Georgia Department of Transportation
Office of Environmental Services
Environmental Procedures Guidebooks

Air & Noise

Air – Assessing Impacts

OBJECTIVE

Assessing air impacts will accomplish the following:

- Screen the project by funding, location, type, operational efficiency, and traffic volumes to determine the criteria pollutants and Mobile Source Air Toxics (MSATs) to be assessed;
- Predict the effects that the proposed project would have on air quality; and
- Demonstrate that the proposed project is consistent with federal and state air quality goals, found in the State Implementation Plan (SIP), the National Environmental Policy Act (NEPA), and the Georgia Environmental Policy Act (GEPA).

METHODOLOGY

Federal-aid projects require an air assessment addressing Clean Air Act (CAA) criteria pollutants and MSATs. Carbon monoxide (CO) and ozone (O_3) are the only criteria pollutants that may require a project level assessment. For state-funded projects, GEPA sets forth guidance on air quality and the air assessment focuses on CO and O_3. Each pollutant has its own methodology for assessing impacts.

Please note, effective October 24, 2016, all of Georgia is considered to be in attainment for particulate matter $(PM)_{2.5}$. As a result, this guidance provides no methodology for assessing $PM_{2.5}$.

CARBON MONOXIDE

The Air Specialist has several methods available to determine how the project will affect CO emissions. The first method requires information related to project type, traffic volumes, and/or level-of-service (LOS) estimates:

- Determine if the project adds capacity (including auxiliary or turn-lanes);
- Determine LOS for signalized intersections, evaluate those with an approach LOS of D, E, or F at or before the design year (20 years from the open or build year); and
- Screen design year traffic volumes to determine whether they exceed 10,000 vehicles per day (VPD).

If the project does not add capacity (including auxiliary or turn-lanes), there are no intersections with LOS D, E, or F at or before the design year, and design year traffic volumes do not exceed 10,000 VPD, then no further assessment needs to be conducted. The Air Specialist needs to document that the project would not increase traffic congestion or increase idle emissions and CO concentrations.

If a further assessment is needed, the Air Specialist can use one of two screening tools to determine if the full CAL3QHC CO Microscale Model needs to be run for the project.

Inputs to the screening tools and models are such that they would provide a "worst-case" analysis. The term "worst-case" is frequently used in air quality impact analyses. The approach is to use a set of "worst-case" conditions:

- Lowest realistic wind speed,
- Worst reasonable stability class (stability refers to a parcel of air's tendency to move upward or downward following a vertical displacement, stability class is the Pasquill Gifford Stability Class used to classify this tendency),
- Lowest reasonable temperature,
- Highest expected traffic volumes,
- Emissions associated with peak speeds, and
- Closest reasonable receptor locations.

If the "worst-case" concentration does not violate state and federal air quality standards, it can be reasonably assumed that under any future set of actual meteorological conditions, the actual air quality will be better than the standards.

GDOT's CO Georgia 2015 Screening Model

One screening tool is GDOT's CO 2015 Screening Model. It is based on FHWA-approved models used in Florida and other approved variations in Alabama and Colorado. The GDOT model was designed to be applied using conservative background concentrations and persistence factors. It uses Georgia-specific modeling input and is representative of local conditions. It is based on emission factors from the latest models (e.g. US Environmental Protection Agency's [EPA] Motor Vehicle Emissions Simulator [MOVES] 2014a), including increases in emission factors due to acceleration from the stop/idling condition to the maximum speed for the intersection, and provides options for road grade.

GDOT and FHWA developed a programmatic agreement for this screening model:

Programmatic Agreement for Project-level Air Quality Analysis for Carbon Monoxide – CO Georgia 2015 Screening Model

Federal Highway Administration and Georgia Department of Transportation, April 2017

Following the programmatic agreement, the Air Specialist can determine a "worst-case" intersection or interchange for the project. This intersection is chosen as the representative intersection for the project corridor, and the Air Specialist enters its information into the model. The model requires the following information for the worst-case intersection:

> Compiled and formatted signal cycle information,

> The hourly approach traffic volumes, or design hourly volumes (DHV),

> Approach speeds based on LOS, congestion or slower movement around the intersection, and

> Emission factors.

One limitation of this model is that the "worst-case" intersection must match one of the nine intersection configuration templates described in the model. If it does not match, the FHWA screening method described below or the full CAL3QHC CO Microscale Model must be run for the project.

