

DEVELOPMENT OF A FLORIDA-SPECIFIC, MOBILE6-BASED CO SCREENING MODEL FOR AIR QUALITY ANALYSES OF TRANSPORTATION PROJECTS

PROBLEM STATEMENT

A large number of motor vehicles idling near or traveling through a large intersection, in concert with adverse meteorological conditions, can produce concentrations of CO near that place that may exceed federal air quality standards. Federal Highway Administration (FHWA) and Florida Department of Transportation (FDOT) rules require that state or federal roadway projects be assessed for potential air quality impacts via a project-level CO analysis. Therefore, carbon monoxide (CO) modeling studies precede proposed highway transportation projects, in order to ensure that the projects will not adversely impact air quality.

For several years, FDOT has used a computerized screening model (COSCREEN98) to assess potential CO impacts. However, this model became outdated when EPA published MOBILE6, and it needed to be replaced. A computerized screening model can save FDOT a great deal of time and effort for each intersection that is analyzed, and, considering all the intersections that must be analyzed in any given year, a great deal of money (e.g., through saved employee time or reduced consultant fees).

OBJECTIVES

The main objective of this project was to develop a replacement for the outdated model, COSCREEN98. The new model had to incorporate the latest versions of MOBILE6 and CAL3QHC (EPA-approved software that must be used for detailed mobile source air quality modeling). Other objectives were to make the model quick, easy to use, adaptable to several different types of intersections, applicable to all the various regions of Florida, and aesthetically pleasing to use.

FINDINGS AND CONCLUSIONS

In federal or state roadway projects, intersections affected by the project must be analyzed for CO impacts. Large intersections may have significant impacts and must be assessed using the latest EPA- and FHWA-approved software (such as MOBILE6.1/6.2 and CAL3QHC). A computerized screening model that incorporates the latest software allows for a quick and easy initial assessment, and for screening out those intersections that are too small (that is, too few cars pass through them) to have a significant CO impact. With modern, cleaner cars, even large intersections may be screened out by these screening techniques.

The developed screening model works for all Florida intersections by using conservative assumptions and built-in inputs to run a quick model of a closely related “standardized” intersection

in order to make a “worst-case” assessment. If the worst-case model does not predict a violation of standards, then it can be assumed that a more detailed realistic model will not predict a violation either. The big advantage of the screening model is that it is much quicker than a detailed approach (i.e., minutes versus days).

If the intersection passes the screening test, nothing further needs to be done; if the intersection fails the screening test, then a more detailed assessment is required. A detailed assessment requires using actual intersection geometry, making actual traffic predictions for all legs of the intersection, and running MOBILE6 and CAL3QHC independently, and this process may take several person-weeks of effort for one complicated intersection. Several states now have screening models, some of which were developed by the research team at UCF. Both EPA and FHWA have accepted these screening models for use in the impact assessment process.

In this project, a modern updated screening model was developed for FDOT for use throughout the state of Florida. Written in Visual Basic, it executes within a few minutes with minimal user input, and produces CO predictions for a variety of intersection types, including a diamond interchange. It is called CO Florida 2004 (COFL2004). It provides greater flexibility and more features than the old screening model but remains very quick and easy to use. The new model has many beautiful and significant photos and graphics for the state of Florida. The modeling is still done using an embedded MOBILE 6.1/6.2 model and an embedded CAL3QHC (version 2) model with pre-set FDOT-approved input scenarios and parameters appropriate to screening analysis. A new report page has been designed to let the user view all the inputs and outputs on one page, and it includes the summary statement that the intersection passes the screening test at the very bottom of the page (If the intersection fails the screening test, an appropriate message is printed telling the user that a detailed modeling study must be performed.). It is expected that this new model will perform well for the FDOT and result in a considerable amount of saved time, effort, and money over the next several years.

BENEFITS

Before state or federal roadways projects can proceed, an air quality analysis is required. COFL2004 is a computerized CO screening test that provides engineers and planners a quick and easy way to screen out those projects that have little or no impact and, thus, to save their efforts for those facilities that may have significant impact on environmental quality.

The new version of COFL2004 is currently being use, and it is already saving FDOT thousands of hours of personnel time and many tens of thousands of dollars in consulting fees as a result of the reduced effort needed to analyze potential air quality impacts near roadway intersections.

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