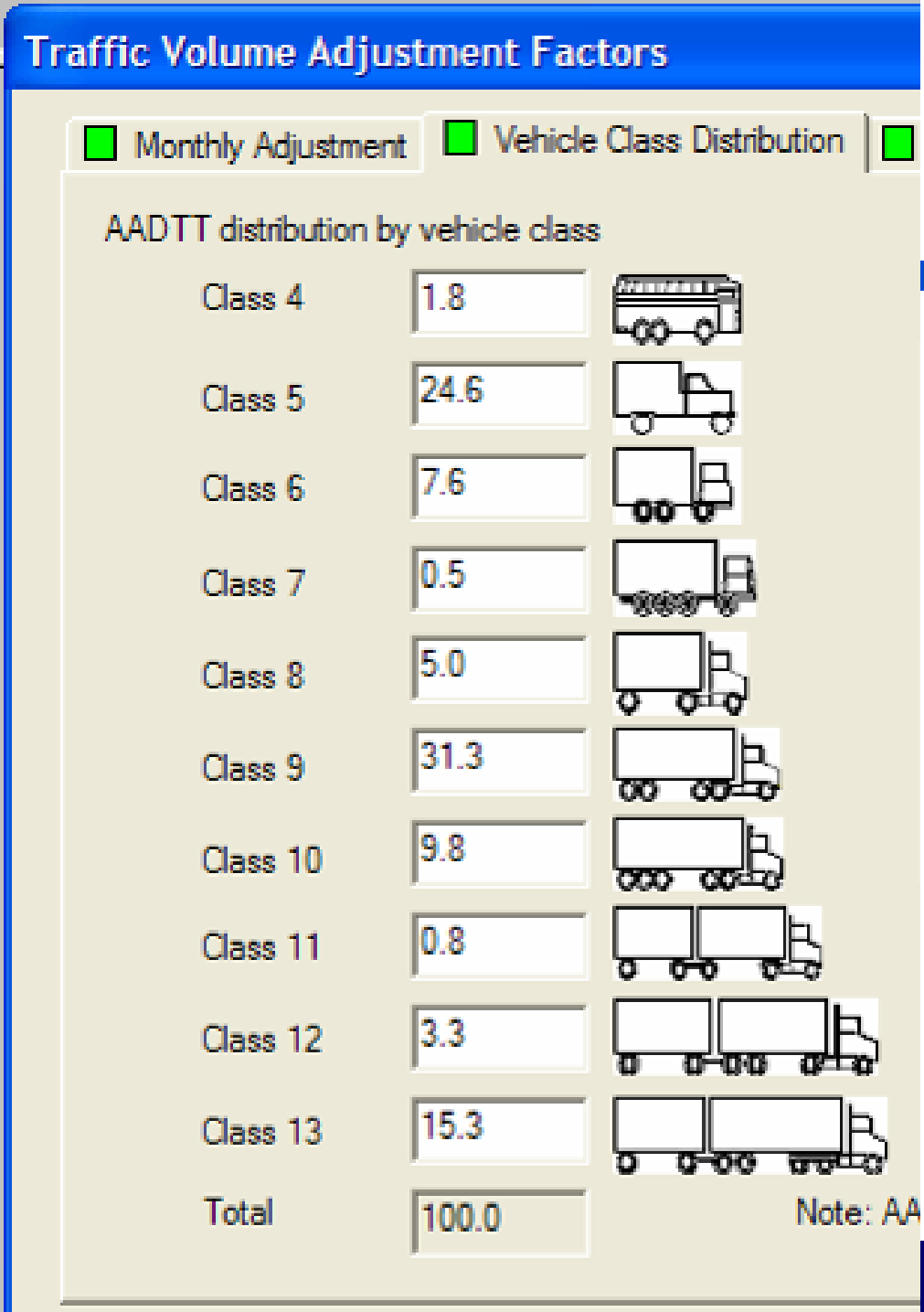
Truck Growth

- Monthly
- Traffic Growth
  - By class
  - Liner
  - Compound



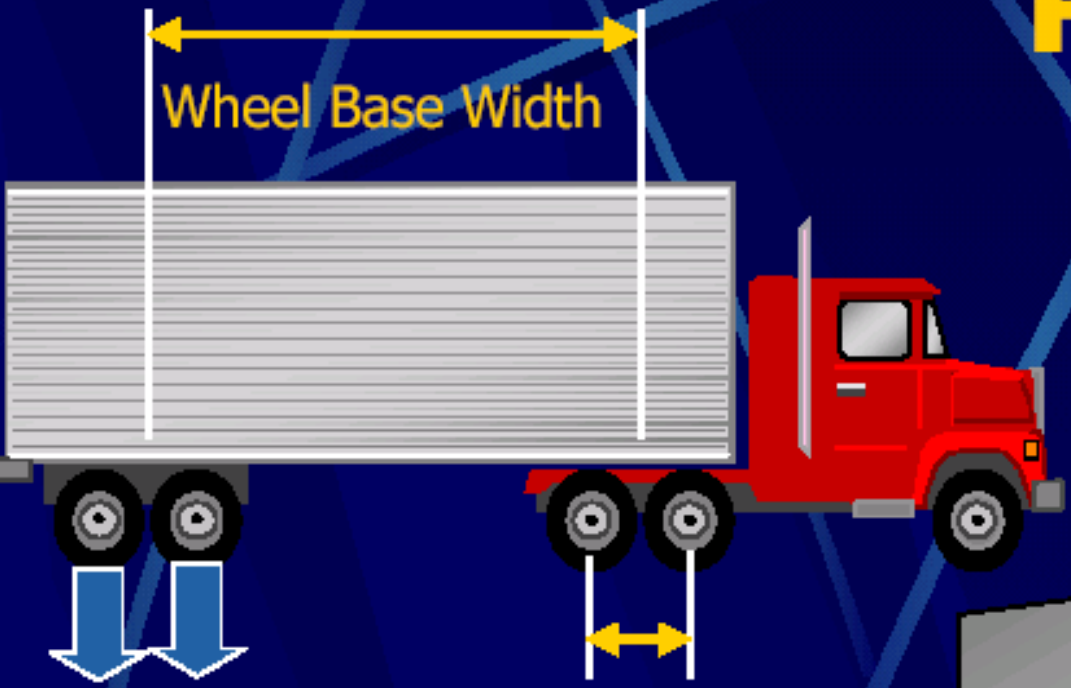
