MD State Highway Administration $PM_{2.5}$ Hotspot Analysis Lessons Learned

AASHTO Air Quality Peer Exchange Presentation

May 6, 2014

SHA State Highway Administration
Maryland Department of Transportation

Purpose of Presentation

- Describe Types of Projects Analyzed
- Review Analysis Methodology
- Lessons Learned from using MOVES2010b
- Lessons Learned from using CAL3QHCR
- Lessons Learned from Documenting Results

Types of Projects Analyzed

- Park and Ride Lots
- New Four-Lane Roadway

Methodology for Park and Ride Lots

- Approached projects as FHWA TDM Strategies
- Recognized Park and Ride Lots reduce vehicle trips to CBDs
- Obtained Regional MOVES inputs from MPO
- Completed a sketch planning analysis

Methodology for Park and Ride Lots

- Analyzed Emission Impacts of New or Expanded Park and Ride Lots
- Determined Expected Annual Reduction of Vehicle-Miles
- Used MOVES2010b to Determine Average Emissions in Grams per Vehicle-Mile
- Calculated Expected Annual Reduction of Emissions in Tons
- Requested Local AQ Agency Agreement that Project met CAA

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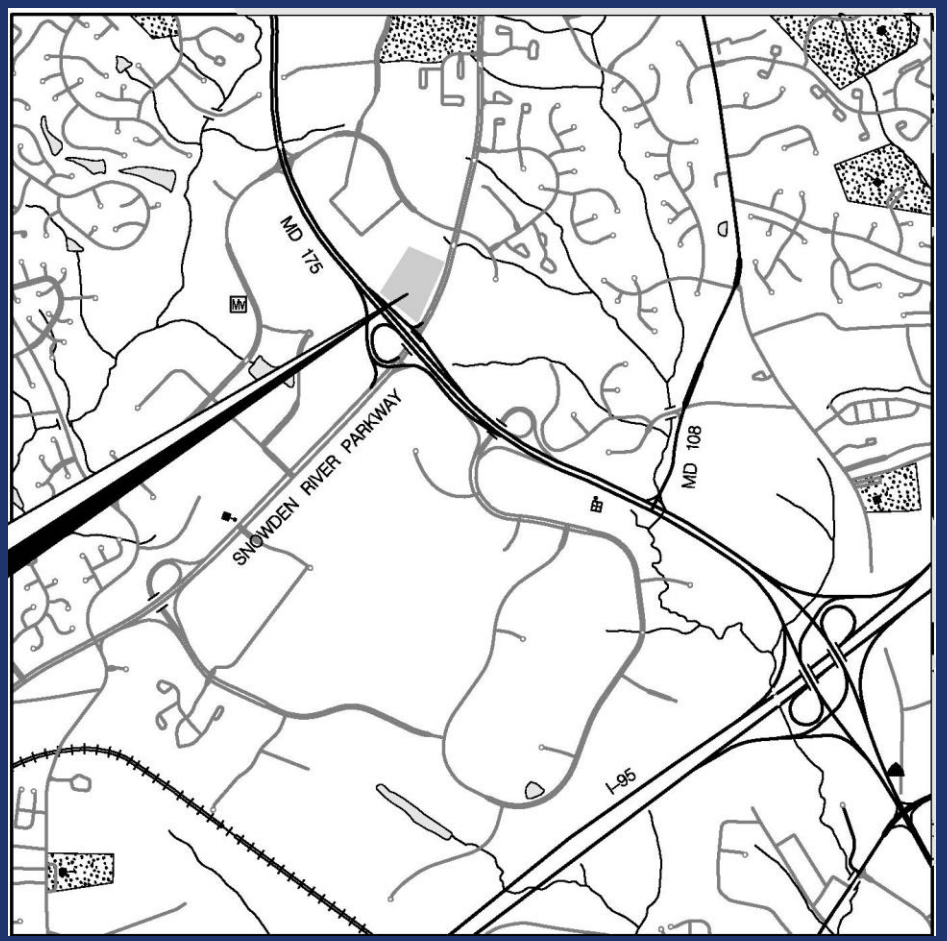
Park and Ride Lots - Example Project

- Interchange of MD 175 and Snowden River Pkwy in Howard County
- Ridesharing lot expansion 96 new passenger vehicle parking spots.
- No designated truck parking in the expansion area.



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Park and Ride Lots - Example Project

- Expected reduction of 49 roundtrips on I-95 towards the City of Baltimore and 47 roundtrips on I-95 towards Washington, DC
- Reduction of approximately 3,354 vehicle-miles per workday
- Annual reduction of 838,500 vehicle-miles
- CO emissions from the MOVES analysis are 6.1022 grams per vehicle mile
- Reduction in CO emissions of 5.64 tons, annually.
- $PM_{2.5}$ emissions from the MOVES analysis are 0.0412 grams per vehicle mile
- Reduction in $PM_{2.5}$ emissions of 0.0381 tons, annually.

