
PM Hot-spot Requirements and Guidance for Transportation Conformity

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U.S. EPA's Office of Transportation and Air Quality

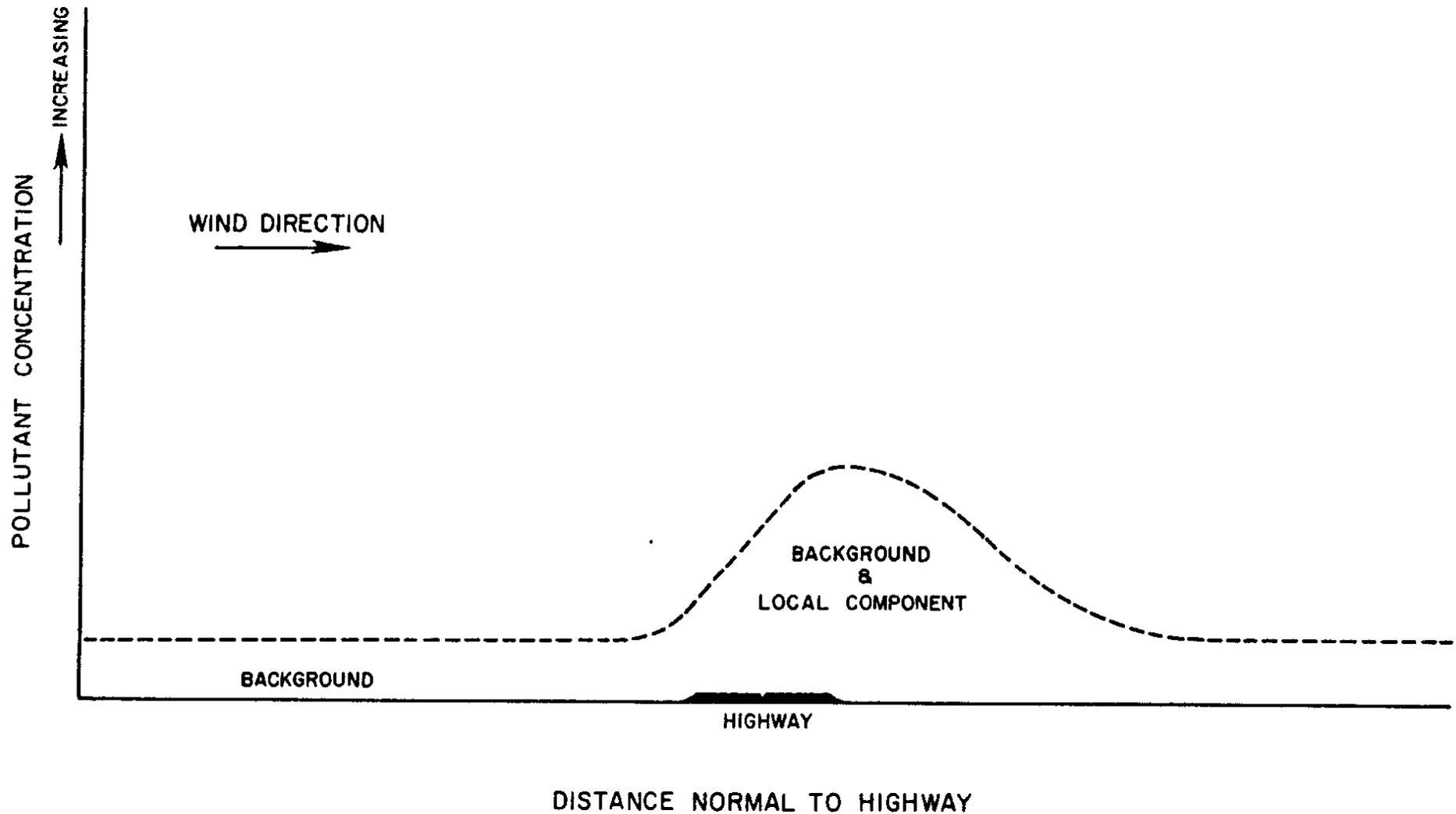
March 13, 2012



Statutory and Regulatory Requirements

- CAA section 176(c) and transportation conformity rule (40 CFR Part 93) require that federally supported transportation projects in nonattainment and maintenance areas cannot:
 - » Cause or contribute to new air quality violations,
 - » Worsen existing violations, or
 - » Delay timely attainment of the NAAQS or interim milestones
- Section 93.101 defines a **hot-spot analysis** as an estimation of likely future localized pollutant concentrations and a comparison to the relevant transportation-related NAAQS
 - » Required for certain highway and transit projects in PM_{2.5}, PM₁₀, and CO nonattainment and maintenance areas
- Project meets conformity requirements, if at each appropriate receptor:
 - PM concentration of **build** \leq NAAQS, *or*
 - PM concentration of **build** \leq PM concentration of **no-build**