Vehicle Classification

Vehicle Class Distribution



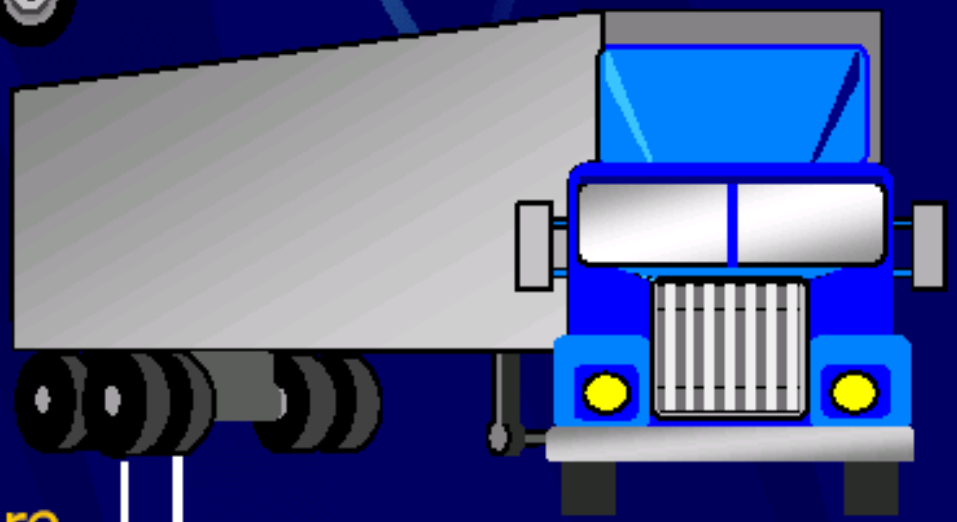
- 13 FHWA Classifications
- Only concerned with trucks

