Florida Department of Transportation Research

Assessing Air Quality Impacts of Managed Lanes
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Researchers at the National Center for Transit Research, University of South Florida, recently studied a segment of I-95 between Ft. Lauderdale and Miami to investigate the impacts of high-occupancy/toll (HOT) lanes on air quality. The project simulated the conversion of one single high-occupancy vehicle lane into two HOT lanes in each flow direction. HOT lanes are expected to reduce roadway congestion, allowing high-occupancy and transit vehicles to experience largely unimpeded flow, while generating revenue from tolls on other users.

The overall goal of the project was to help researchers understand potential impacts of managed lanes on air quality and bus transit, and to improve methods for determining those impacts. First, researchers assessed baseline air quality by compiling local air quality information from two data sources: local and state air monitoring reports, and the federal air quality data system.

Next, researchers used a transportation corridor micro-simulation model (CORSIM) to estimate changes in corridor speed performance and pollutant emissions by simulating traffic flow before and after implementation of the HOT lanes. Emissions were estimated using emissions factors calculated with the EPA's MOBILE6.2 model.

Finally, to estimate the impacts of the I-95 HOT lanes on air quality, researchers estimated changes in ambient concentrations of emitted pollutants using the AERMOD atmospheric dispersion model, a steady-state Gaussian plume model developed by the EPA and the America Meteorological Society.

Through simulation studies, researchers found that corridor speeds improved after implementation of the HOT lanes, particularly the northbound lanes during afternoon peak hours. Bus travel times, in particular, were reduced by nine minutes on average. Estimated emissions changes were small in magnitude and mixed in direction. Compared with the baseline, researchers estimated small increases in carbon monoxide, nitrogen dioxide, particulate matter, and benzene emissions. Conversely, small decreases in total hydrocarbon emissions were found. Emissions from buses, specifically, were estimated to decrease as a result of HOT lane implementation for all pollutants studied. However, uncertainties in two factors, the vehicle volume change resulting from the HOT lane implementation and the response of emissions factors to corridor speed changes, lead to substantial uncertainty in estimated emissions changes.

High occupancy/toll (HOT) lanes (far left) on I-95

Researchers simulated slightly higher ambient concentrations of studied pollutants emitted from the corridor (specifically carbon monoxide, nitrogen oxides, and benzene) throughout much of the study area after implementation of the HOT lanes. Decreases in ambient concentrations near the northern end of the corridor were also found, due to changes in the spatial distribution of emissions. The largest differences were estimated near the corridor, which could be important for populations living nearby. Overall, researchers estimate that changes in both emissions and concentrations were small, indicating only small expected impacts of the HOT lane project on air quality.

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