

# FHWA MOVES Sensitivity Testing

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# Overview

Key Findings of AECOM MOVES model testing

Comparisons of MOVES, MOBILE6.2, and Emfac

## AECOM Testing

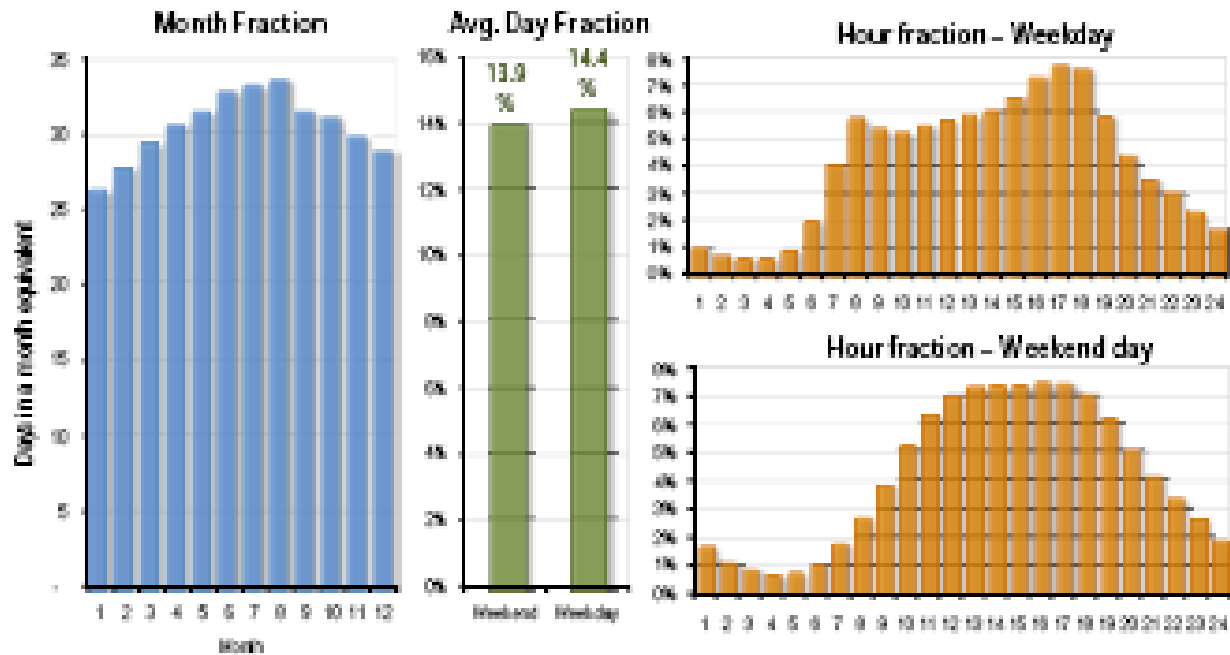
- **FHWA contracted with AECOM for testing of the MOVES model**
- **Series of three webinars presented for FHWA and EPA staff:**
  - Experiences running the model
  - Sensitivity analysis
  - Inventory approaches using actual regional travel data

## VMT Temporal Distributions

- **Annual VMT allocated internally to month, day, hour**
  - EPA is working on additional flexibility here
- **AECOM Observations**
  - Summer VMT quite high
    - August is 27% higher than January
  - Weekday/weekend difference only 0.5%
  - Relatively low weekday peak hour fractions
    - AM peak <6%, PM peak <8%
    - 7 weekend day hours have 22% more VMT than weekday AM peak