Axle Configuration Parameters



Tire Pressure

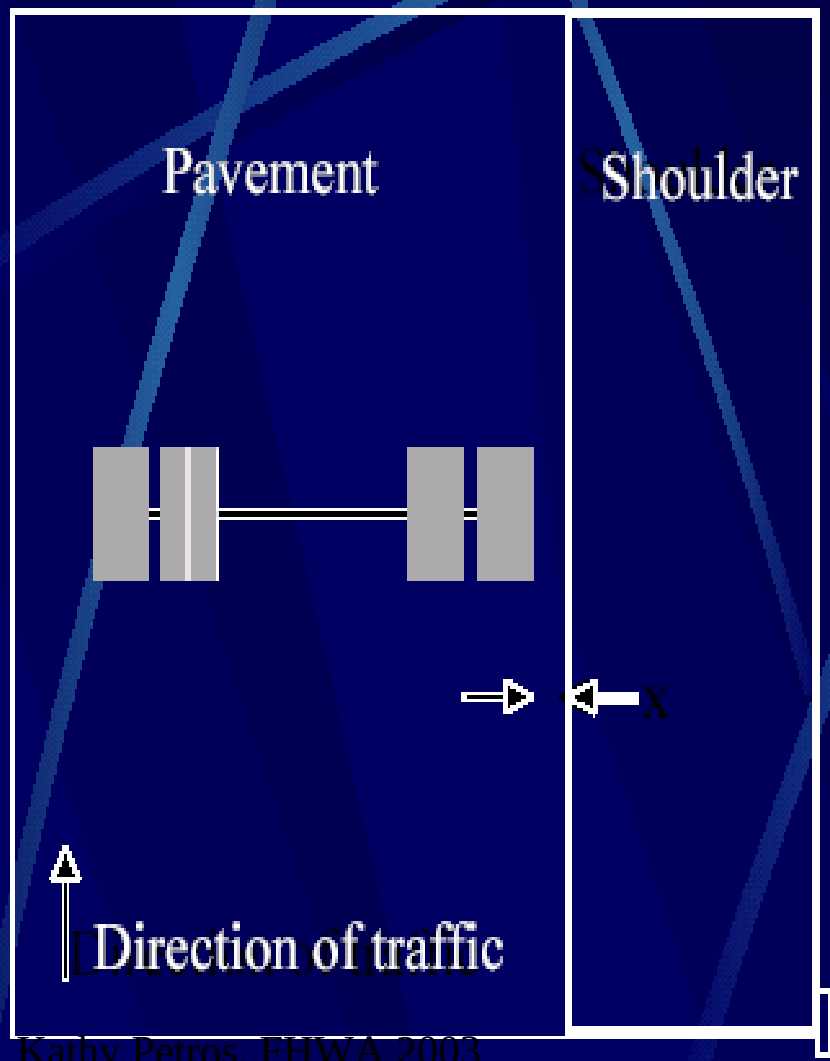
Axle Spacing



Dual Tire Spacing

Axle Width

Traffic Wander

