Title: Work Zone Effects on Performance of Toll Plaza

No-lane closure workzone is typical during the construction of open road tolling lanes of a toll plaza. The influence of no-lane closure on toll plazas’ performance is unknown because very few studies have been conducted to address this topic. The open road tolling (ORT) has become the new trend of operating an efficient toll plaza. So, the upgrading of a toll plaza from gated E-pass to open road E-pass has become common. The better the toll plaza authority knows about the influence of this construction and congestion effects, the better it can serve the customers. This project mainly deals with the effects of no-lane closure workzone on the toll plaza performance, and with the collected data, a model was developed predicting 15 minutes throughput and queue length. To better study the workzone impact on toll plaza performance, three sites with different characteristics were selected. They are Lake Jesup Mainline Plaza along the Seminole Expressway (SR-417), the Beachline West Expressway Toll Plaza along the SR-528 and Conway toll plaza along the Holland East-West Expressway (SR-408) in Orlando area of Central Florida. Data preparation includes demand, throughput, processing rates, and queue lengths of different toll categories. Data was collected during peak period for before and during the no-lane closure construction (phase 1) at SR-528 and Lake Jesup toll plaza at SR-417, and middle lane construction (phase 2) and after opening ORT lanes (phase 3) at Conway toll plaza at SR-408. Comparisons were conducted between non-construction stage and construction stage for non-lane closure workzone effects study using data from 417 and 528, and comparisons between middle-lane-construction and complete of construction stage for ORT impact study using data from 408. Analysis results showed that when the toll plaza is operating at or close to its capacity, the no-lane closure workzone can have a negative impact on its performance. But when the toll plaza’s demand is lower than the capacity, the no-lane closure workzone has no impact at the toll plaza’s performance. And the ORT lanes have a positive influence on the capacity and throughput of the toll plaza. After the impact of no-lane closure workzone on toll plaza has been analyzed, all the data from three toll plazas are put together and a model is built using the variables of Demand/Capacity ratio, percentage of each category of vehicles, E-pass, Automatic or Manual, number of Manual lanes, workzone or no-workzone. Throughput and Queue length can be predicted by this model.

Major: Transportation

Educational Career:
Bachelor’s of Transportation Engineering, BS, 2007, Tongji University

Committee in Charge:
Dr. Essam Radwan, Chair, Civil, Environmental & Construction Engineering
Dr. Mohamed A. Abdel-Aty, Civil, Environmental & Construction Engineering
Dr. Jack Klodzinski, Florida’s Turnpike Enterprise

Approved for distribution by Dr. Essam Radwan, Committee Chair, on October 20, 2009.

The public is welcome to attend.