Focus of PM Hot-spot Analysis

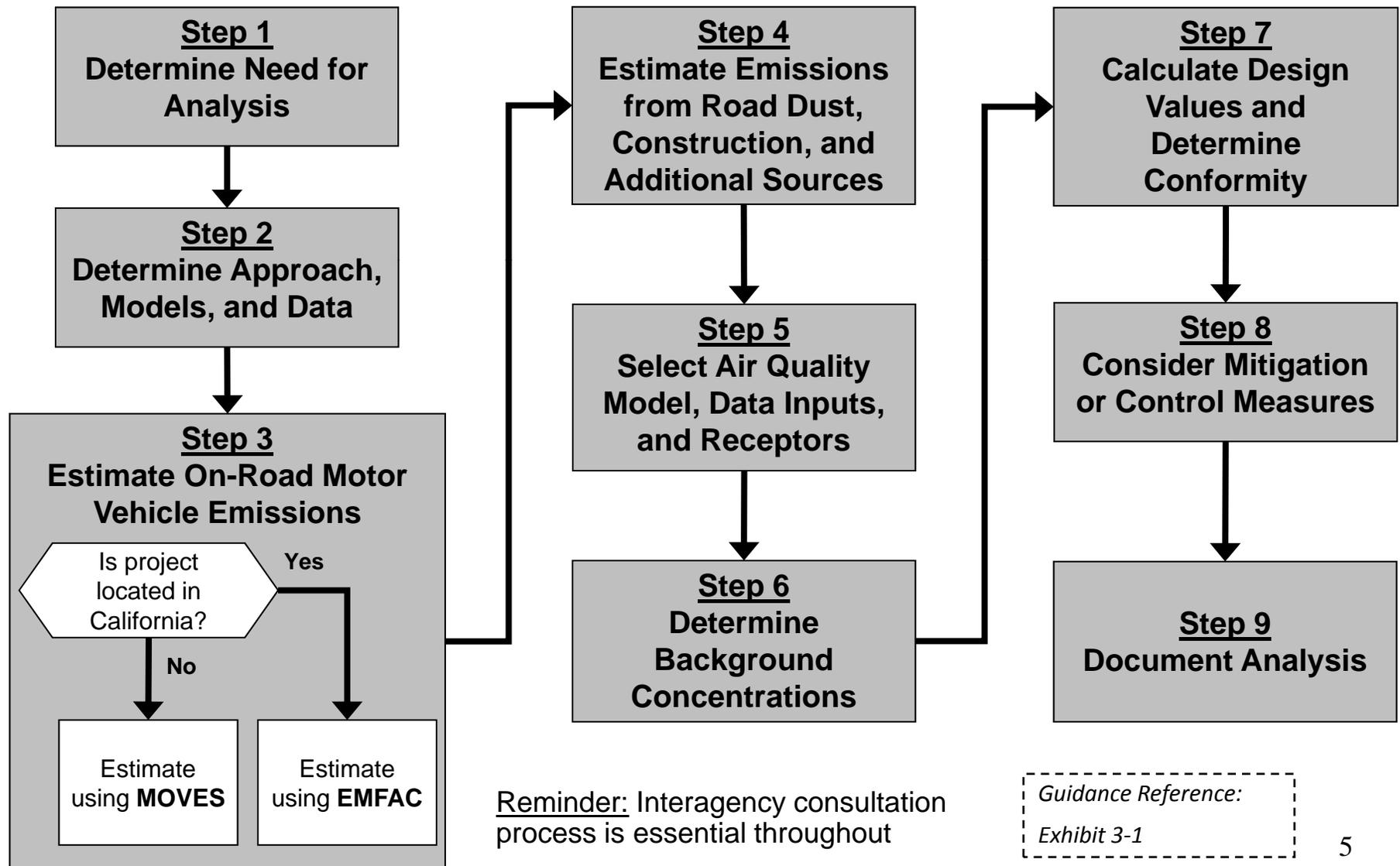




New EPA Guidance

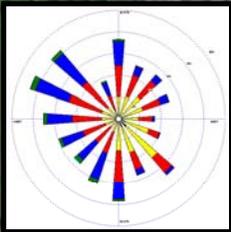
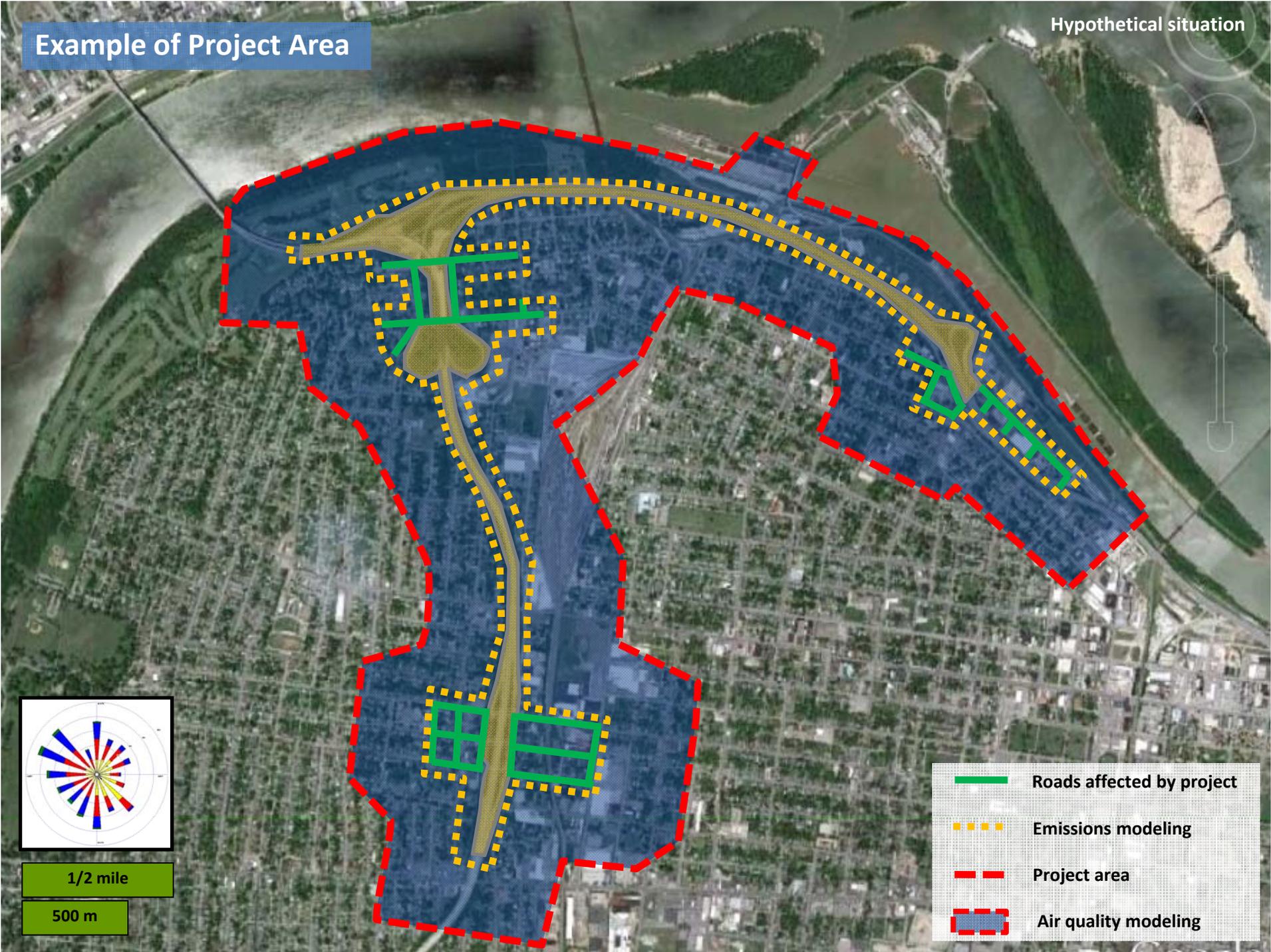
- On December 20, 2010, EPA released PM Hot-spot Guidance
 - » *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas*
 - » Quantitative PM hot-spot analyses required after December 20, 2012
- Technical guidance covers:
 - » Emissions modeling,
 - » Air quality modeling,
 - » Background concentrations,
 - » Design value calculations, and
 - » Mitigation/control measures
- Guidance is consistent with EPA's "Guideline on Air Quality Models" (40 CFR Part 51, App. W), PM NAAQS, SIPs, and other regulatory programs