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New Four-Lane Divided Roadway – Project Background

- Located in Montgomery County, MD
- Nonattainment area for 1997 $PM_{2.5}$ Annual and 24-Hour standards
- Maintenance area for CO
- 0.6 mile of new 4 lane divided roadway
- Identified as a potential project of air quality concern and a candidate for hot-spot analysis for both $PM_{2.5}$ and CO

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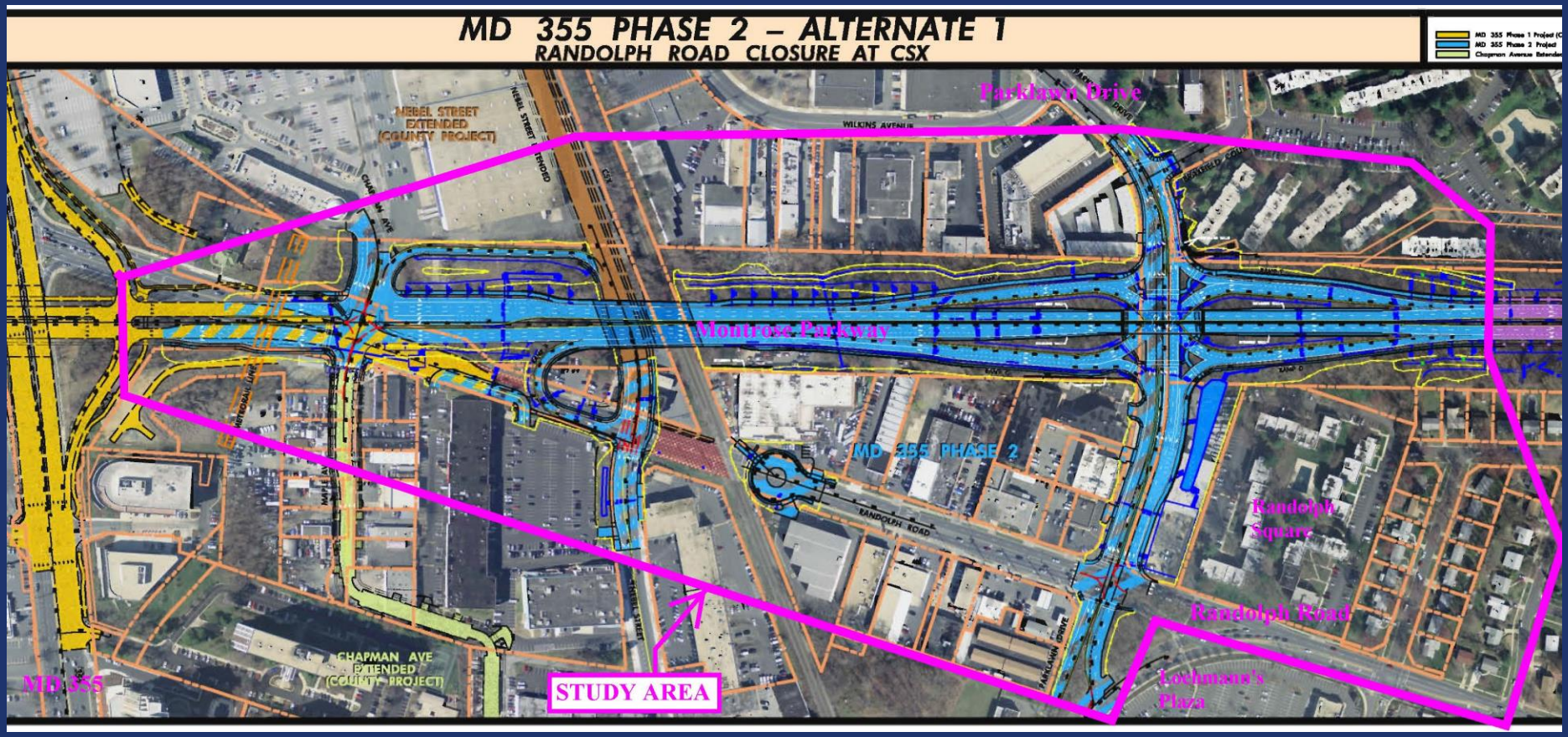
New Four-Lane Divided Roadway – Project Description



Methodology for New Four-Lane Divided Roadway

- Analysis Years (2007, 2017, 2025, 2040) determined by available MOVES data files from MPO Regional Conformity Analysis
- Followed Procedures in EPA “Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas”

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Methodology for New Four-Lane Divided Roadway

