



Florida Department of Transportation Research Impact of Lane Closures on Roadway Capacity, Phase 2 BDK77-977-18

Maintenance or construction on two-lane roads often requires setting up a work zone which closes one lane and uses the other for both traffic directions. Workers posted at each end of the work zone allow traffic to flow alternately one way and then the other, often causing delays for drivers. There are no national standards for the design, operation, and impact of work zones, and the Florida Department of Transportation (FDOT) has commissioned studies to address this issue.

In a previous project (BD545-61), University of Florida researchers developed a simulation program, FlagSim, based on major factors that influence work zone performance measures for lane closures on two-way, two-lane roads. They also developed methods to estimate traffic diversion from the work zone. In this project, the same team advanced their work by calibrating FlagSim with field data, also addressing the effect of grade on work zone performance and updating the estimation of traffic demand in work zones.

To collect field data, researchers identified three lane closure sites in North Central Florida. Video was collected at these work zones using a stationary camera and a vehicle equipped with a dash-mounted video camera. Video footage was analyzed for data, including times when flaggers changed their signs, vehicle types, work zone travel times, vehicle speeds, number of vehicles per phase, queue length, and others.

Calibration consisted of setting initial driver parameters in FlagSim to values consistent with field data and other sources. Many simulations using varied input conditions yielded average work zone travel speeds and average saturation headways, which were then compared to field values. Tuning input parameters over many iterations of this process resulted in calibration.

Video analysis data were also used to calibrate FlagSim for the effect of grade on work zone performance. Vehicles were categorized as



Work zones on Florida's many two-lane roads must be carefully designed to minimize impacts on drivers.

passenger cars or small, medium, or large trucks. FlagSim's full vehicle dynamics component takes into account physical and drivetrain characteristics of vehicles, and is able to determine the power available to accelerate the vehicle at every time step in the simulation. This capability allows FlagSim to account for roadway grade, which has an important effect on truck travel time in a work zone.

In designing work zones, the capacity of the work zone is compared with the estimated hourly demand to determine the times of day that a lane can be safely closed. When a work zone is in place, drivers who normally use the route can be divided into those who choose alternative routes and those who do not. The percentage of drivers represented by the latter is the remaining traffic factor (RTF), which was estimated in the previous project using discrete choice modeling and a binary Logit model. In this project, the approach was refined by calibrating RTF to field data.

This project increased the sophistication, accuracy, and usefulness of the work zone design program FlagSim. This advancement will help planners design work zones with less delay for drivers, helping to maintain the efficiency of Florida's extensive network of two-lane roadways for the many drivers who rely on them.