The project passes the screening test if the highest one-hour CO concentration of the worst-case intersection is lower than the maximum allowable National Ambient Air Quality Standards (NAAQS). The NAAQS for CO is a one-hour level of 35 parts per million (ppm) and an eight-hour level of 9 ppm. If the intersection passes the screening test, then no further assessment is needed for the project.

If it fails the screening, then the Air Specialist must conduct the full CAL3QHC CO Microscale Model.

FHWA's 2017 CO Categorical Hotspot Finding Tool

Another screening tool is FHWA's 2017 CO Categorical Hotspot Finding Tool. FHWA developed this tool in consultation with the EPA and the Federal Transit Administration. It uses the latest version of the MOVES emission model, MOVES2014a. FHWA made this tool available in 2017 for use in place of an independent CO hot-spot analysis, for suitable projects. It is also useful for projects with intersections that do not match intersection templates provided in GDOT's CO Georgia 2015 Screening Tool.

FHWA prepared guidance material for using this tool:

2017 Carbon Monoxide Categorical Hot-Spot Finding Tool

Federal Highway Administration, July 2017

The model has several limitations. It does not accept traffic volumes over 2,640 vehicles per hour (VPH) for any one approach in the intersections analyzed, it cannot study intersections with more than 4 through lanes or more than 2 turn lanes, and may not be used for intersections with LOS F. If the intersection meets one of these conditions, then either the CO Georgia 2015 Screening Tool described above or the full CAL3QHC CO Microscale Model must be run for the project.

The tool determines if all traffic data values for the project intersection analyzed for CO are within the acceptable range of modeled parameters for the CO categorical hot-spot finding. Projects meeting the finding's parameters would not produce a CO concentration higher than what was modeled and, when combined with background concentrations, would not violate the NAAQS for CO. If it meets these parameters, then no further assessment is needed for the project.

If it fails these parameters, then the Air Specialist must conduct the full CAL3QHC CO Microscale Model.

Full CAL3QHC CO Microscale Model

The CAL3QHC microscale model combines the California Line Source Model (CALINE3) developed by the California Department of Transportation, with an algorithm for estimating queue lengths at signalized intersections. The CALINE3 and CAL3QHC models are accepted by the EPA and FHWA as techniques for assessing the air quality impacts that may occur from the operation of motor vehicles on roadways.

The model is based on GDOT Rate Tables using MOVES. Emission levels are calculated per the following site-specific criteria:

- Road grade,
- Vehicle mix,
- Design year,
- Road type, and
- Speed.

Other inputs to the model include temperature, wind speed, mixing cell height (the elevation of the boundary between the vertically mixed layer of air closest to the earth's surface and the relatively stable layer of air above), and surface roughness.

Peak AM or PM hourly traffic volumes are used as the worst-case conditions for the one-hour analysis.

The assessment should also incorporate a background CO concentration. This is the concentration immediately upwind of the source. A background CO concentration of 1 ppm should be added for rural areas, 2 ppm for suburban areas, and 3 ppm for urban areas. The background CO concentration is added to the air quality dispersion modeling results.

Receptor locations are also identified to calculate pollutant calculations. These locations should represent the closest places where the public is likely to be present, but they must be located outside of the mixing zone width of modeled segments. Sensitive receptors, defined as hospitals, nursing homes, schools, and other institutional facilities, are also considered by the model.

The results of the microscale analysis should demonstrate that CO concentrations would not exceed state for federal air quality standards through the predicted design year traffic estimates. It should conclude that the project is consistent with region wide air quality goals and is consistent with the SIP for air quality.

OZONE

The CAA requires Transportation Plans and Transportation Improvement Programs (TIP) in areas not meeting the NAAQS to conform to the emissions budget of the SIP for air quality. For projects within the non-attainment area or a maintenance area for O_3, inclusion in a conforming plan serves as an assessment, or project-level analysis, of O_3.

The Air Specialist will need to document the following information from the five-year conforming plan:

- The agency that developed the plan (e.g. the Atlanta Regional Commission),
- The date the agency adopted the plan,
- The date the agency received a conformity determination from the US Department of Transportation, and
- The reference number used to identify the project within the plan.

If the project is not in the conforming plan, the plan must be amended to include the project. The GDOT Air Specialist or Project Manager will need to coordinate with the GDOT Office of Planning and agency officials to obtain an amendment. The project reference number from the amendment will need to be documented once the amendment is adopted.

