Announcing the Final Examination of Alexander Navarro for the degree of Master of Science

Time & Location: July 1, 2014 at 3:00 PM in Engineering II 211P
Title: An Analysis of Flashing Yellow Arrow Signal Control at Intersections with a Varying Number of Opposing Thru Lanes

The Flashing Yellow Arrow Left Turn signal is quickly becoming prominent in Central Florida as a new method of handling left turns at traffic signals. While the concept of a protected-permitted left turn is not groundbreaking, the departure from the typical display of a five-section signal head is, for this type of operation. The signal head introduced is a four-section head with a flashing yellow arrow between the yellow and green arrows. With this signal head quickly becoming the standard, there is a need to re-evaluate the operational characteristics of the left turning vehicle and advance the knowledge of the significant parameters that may affect the ability for a driver to make a left turn at an signalized intersection.

With previous research into the behavioral and operational characteristics of the flashing yellow arrow conducted, there is more information becoming available about the differences between this signal and the previously accepted method of allowing left turns at an intersection. The protected-permitted signal is typically displayed at an intersection with up to two thru lanes and generally a protected signal is installed when the number of thru lanes increases above two unless specific criteria is met. With the advent of larger arterials and more traffic on the highway networks, the push to operate these intersections at their maximum efficiency has resulted in more of these protected-permitted signals being present at these larger intersections.

The core of the research that follows is a comparative analysis of the operation of the intersection with larger geometry to that of the smaller geometry. The parameters of the left turn movement were examined through means of collecting, organizing and analyzing just over 68.5 hours of field data. This research details the generation of a simulation model using Synchro, a traffic simulation package, and regression models using field driven data to predict the number of left turns that can be made in the permitted face under specific operating parameters. Intuitively, a larger intersection will not allow for as many permitted lefts as a smaller intersection with all conditions remaining the same. The conclusions drawn from this analysis provide the framework to understanding the similarities and the differences that are encountered when the intersection geometry differs and help to more efficiently manage traffic at signalized intersections.

The work of this field promises to enhance the operations of the left turning movement for traffic control devices. With an understanding of the statistical models generated, a broader base of knowledge is gained as to the significant parameters that affect a driver's ability to make the left turn. A discussion of the statistical differences and between the models generated from the small and large geometry intersections is critical to drive further research into standards being developed for the highway transportation network. The exploration of specific parameters to predict the number of permitted left turns will yield results as to if there is more to be considered with larger intersections moving forward as they become a standard sight on the roadway network.

Major: Civil Engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 2012, University of Central Florida

Committee in Charge:
Essam Radwan, Chair, Civil, Environmental, and Construction Engineering
Hatem Abou-Senna, Civil, Environmental, and Construction Engineering
Mohamed Abdel-Aty, Civil, Environmental, and Construction Engineering
Approved for distribution by Essam Radwan, Committee Chair, on June 12, 2014.

The public is welcome to attend.