Completing a PM Hot-spot Analysis



Example of Project Area

Hypothetical situation



1/2 mile

500 m

-  Roads affected by project
-  Emissions modeling
-  Project area
-  Air quality modeling

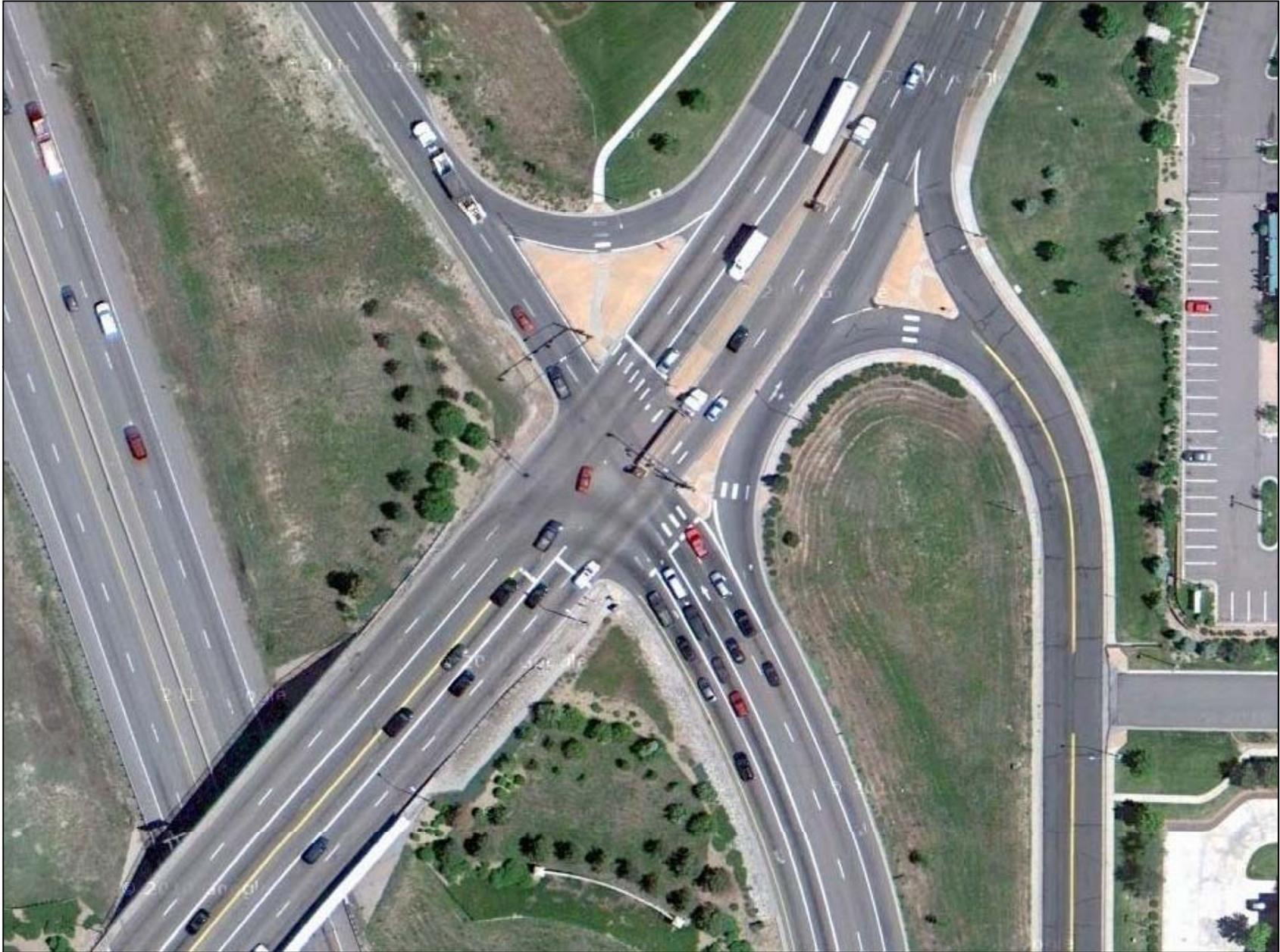


Emissions Modeling

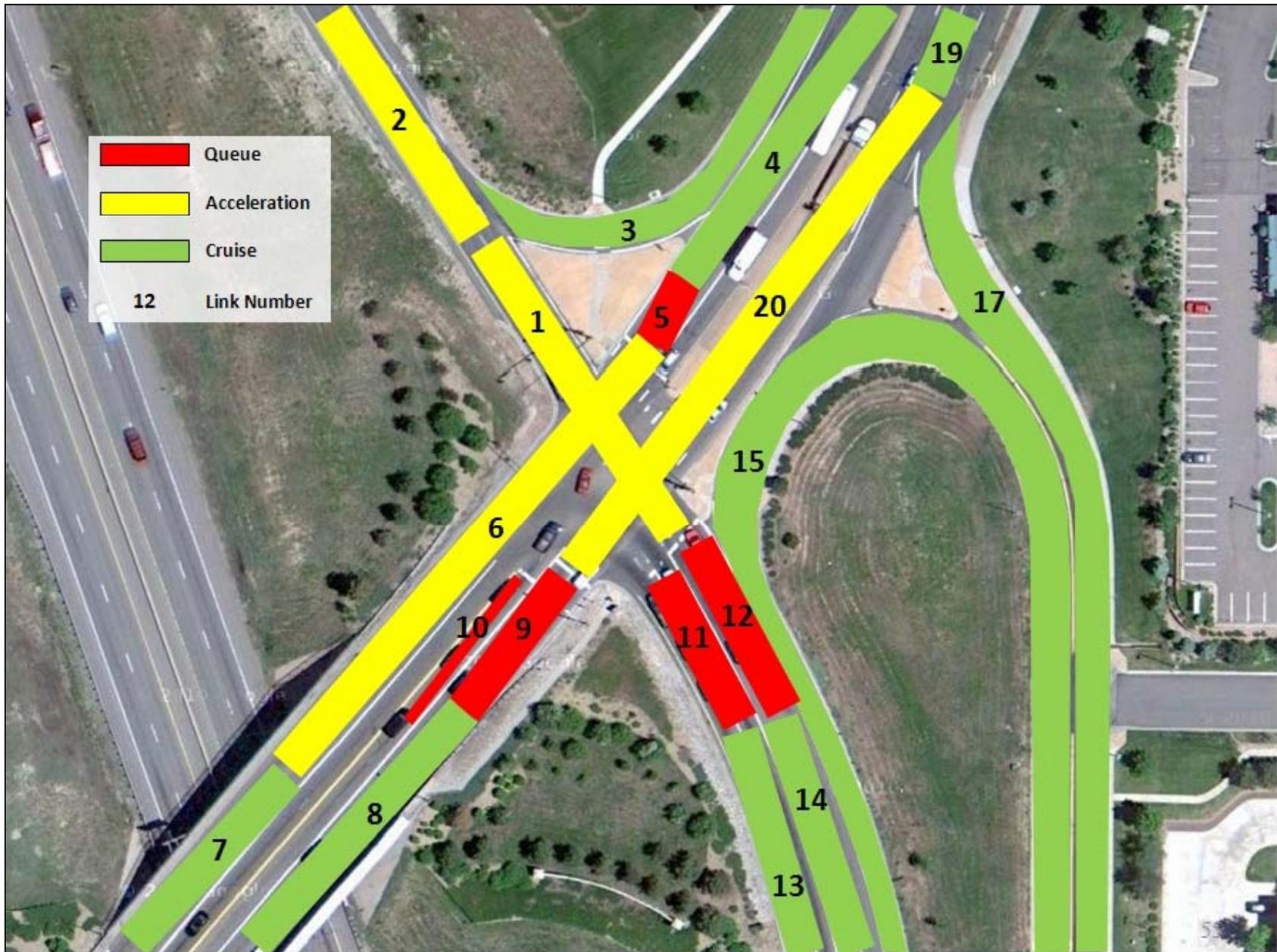
- Latest emissions models required (pending grace period)
 - » MOVES2010a
 - » EMFAC2007 in California
 - » For future model releases, EPA will explain how and when new models and revisions apply for PM hot-spot analyses
- Define a project's links in MOVES to accurately capture emissions where they occur and include segments with similar traffic/activity conditions and characteristics
- When applicable, complete emissions modeling for road and transportation-related construction dust (e.g., AP-42) or nearby sources affected by the project (e.g., locomotives at an expanded freight terminal)

Guidance Reference:
Sections 3.3.6, 3.5, 4,
5, & 6

Defining MOVES Links (with Average Speed)



Defining MOVES Links (with Average Speed)