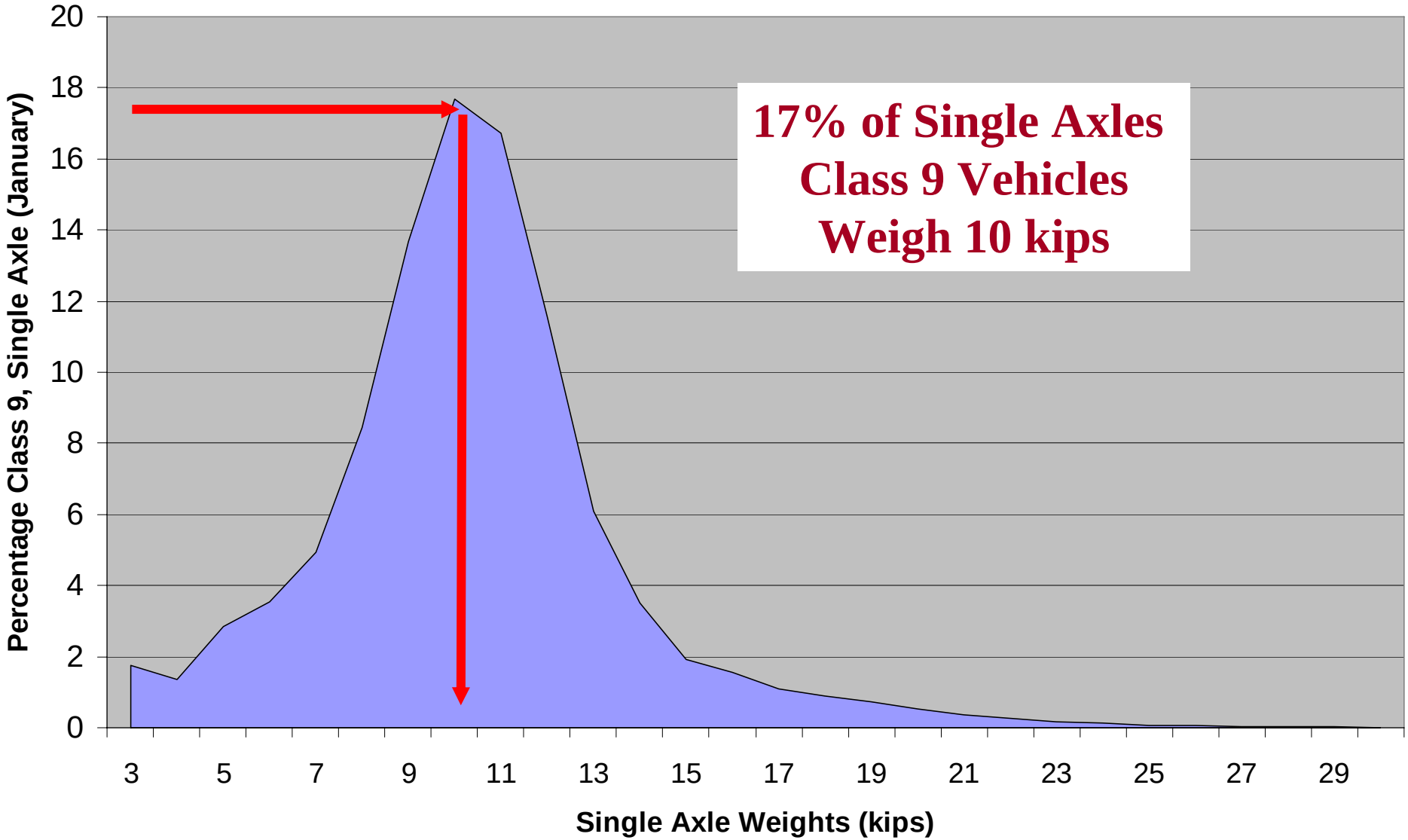


Used to calculate pavement responses & the number of axle load applications over a point for predicting distress & performance.