# VMT Fractions by Month, Day and Hour

8

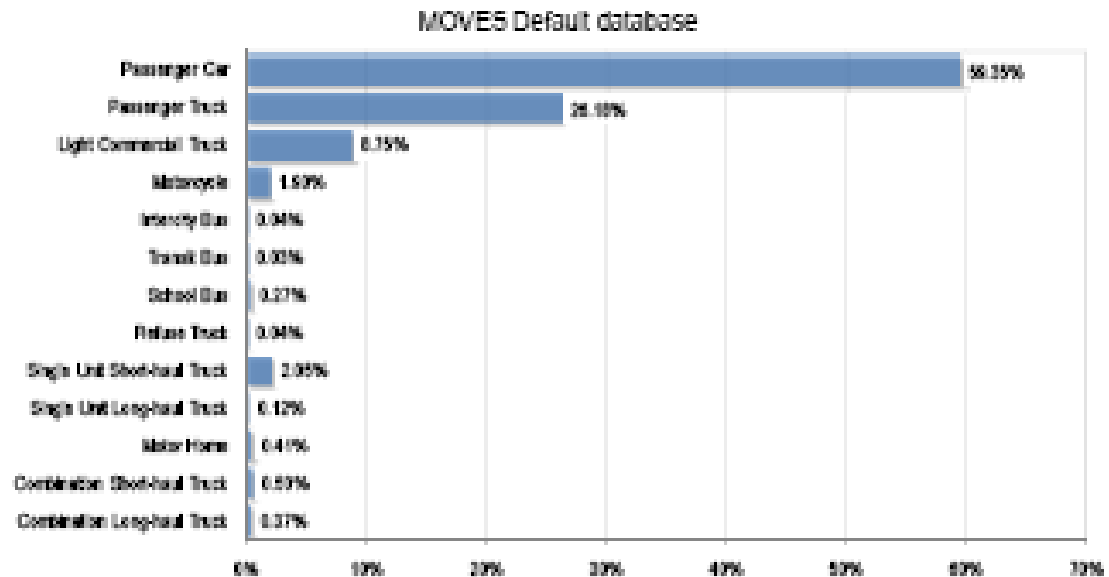


MOVES Experience

# VMT by Source Type

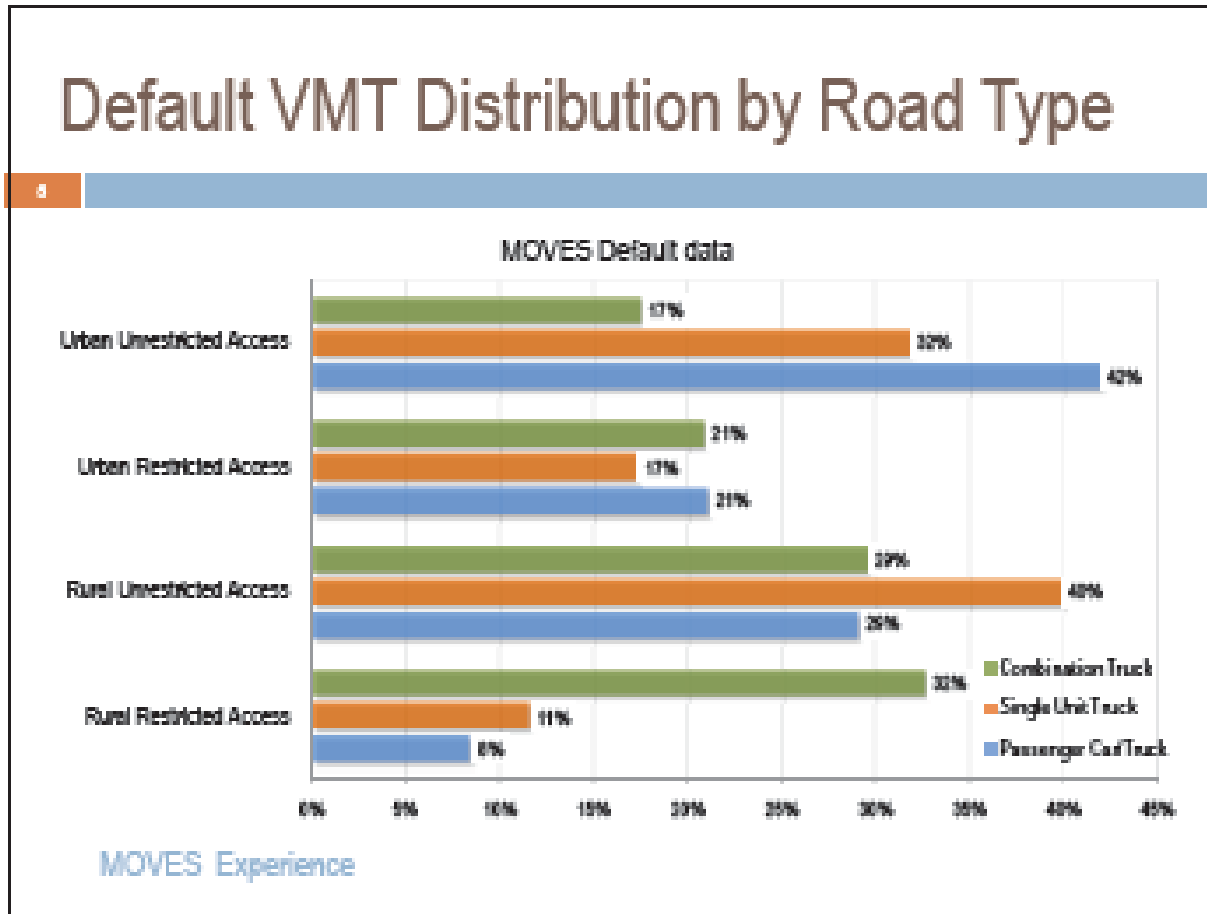
## Default VMT Distribution by Source Type