For projects outside of O_3 non-attainment or maintenance areas, no assessment of this criteria pollutant is required. The Air Specialist must document that the project is in an area of the state that is in attainment for O_3.

MOBILE SOURCE AIR TOXICS

Only federal-aid projects should be analyzed for MSATs. FHWA has developed a three-tiered approach for analyzing MSATs based on the example projects defined within its guidance document:

Updated Interim Guidance on Mobile Source Air Toxic Analysis in National Environmental Policy Act Documents

Federal Highway Administration, October 2016

With this guidance, the Air Specialist will screen the project based on type and traffic volumes to determine which approach is appropriate.

The three tiers include:

- No analysis for *projects with no potential for meaningful MSAT effects*;
- Qualitative analysis for *projects with low potential MSAT effects*; and

- Quantitative analysis to differentiate alternatives *for projects with higher potential MSAT effects*.

Projects with No Potential for Meaningful MSAT Effects

Projects in this category include:

- Projects qualifying as a Categorical Exclusion (CE) under 23 CFR 771.117;
- Projects exempt under the CAA conformity rule under 40 CFR 93.126; and
- Other projects with no meaningful impacts on traffic volumes or vehicle mix.

For projects qualifying as CEs or exempt under CAA, no analysis of MSATs is necessary. For other projects with no or negligible traffic impacts, no MSAT analysis is recommended. However, Air Specialist must document the basis for the determination with a brief description of the factors considered. Appendix A of the FHWA guidance includes appropriate language for this discussion.

Projects with Low Potential MSAT Effects

This category includes a broad range of projects, including those that serve to improve the operations of highway, transit or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase emissions.

The Air Specialist will conduct a *qualitative* assessment of emissions projections. According to FHWA guidance, the assessment consists of a narrative that describes the project's expected effect on traffic volumes, vehicle mix, and/or traffic routing. It then describes the associated changes in MSATs for the project alternatives, based on vehicle miles travelled, vehicle mix, and speed. The narrative will also include national trend data that projects the substantial overall reductions to emissions due to stricter engine and fuel regulations issued by the EPA. Appendix B of the FHWA guidance includes specific examples of appropriate language for this assessment.

Examples include:

- Minor widening projects;
- A new interchange connecting an existing roadway with a new roadway;
- A new interchange connecting new roadways; and
- Minor improvements or expansions to intermodal centers or other projects that affect truck traffic.

The language should be modified to reflect project-specific information to include in the narrative.

The narrative will also include a discussion of information that is incomplete or unavailable for a specific assessment of MSAT impacts. It should discuss how current scientific techniques, tools, and data are not sufficient to accurately estimate human health impacts from transportation project in a way that would be useful to decision-makers. Appendix C of FHWA's guidance offers appropriate language for this discussion.

Projects with Higher Potential MSAT Effects

According to FHWA guidance, projects in this category meet a two-pronged test:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, involving a significant number of diesel vehicles for new projects or accommodating with a significant increase in the number of diesel vehicles for expansion projects; or
- Create new capacity or add significant capacity to urban highways such as Interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the annual average daily traffic is projected to be in the range of 140,000 to 150,000 or greater by the design year; and
- Be proposed to be located in proximity to populated areas.

Projects falling in this category will require a *quantitative* analysis of MSATs. Per FHWA's Interim Guidance, the Air Specialist should contact the Office of Natural and Human Environment (HEPN) and the Office of Project Development and Environmental Review (HEPE) in FHWA Headquarters for assistance in developing a specific approach for assessing impacts. FHWA's Georgia Division and Headquarters will guide the quantitative analysis. In general, the Air Specialist develops a methodology, based on travel demand and road network, and then coordinates it through OES's Air and Noise Section Manager for review and approval.

Once the methodology is approved, then the MSATs model is run for the quantitative analysis using MOVES software, or a product that incorporates MOVES.

The quantitative analysis will forecast local-specific emission trends of the priority MSAT for each alternative. The analysis may also address the potential for cumulative impacts, where appropriate, based on local conditions. How and when cumulative impacts should be considered would be addressed as part of this assistance. The analysis will also include relevant language on unavailable information, as offered in Appendix C of FHWA's guidance.

If the quantitative analysis indicates meaningful differences in MSAT levels between the alternatives, mitigation options should be identified and considered. Appendix E of FHWA's guidance offers information on mitigation strategies.

Guidebook Revision History

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Initial Publication	All	5/22/2019
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