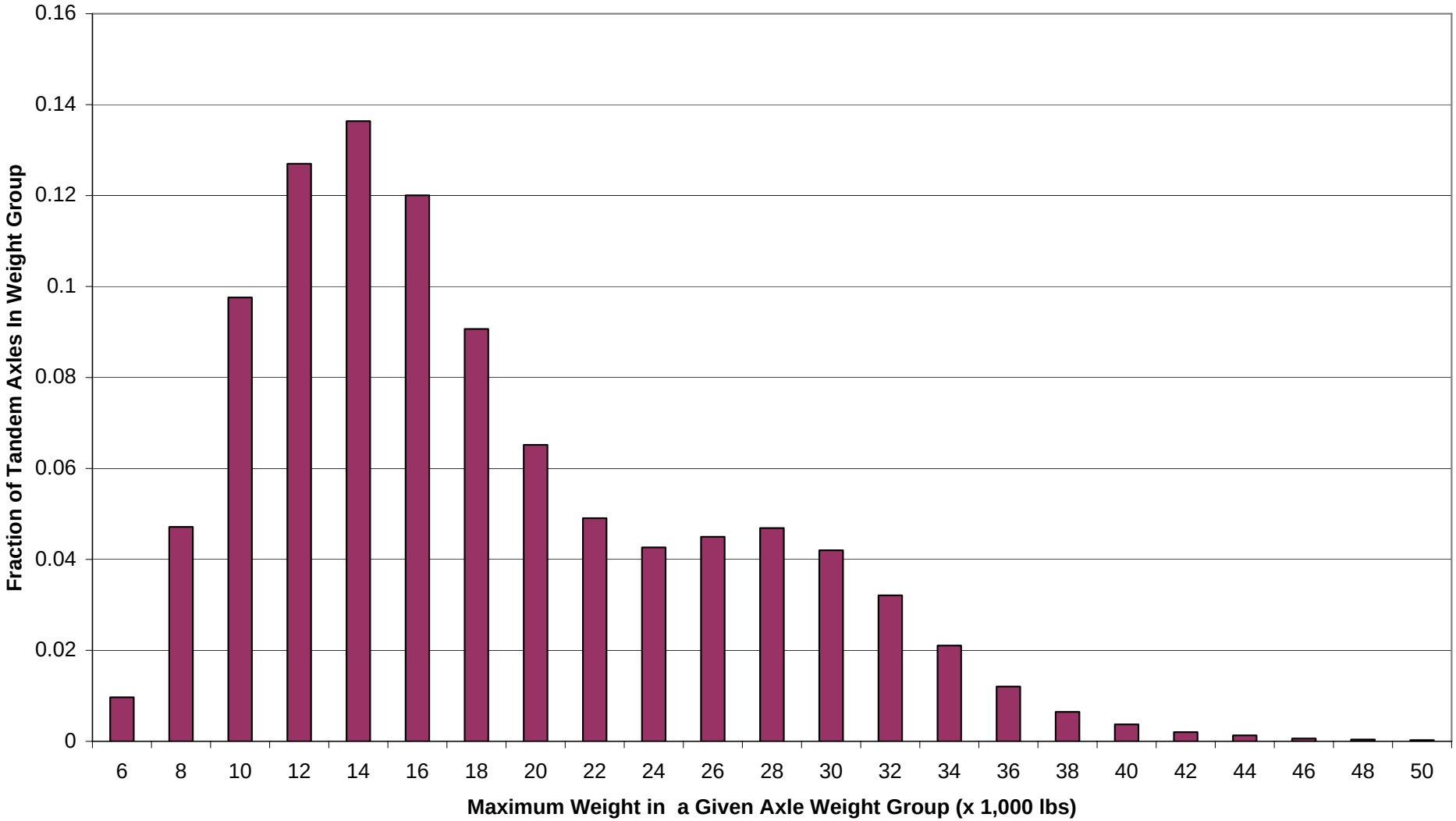
- Mean wheel location = 18 in.
- Standard deviation = 10 in.
- Design lane width.

