



Florida Department of Transportation Research

Commercial Heavy Vehicle Impacts on Signalized Arterial Corridor Performance

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Current Situation

A changing population, economy, and business practices have led to significant increases in commercial truck traffic on urban roads in Florida. Arterial corridors that are heavily used by commercial vehicles often suffer from poor operational performance, either because their designs did not consider current levels of commercial truck traffic or the analysis on which the design was based did not properly account for the effect of commercial vehicles. The Highway Capacity Manual (HCM) provides a commonly used method for analysis of arterial corridors, but it does not properly account for the full vehicle dynamics of heavy vehicles.

Research Objectives

University of South Florida researchers used microsimulation to model the acceleration and deceleration of heavy vehicles and more accurately predict their impact on traffic flows.

Project Activities

The HCM method for analysis of arterial corridors underestimates the impact of heavy vehicles on traffic flows. Also, it does not take into account the slower gear-changing capabilities of trucks in its deterministic and analytic methodology; therefore, it does not account for powertrain characteristics (engine and transmission characteristics) and resistance forces that provide more accurate vehicle acceleration modeling. In a series of tasks, the researchers addressed this shortcoming using microsimulation.

After the literature review was completed, the researchers began recording traffic at four consecutive intersections on corridors in Tampa, Gainesville-Starke, Jacksonville, and Miami. Video taken at each site confirmed a significant percentage of commercial trucks in the traffic flows. From the video, six traffic parameters were derived: average speed, average stopped delay, average queue length, saturation flow rate, stop rate, and signal timing offset. These data were used in the simulation task to calibrate the microsimulation.

Once calibrated, the microsimulation tool was used with a number of scenarios, which were tested using both microsimulation and the HCM calculations. A number of road geometries were considered, representing a wide variety of traffic, roadway, and control characteristics. From these, five were selected for simulation and comparison with HCM results. Then, a range of roadway grades, traffic demands, and truck percentages were selected, yielding 36 scenarios for each geometry. A total of 180 scenarios were simulated.

As expected, HCM calculations produced higher running speeds than the simulation because the simulation accounts explicitly for roadway grade and truck percentage in the traffic flow. HCM estimates of running time increasingly exceeded the simulation's estimates as grade and truck percentage increased.

Project Benefits

With Florida's heavy traffic that includes heavy freight traffic, improved models of arterial flow can lead to better traffic controls and improved operation of Florida arterials.

For more information, please see dot.state.fl.us/research-center.



In Florida, heavy trucks are a common sight. They have a greater impact on traffic than traditional models show.