7



MOVES Experience

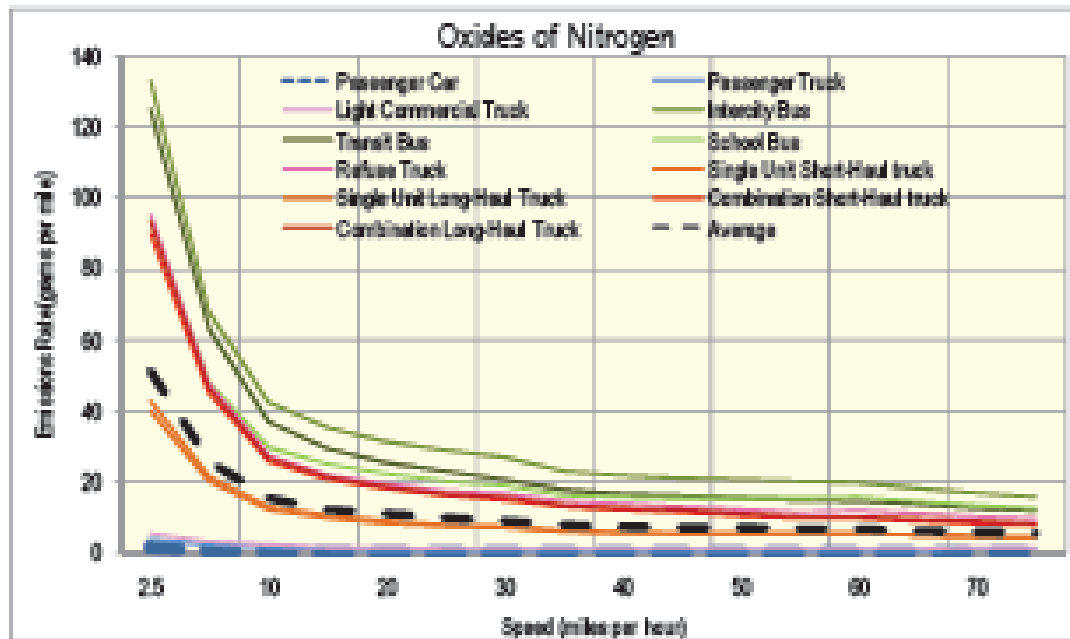
# VMT by Source and Road Type



# Emissions Vary Greatly by Source Type

## NOX Emissions by Vehicle Type

21



MOVES Experience

## Other Observations

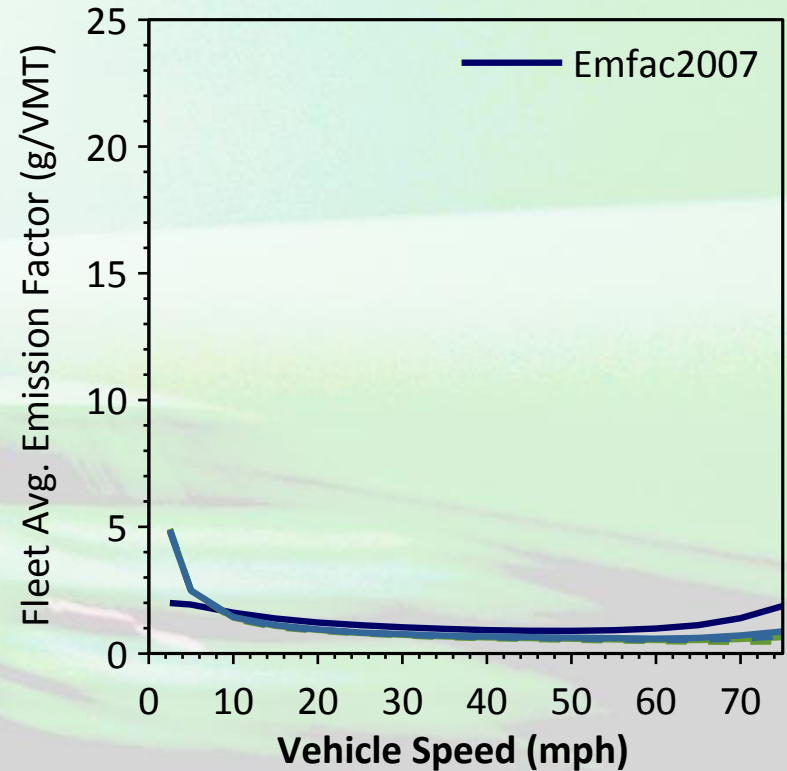
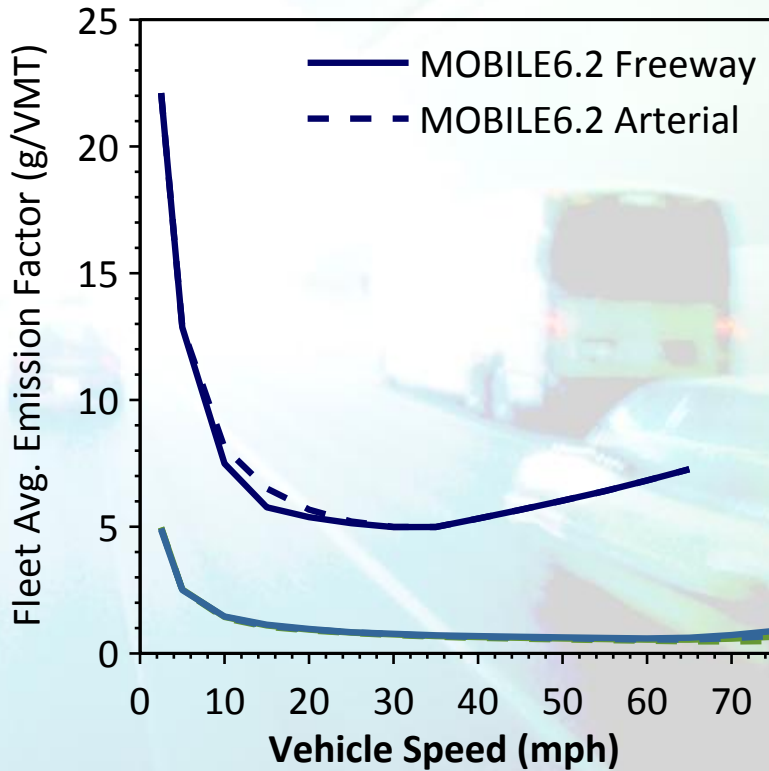
- **Emission rates very sensitive to speed**
  - Detailed speed distributions needed, should include speeds <15 mph and >65 mph (where largest changes occur)
  - Most important for restricted access roads and high ramp fractions
- **Emission rates very sensitive to source types and ages**
  - Fleet mix and age inputs have a large impact
  - Good local data identifying passenger cars and passenger trucks important
  - Truck rates more sensitive to low speeds (need local VMT fractions by source and road type)

## Other Observations

- **Comparisons runs using defaults and local data (for Portland) showed use of less refined inputs (greater use of defaults) resulted in higher emissions**
  - Local car/truck distributions reduced NO<sub>x</sub> by 14%
  - Other local data impacted emissions by 2 – 6%
  - Exception: use of speed distributions instead of single average speed increased emissions 6 – 11%
- **Inventory method (using MOVES to generate the inventory, or running MOVES to obtain emissions rates) resulted in large emissions differences**
  - “Lookup” (emissions rates) method resulted in 4 – 19% lower emissions, depending on pollutant and month

