In the United States, there are two schemes of operating traffic signal controls for permitted protected left turns (PPLT) namely the traditional five-section head system (known as Dog-House) and the flashing yellow arrow system (FYA). Past studies have agreed that these controls lead to decrease the average delay per left turn vehicle, decrease the protected green time, increase the left turn capacity, and enhance the intersection overall operation.

The flashing yellow arrow (FYA) has been approved by the Federal Highway Administration as the national standard for the PPLT operations at signalized intersections. So, the Florida Department of Transportation also approved this new system and they are extensively replacing the traditional system with the new system on the area of Central Florida (Lin, et al, 2010). Both these systems have been used for a long time and there are some studies that evaluated these systems but there are limited number of projects that evaluated and/or compared between the two PPLT systems from the operational perspective.

The main goal of this research is to study the characteristics of traffic operations and evaluate the effectiveness of the conversion from five-section head signal to the FYA treatments at 13 intersections located in Orlando, Florida. To reach this goal, detailed data collection efforts were conducted at 13 selected intersections in the central Florida area and appropriate statistical tests were conducted using the Minitab 17 Software. Statistical tests were attempted to fit different new regression models that correlate delay and left turn volumes as response variables against a set of independent variables that included permitted green time, opposing volume, percent of truck, time gap, speed, and land use type. In addition to fitting the data to regression models, these models were also analyzed for the purpose of detecting any significant differences between the five-section head treatment and FYA treatment.

The statistical differences of converting the five-section head system to FYA system were discussed. The results in this thesis agreed with some of the previous studies and did not agree with others. In general, the flashing yellow arrow system was found to enhance the intersection operation, increase the number of left turn vehicles, and reduce the delay. Also, some suggestions and recommendations were made based on this study results.

Major: Civil Engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 2010, Qassim University

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 16, 2014.

The public is welcome to attend.