General Overview of Air Quality Modeling

- Includes:
 - » Selecting the air quality model
 - » Characterizing emissions sources
 - » Obtaining meteorological data
 - » Specifying receptors in project area
 - » Running the AQ model
- PM Hot-spot Guidance is consistent with recommendations for AQ modeling in 40 CFR Part 51, App. W
- Project sponsors will need to refer to the latest user guides and available guidance for complete instructions

Guidance Reference:

Section 7



Selecting an Appropriate Air Quality Model

Type of Project	Recommended Model
Highway and intersection projects	AERMOD, CAL3QHCR
Transit, freight, and other terminal projects	AERMOD
Projects that involve both highway/intersections and terminals, and/or nearby sources	AERMOD

- Recommendations are consistent with EPA's current recommended models in 40 CFR Part 51, App. W, approved models on SCRAM
- CAL3QHC is not appropriate for modeling refined PM hot-spot analyses

Guidance Reference:
Exhibit 7-2 & Sec. 7.3.1



Types of Emission Sources

	Line Source	Point Source	Area Source	Volume Source
Different source types can be used in a hot-spot analysis to represent...	<ul style="list-style-type: none">Highways and intersections	<ul style="list-style-type: none">Bus garage or transit terminal exhaust stacks	<ul style="list-style-type: none">Transit or freight terminalsParking lotsHighways and intersections	
Model	AERMOD* CAL3QHCR	AERMOD	AERMOD	

*AERMOD can simulate line sources using a series of adjacent area or volume sources.

- For AQ modeling, physical characteristics and locations are assigned to the links developed for emissions modeling in MOVES
- Timing of emissions – use approach for MOVES runs in AQ modeling

Guidance Reference:
Sect 7.3.2, 7.4, App J.3.3-3.5



Selecting Meteorological Data and Placing Receptors for AQ Modeling

- Obtain representative meteorological data
 - » Use 5 years of representative off-site data (most common)
 - Alternatively, use at least 1 year of site-specific data (if available)
 - » Assess representativeness based on latest *AERMOD Implementation Guide*
- Receptor spacing should be of sufficient resolution to capture concentration gradients around the locations of maximum modeled concentrations
 - » Place receptors in locations public can access (e.g., sidewalks, neighborhoods, parks)
 - » Consider excluding locations where public cannot access (e.g., fenced private property, within right-of-way)
 - » Additional guidance for annual PM_{2.5} NAAQS
- Consistent with 40 CFR Part 51, App. W

Guidance Reference:

Sections 7.5 and 7.6



What Do Background Concentrations Include?

- Background concentrations are those emissions not from the project that also affect the project area
 - » From **nearby sources** and **other sources**
- **Nearby sources:** Individual sources other than the project that contribute to ambient PM concentrations in the project area; in general only included in AQ modeling when affected by the project
 - » Example: a port, rail yard, or intermodal terminal where emissions will increase as result of a highway project
- **Other sources:** Emissions not from project or any nearby source that is modeled
- State and local AQ agencies and EPA Regions are key resources

Guidance Reference:

Section 8.1



Calculating Design Values and Determining Conformity

- For conformity purposes, a “design value” is a statistic that describes future air quality concentrations in the project area that can be compared to a particular NAAQS
- Calculated by combining:
 - » Results of AQ model (project and nearby source concentrations) *with*
 - » Representative background concentrations
- Each NAAQS calculates design values differently
- Result of this step: design values for the project that are then used to determine if project conforms
- OTAQ has developed tips for calculating design values, including a MySQL script for the 24-hour PM_{2.5} NAAQS

Guidance Reference:

Sections 3.8 & 9



PM Hot-spot Training

- EPA and FHWA have developed a 3-day technical course that focuses on applying models for conformity PM hot-spot analyses:
 - » MOVES at the project scale (EMFAC in CA)
 - » AERMOD, and
 - » CAL3QHCR
- Course includes:
 - » Additional tools & tips
 - » Simple hands-on exercises to apply models
 - » “Example analysis” to demonstrate how models used in practice



For More Information

- See EPA's conformity website for:
 - » Regulations, policy guidance, FR notices, training
 - » www.epa.gov/otaq/stateresources/transconf/policy.htm#project

- See EPA's MOVES website for:
 - » Software, MOVES MySQL scripts, technical documentation, and other helpful background materials
 - » www.epa.gov/otaq/models/moves/

- Questions?
 - » Specific questions on a particular project analysis
 - Contact appropriate EPA Region or DOT field office
 - » General questions on PM hot-spot guidance and training
 - patulski.meg@epa.gov
 - » Technical questions about guidance document
 - conformity-hotspot@epa.gov