- Background Emission Concentrations Obtained from EPA Monitor Value Reports
- 16 MOVES2010b Model Runs Conducted for each Analysis Year
- Model Runs Analyzed Following Pollutants:
  1. Carbon Monoxide
  2. Primary Exhaust PM2.5-Total
  3. Primary PM2.5-Organic Carbon
  4. Elemental Carbon
  5. Sulfate Particulate
  6. Brakewear Particulate
  7. Tirewear Particulate
  8. Total Energy Consumption

Methodology for New Four-Lane Divided Roadway

- Model Runs Analyzed Following Processes:
  1. Running, Start and Extended Idle Exhaust
  2. Crankcase Running, Start and Extended Idle Exhaust
- Databases provided by the MPO as used in the Regional Conformity Analysis included:
  1. Meteorology
  2. Age Distribution
  3. Fuel Supply
  4. Fuel Formulation
  5. Inspection and Maintenance
- Databases created using MOVES spreadsheet template:
  1. Link Source Type
  2. Links

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Methodology for New Four-Lane Divided Roadway - Links

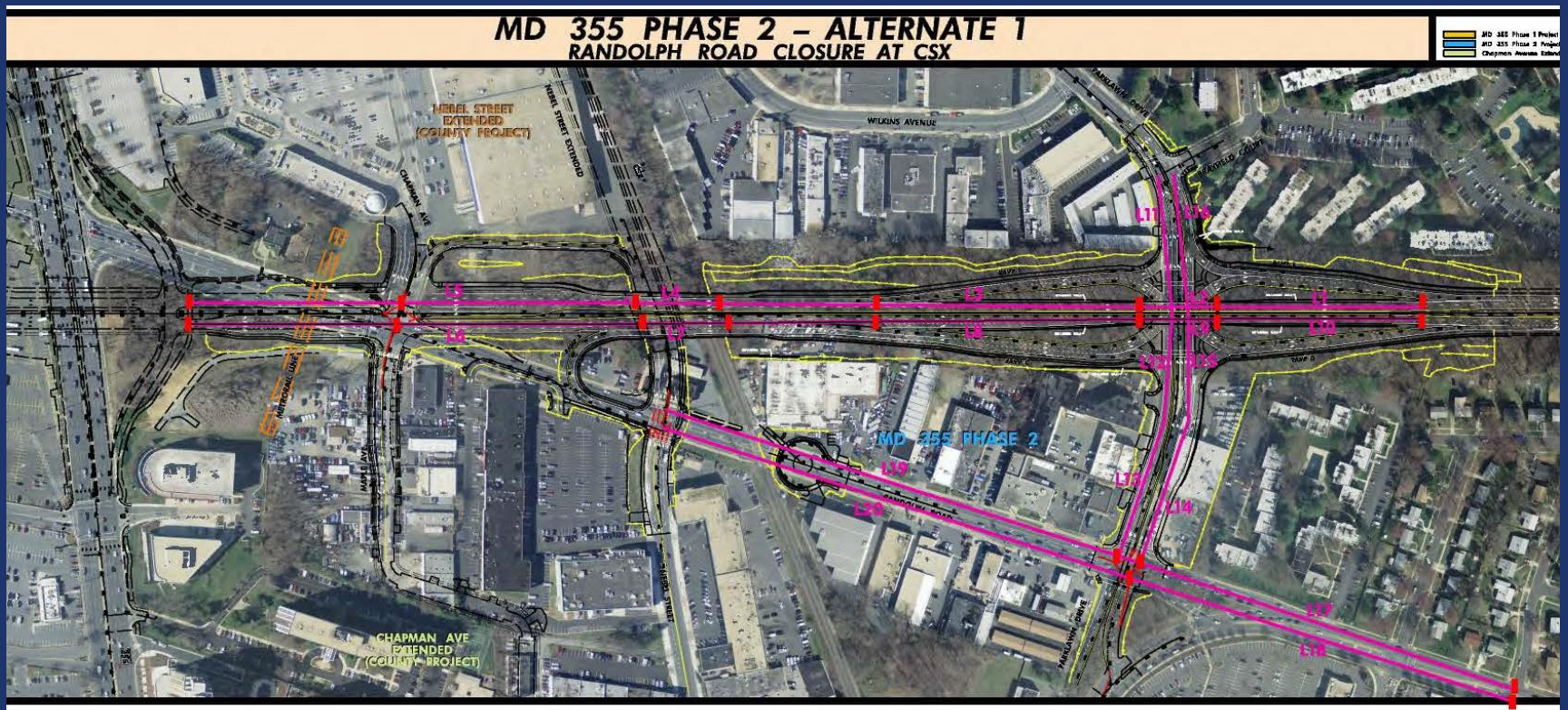

Figure 2. Link Locations

Methodology for New Four-Lane Divided Roadway - Receptors

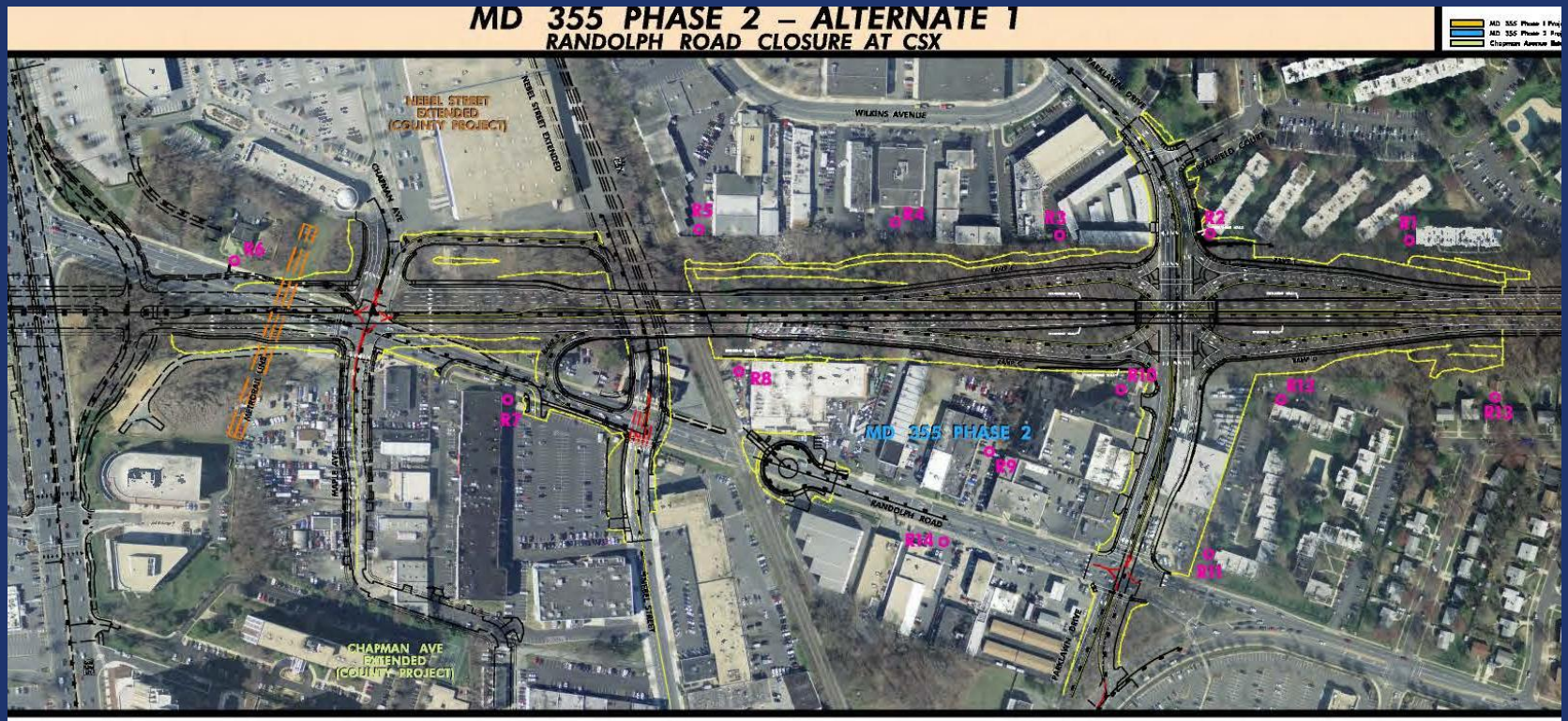

Figure 3. Receptor Locations

MOVES 2010b Lessons Learned

- Helpful to use MPO Regional Conformity Analysis Databases
- Important to name input and output files to correspond with analysis year, quarter and time period
- Traffic data was assembled from several sources to complete Link Source Type database for the Project Data Manager
- Did not include Brake wear and Tire Wear in initial Model Runs
- Nearest monitor source of CO was in adjacent county
- There were no significant other sources of emissions, and road dust and construction activities were not considered

CAL3QHCR Lessons Learned

- Needed to recognize link type (e.g., at-grade, bridge)
- Challenge finding recent Met Data, resorted to using data from 1991 for each analysis year
- Some analysis time savings by modifying previous quarter .BAT files, .CTL files, .INP files and .MET files, just required updating analysis year/quarter traffic and emission factor
- Multiple staff worked on different analysis years, needed to confirm using latest model version

Documenting Results Lessons Learned

- Only developed Technical Memo for ICG review and to memorialize analysis process undertaken
- Challenge developing Design Values from CAL3QHCR output and monitoring station data for NAAQS timeframes
- No new or worsening violations resulting from proposed project