Vehicle Weight

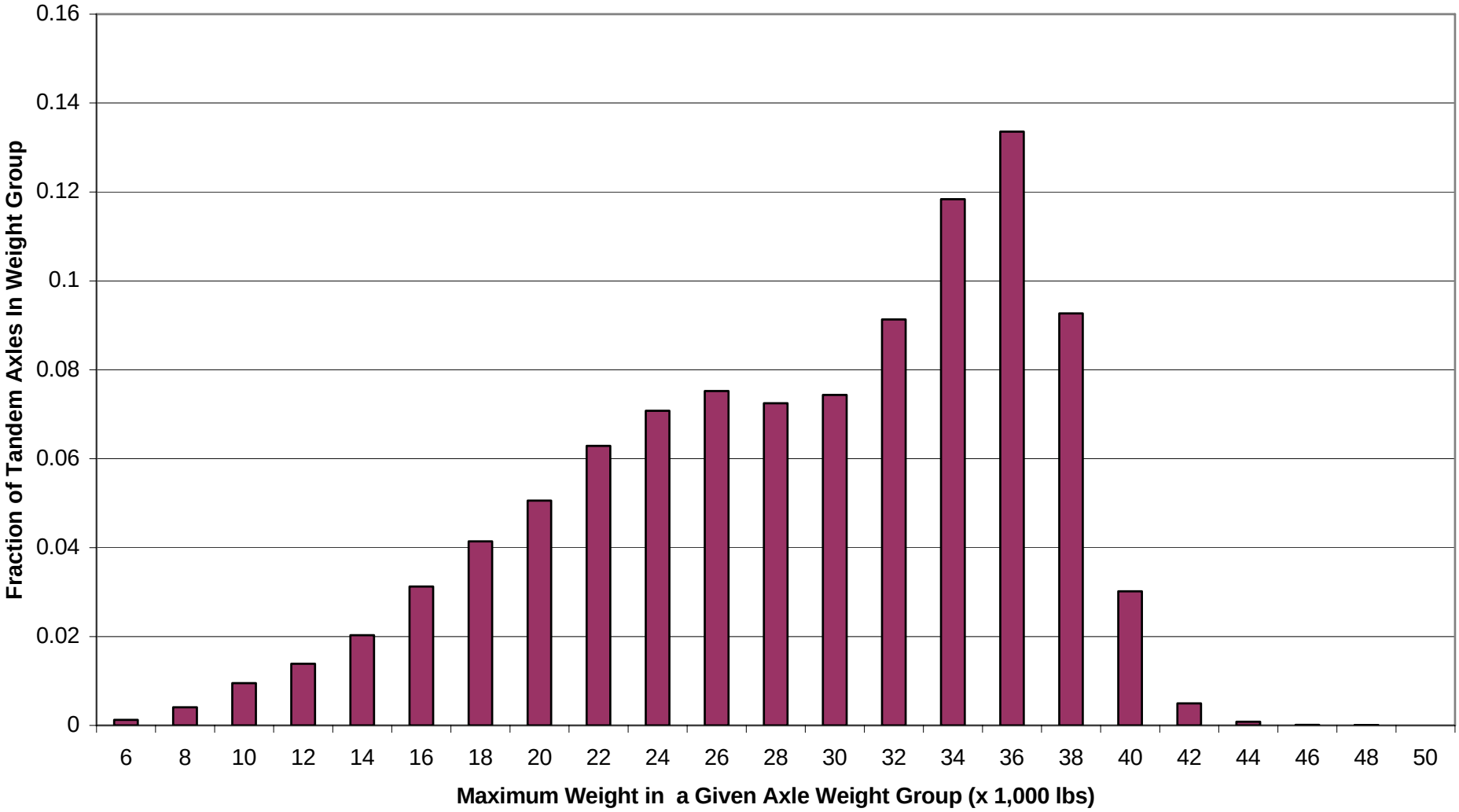
Vehicle Weight (Axle Load Spectra)



Tandem Axle Load Distribution
Lightly Loaded Trucks



Tandem Axle Load Distribution
Heavily Loaded Trucks



ESAL Comparison

Lightly Loaded = 0.186 (flexible)