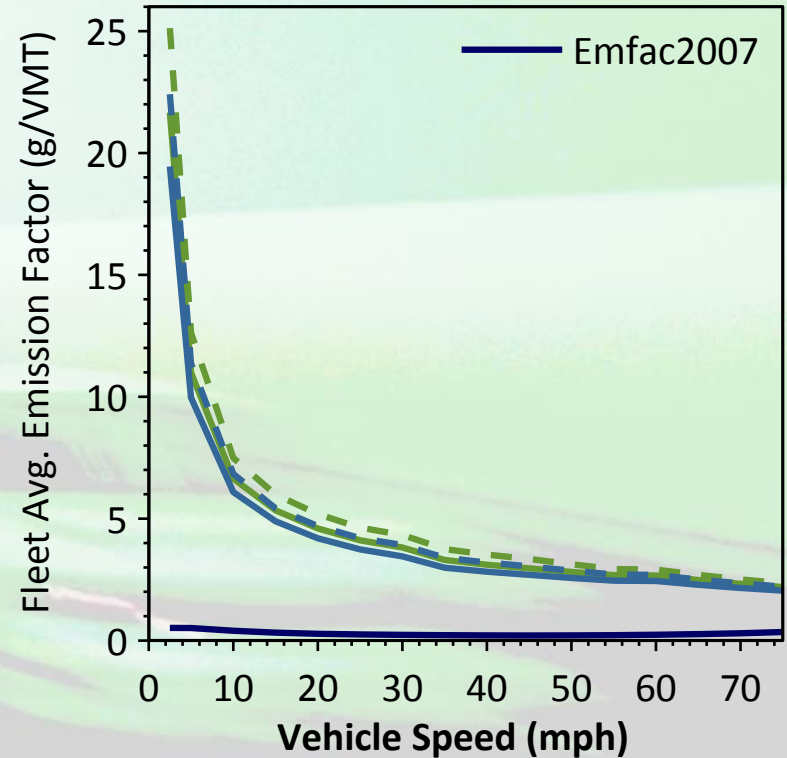
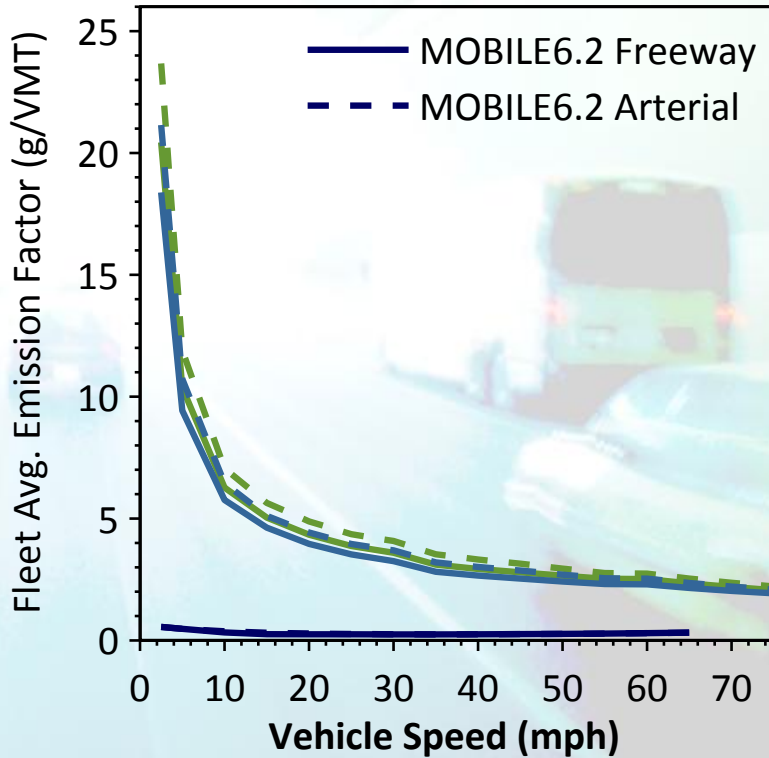
# Variability of Emission Factors with Speed – Carbon Monoxide (CO) – 2030

- MOVES Urban Unrestricted
- - - MOVES Urban Restricted
- MOVES Rural Unrestricted
- - - MOVES Rural Restricted



