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December 1, 2011

Federal Highway Administration
1200 New Jersey Avenue, S.E., HOTO-1
Washington, DC 20590

Experimentation Request: 4(09)-13 (E) Yellow LED Border on Ped Signal – Caltrans

Thank you for your August 8, 2011 response providing conceptual approval to experiment with a modified pedestrian signal head that includes a yellow LED border. We feel that the additional information provided by the yellow border will benefit both vehicular traffic and pedestrians. The experiment would attempt to determine whether this modification, displayed from when a pedestrian call has been made until the pedestrian phase has ended, improves the yielding behavior of motorists turning left and right through the crosswalk.

As noted in your response, the next step in the experimentation process is to submit a fully developed evaluation plan to FHWA for review and approval. The following sections of this correspondence will provide background for the experiment and describe the plan to assess the effectiveness of the modified pedestrian signal head.

Problem Identification

Item No. 1: Vehicle-Pedestrian Conflicts

It is not uncommon to witness conflicts between vehicular traffic making right turns and pedestrians using the adjacent crosswalk at busy urban intersections with traffic signals. The conflict usually occurs because the motorist's attention is either directed straight ahead at the signal indications or to the left when watching for approaching side street traffic to perform a right-turn-on-red. Another factor is the visibility of the pedestrian. If the pedestrian is waiting on the same corner as the vehicle, he or she is possibly out of the motorist's direct line of sight and may not be noticed. When the two phases operate together, the motorist begins the right turn just as the pedestrian steps off of the curb into the crosswalk. The surprised motorist normally reacts by slamming on the brakes or swerving around the pedestrian.

The vehicle-pedestrian conflict described above could be reduced if the motorist were made aware that a pedestrian is going to use the crosswalk. The objective of this experiment is to determine whether the yellow LED border measurably improves the yielding behavior of motorists turning left and right through crosswalks.

Item No. 2: Pedestrian Compliance

Another problem that occurs at traffic signals is pedestrian compliance. Because pedestrians do not normally receive any kind of confirmation that the signal is going to serve them after pushing the walk-button, they sometimes become impatient and will look for an opportunity to cross the intersection before the walk indication is displayed. Similar to pushing a button that lights up when calling an elevator, the yellow LED border will let pedestrians know that their call has been received and the walk indication is imminent. Therefore, while evaluating the yellow LED border for vehicle-pedestrian conflicts, the experiment will also determine if the treatment improves pedestrian compliance.

Experimental Design

The recommended strategy to evaluate this device is to perform a before-after analysis at several intersections. In order to effectively evaluate the treatment, the intersections to be studied will need to have high volumes of vehicle traffic turning through busy crosswalks. Initially, the study would evaluate five intersections in the City of Redding, California. Caltrans, District 2 and the City of Redding would partner to carry out the before-after studies at the selected locations.

Each location will be observed using digital video recording equipment for the before and after conditions. Each condition will be observed for seven consecutive days, 24-hours per day. The data will be collected during good weather when pedestrian activity is high. Also, if the crosswalk to be studied is near a school, the data collection will be conducted while the school is in session.

A one month learning period will be provided after the modified pedestrian signal heads are installed at an intersection before the after-treatment data is collected. This will allow both motorists and pedestrians enough time to notice the yellow LED borders and gain an understanding of how they work.

Statistical Analysis

One of the objectives of the experimental design is to obtain a sample size large enough to satisfy statistical requirements. A minimum sample size of 30 is suggested when evaluating vehicle-pedestrian conflicts, and at least 50 pedestrians should be observed when performing pedestrian compliance studies (*Model Pedestrian Safety Program: User's Guide*, Report No. FHWA-RD-87-039). It is anticipated that the combined results for five locations, each observed for seven consecutive days before and after the device is installed, will produce enough data to satisfy these requirements.

For vehicle-pedestrian conflicts, the Measure of Effectiveness (MOE) will be the percentage of turning vehicles that yield to pedestrians using a crosswalk at a signalized intersection. For the purpose of this study, a "yield" will be defined as when a motorist does not initiate a left or right turn through a crosswalk until the pedestrian(s) has adequately cleared the conflict area.

The MOE for the second item, pedestrian compliance, will be the percentage of pedestrians who wait for the walk symbol before crossing the intersection.

A summary of the proposed evaluation plan is provided as an attachment.

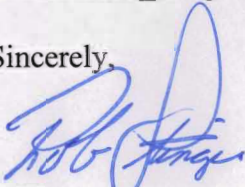
Approvals

In order to proceed with this experiment, an approval from FHWA and the California Traffic Control Devices Committee (CTCDC) will be necessary. If FHWA is satisfied with this evaluation plan as submitted and provides its approval, the package will be presented to the CTCDC at the next scheduled meeting in February 2012. Pending these approvals, several pedestrian signal heads will be modified with the yellow LED borders to begin the evaluation plan in the Summer/Fall of 2012.

Should the results of this initial study indicate that the yellow LED border is effective in reducing vehicle-pedestrian conflicts and/or improving pedestrian compliance, a proposal will be made to the California Traffic Control Devices Committee (CTCDC) to open the experiment to other Caltrans districts and local agencies that are interested in participating. The results of these additional evaluations would ultimately be compiled into a final report and submitted to FHWA.

I look forward to your response regarding this experimentation request. Feel free to contact me if you have any questions or require more information. I can be reached at 530-225-3229 or via email at rob_stinger@dot.ca.gov.

Sincerely,



ROB STINGER, P.E.
Chief, Traffic Engineering & Operations
District 2

Attachment

Cc: FHWA California Division Office
Devinder Singh – CTCDC Executive Secretary
Ed Lamkin – Caltrans District 2 Maintenance & Operations.

Evaluation Summary

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Design Consideration	Response
Evaluation design	Observational (digital video recording) – before-after
Evaluation question #1	Will the addition of yellow LED borders on pedestrian signal heads improve vehicle yielding?
Evaluation question #2	Will the addition of yellow LED borders on pedestrian signal heads improve pedestrian compliance?
Independent variable	Yellow LED border presence; two levels of this variable: LED border absent/ LED border present
MOE #1	Percentage of vehicles yielding prior to turning through an adjacent crosswalk when a pedestrian is present
MOE #2	Percentage of pedestrians that comply with pedestrian signal indications
Other independent variables controlled	Time of day is same between periods, day of week is same between periods, school in session or not in session is same between periods, no changes to roadway geometry
Other variables to be considered in evaluation	Traffic volume: vehicles, bicyclists, and pedestrians