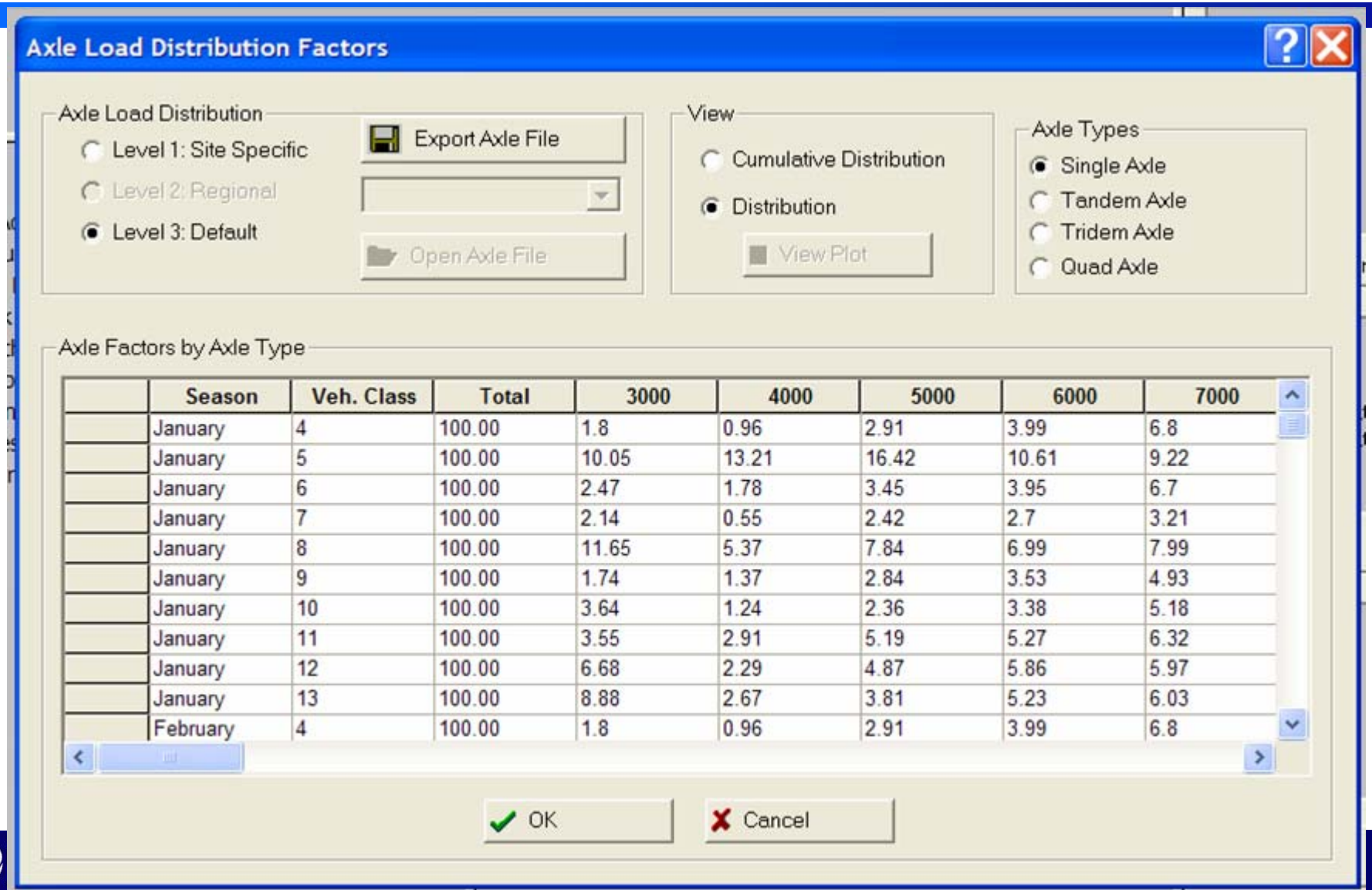
Moderately Loaded = 0.355

Heavily Loaded = 0.666

Conclusion:

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

MEPDG Input screen



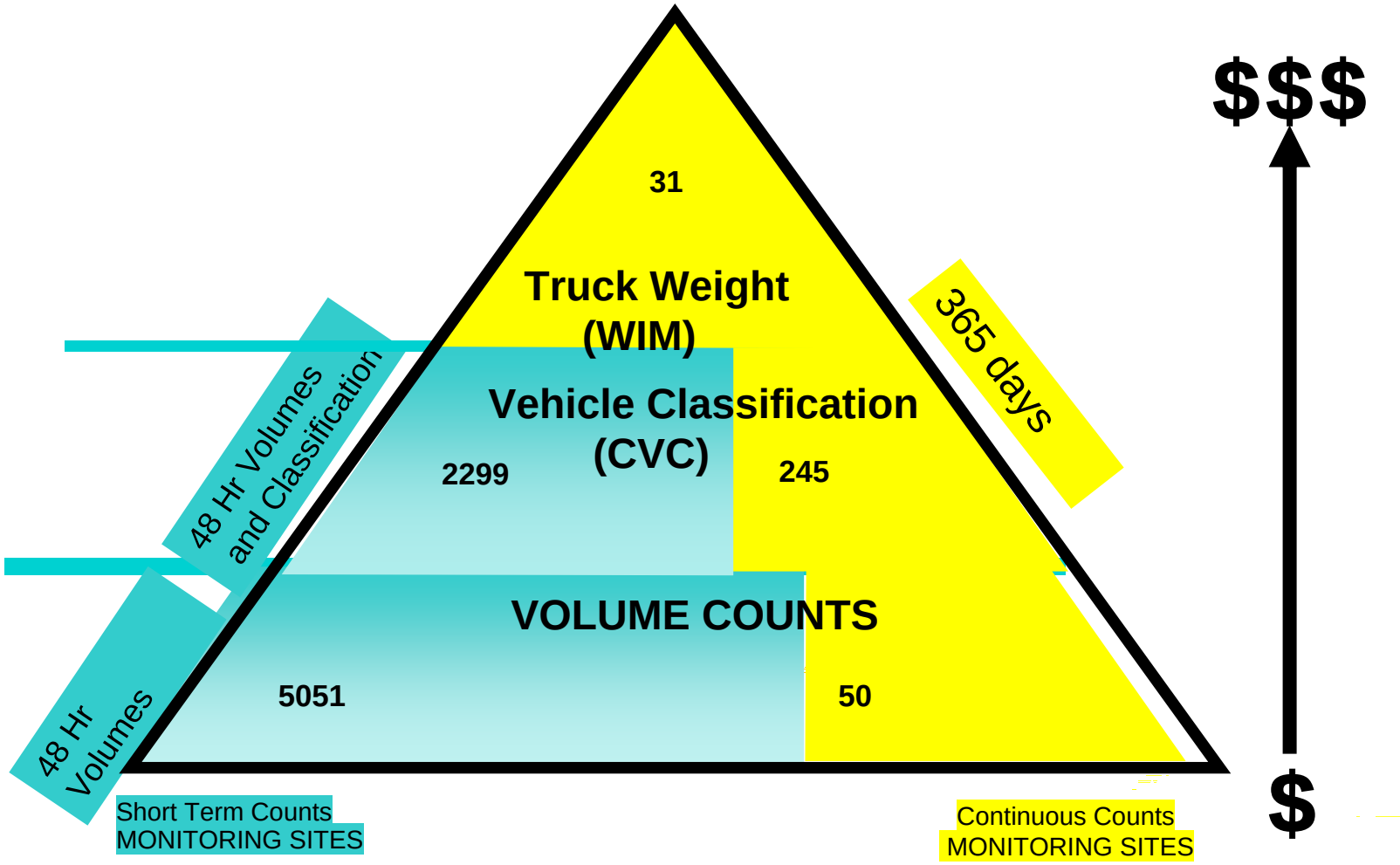
	Season	Veh. Class	Total	3000	4000	5000	6000	7000
	January	4	100.00	1.8	0.96	2.91	3.99	6.8
	January	5	100.00	10.05	13.21	16.42	10.61	9.22
	January	6	100.00	2.47	1.78	3.45	3.95	6.7
	January	7	100.00	2.14	0.55	2.42	2.7	3.21
	January	8	100.00	11.65	5.37	7.84	6.99	7.99
	January	9	100.00	1.74	1.37	2.84	3.53	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

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 ???


DIESEL
w/ PUC
ARM 9
UNLEADED
353 9
PREMIUM UNLEADED
LEG 9
THIRD ST