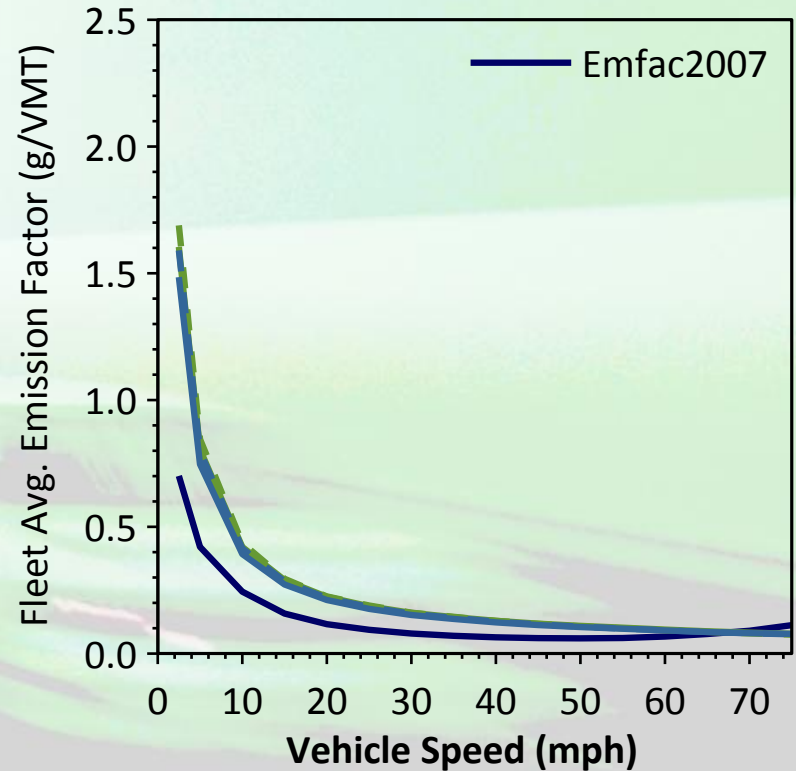
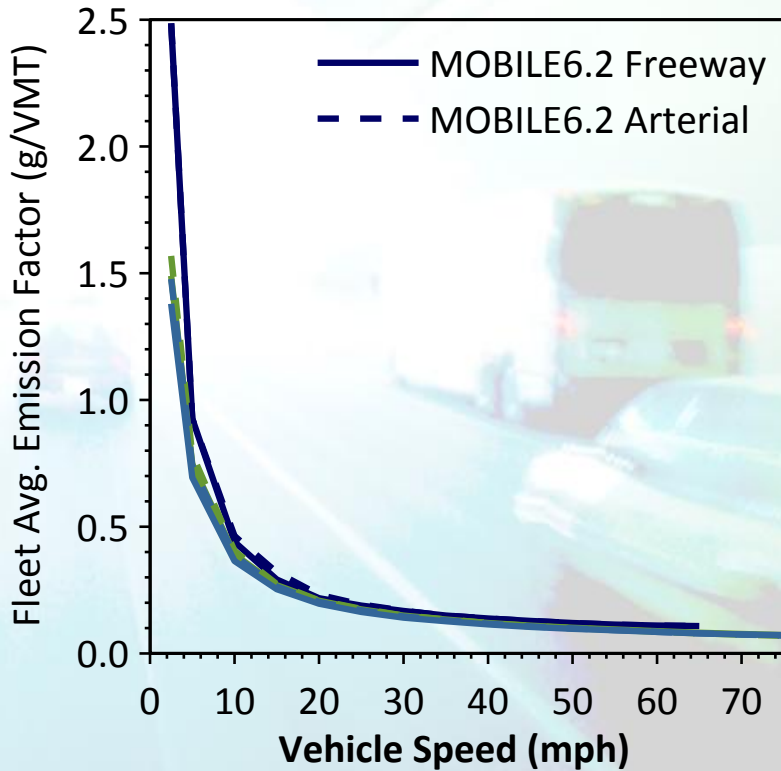
# Variability of Emission Factors with Speed – Nitrogen Oxides (NOx) – 2030

- MOVES Urban Unrestricted
- - - MOVES Urban Restricted
- MOVES Rural Unrestricted
- - - MOVES Rural Restricted



# Variability of Emission Factors with Speed – Volatile Organic Compounds (VOC) – 2030

- MOVES Urban Unrestricted
- MOVES Rural Unrestricted
- - - MOVES Urban Restricted
- - - MOVES Rural Restricted



# Variability of Emission Factors with Speed – Fine Particulate Matter (PM<sub>2.5</sub>) – 2030

- MOVES Urban Unrestricted
- MOVES Rural Unrestricted
- - - MOVES Urban Restricted
- - - MOVES Rural Restricted

