



Florida Department of Transportation Research

Merging Taper Lengths for Short Duration Lane Closures

BDK51

Maintenance activities on public roadways often require lane closures. To ensure worker and traveler safety, advance warning signs, marker cones, and lighted merge indicators direct traffic into open lanes. While minimum requirements for temporary traffic controls are set by the *Manual on Uniform Traffic Control Devices (MUTCD)*, the Florida Department of Transportation (FDOT) sets the standards on Florida highways. They provide guidance for typical activities, leaving specifics to agency judgment.

Activities such as changing the lamp in a traffic signal can take 15 minutes or less; setting up cones and mobile signage can take longer and expose workers to more risks than the repair operation itself. FDOT permits simpler controls when work operations require one hour or less and other criteria are met, but taper length for merging is still guided by the MUTCD. So, utilities asked FDOT to allow shorter taper lengths for brief operations to shorten setup times and reduce the gear and vehicles needed.

Researchers at the Texas Transportation Institute studied the effect of varying taper lengths on driver behavior under conditions permitting simplified traffic controls. Studies in Broward, Orange, and Hillsborough counties were conducted in two phases. Data from both phases were used to develop measures of effectiveness (MOE), such as lane distribution, percent of vehicles occluded, percent of vehicles trapped in the closed lane, and vehicle acceleration/deceleration.

First, researchers measured safety and operational impacts of different taper lengths during

operations of 15 minutes or less, based on FDOT Standard Index 613. A randomized treatment order for each combination of speed limit and number of lanes open compensated for fluctuating traffic volumes. All observations were made during the day under dry pavement conditions.

Speed and deceleration of vehicles in the closed lane were captured using LIDAR (Light Detection and Ranging; a laser-based method). Video captured lane choice. Data collection methods permitted behavior profiles of individual vehicles.



Utility operations, like relamping, take less than 15 minutes and may not warrant temporary traffic controls.

Second, the same operations as in phase one were conducted as mobile operations, and the safety and operational impacts were evaluated. No merging taper was set up, but utility trucks were equipped with warning lights. The trucks are larger than many vehicles on the road and therefore visible to approaching traffic. Lane choice, vehicle occlusion, and trapped vehicles were recorded manually or captured using mechanical counters.

Based on the study findings, researchers recommended that work operations that last more than 15 minutes utilize a merging taper length that meets MUTCD requirements. In addition, operations that last 15 minutes or less can be accommodated as mobile operations without creating frequent operational or safety problems upstream of the work vehicle, if certain conditions are met. The researchers also recommended the use of advance warning signs, but further research may be needed to determine the optimal number of signs.