



## Florida Department of Transportation Research

### Estimation of Capacities on Florida Freeways

BDV32-977-03

The capacity of Florida's highways is constantly being evaluated, with an eye to future needs. Capacity is estimated with the assistance of planning tools and then used by engineers in other tools to design and prioritize projects.

Capacity values are used to estimate travel time reliability of highways, based on the Highway Capacity Manual (HCM), revised by the Transportation Research Board in 2010. The HCM provides guidance for analysis and estimation of capacity on many types of highway facilities. The HCM is an important source of information, but it must be assessed against local conditions, and its underlying data and methods are subjects of continuing research. For example in Florida, field data have shown that freeway capacities are noticeably lower than the values recommended in the HCM and that maximum throughput may vary in ways not predicted in the HCM.

In this project, University of Florida researchers collected field data at several urban and rural freeway and multilane locations in Florida in order to measure capacity flows and to provide recommended capacity values before and after initiation of oversaturation, or breakdown, when traffic demand begins to exceed highway capacity. Initiation of oversaturation is indicated by a noticeable drop in average vehicle speed.

Researchers obtained urban freeway data from STEWARD (Statewide Transportation Warehouse for Archived Regional Data), a central data repository maintained by the Florida Department of Transportation (FDOT). The data represented various types of bottlenecks, including merge junctions and weaving segments, as well as geometric bottlenecks, such as lane drops. Rural freeway and multilane highway data were obtained from FDOT's permanent count stations. Incidents and weather data were obtained to ensure that the final datasets included capacity observations due to excess demand and not due to random events such as incidents or bad weather.



*Understanding highway capacity is critical to planning efficient highways.*

Based on the literature review, six definitions of capacity were considered: breakdown flow; maximum 1-minute pre-breakdown flow within 15 minutes; maximum 5-minute pre-breakdown flow within 15 minutes; average 5-minute pre-breakdown flow; average 15-minute pre-breakdown flow; and average discharge flow. Values for these measures of capacity were derived from field data, where available, and categorized on the basis of highway configuration.

From the capacity measures investigated, the researchers recommended defining pre-breakdown capacity as the 85th percentile of the 15-minute average pre-breakdown flow and the post-breakdown capacity as the average discharge flow. These measures showed the drop in throughput most clearly. They also proposed revising density thresholds for defining Level of Service (LOS) on various types of highway segments corresponding to the recommended capacity values.

As Florida and its highways continue to grow, planning tools supported by the most accurate data are essential to make sure that limited resources are distributed most effectively.

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For more information, visit <http://www.dot.state.fl.us/research-center>