

Report R27-R03: Developing Guidelines for Context Specific Crosswalk Design

Background

The Virginia Department of Transportation (VDOT) mandates high-visibility crosswalks (HVCs) at marked crosswalks at all unsignalized crossings, roundabouts, and pedestrian hybrid beacons except on stop-controlled approaches as described in IIM-TE-384.1. At signalized intersections, marking type is left to engineering judgment per IIM-TOD-400. VDOT is responsible for the routine maintenance of a large crosswalk inventory. Because HVCs have higher costs than transverse crosswalks, appropriate deployment is important.

Research Objectives

The study assessed the effectiveness of HVCs in different contexts through literature and real-world data collection. This approach allowed the researchers to determine whether the data supported VDOT crosswalk marking guidance and if any changes to existing guidance (IIM-TE-384.1 and IIM-TOD-400) were warranted. A survey was also distributed to Virginia localities to understand how crosswalk marking application varies statewide.

Approach

First, the report provides a summary of existing research regarding contexts in which HVCs are effective. The next phase of the research involved a survey of crosswalk marking practices in Virginia localities. Finally, an analysis of near-miss events using post-encroachment time (PET) between vehicles and pedestrians was performed at six signalized intersections in Virginia with both HVCs and transverse crosswalks.

Outcomes

The study recommends no changes to current guidance for HVCs in IIM-TE-384.1. The available research supports HVC guidance at unsignalized and midblock crossings and does not support a change to the guidance regarding pedestrian hybrid beacons, roundabouts, and the use of bar pair crosswalks. The study recommends no changes to the current guidance to use engineering judgment regarding crosswalk marking type at signalized intersections in IIM-TOD-400.

An analysis of near-miss events at six signalized intersections in Virginia found that right turning vehicles and higher pedestrian speeds were associated with lower (more severe) PET values. Skewed intersections and nighttime hours were associated with higher rates of near-miss events.

The study recommends additional research on several topics. A follow-up analysis could examine the relationship between pedestrian signal activation and pedestrian counts and establish the degree to which actuation data are a reliable predictor of observed pedestrian volume. Additional research could also explore the rationale for selecting longitudinal or bar pair crosswalk markings.

Research Benefits

Continuing to recommend HVCs at unsignalized and midblock crossings ensures that HVCs are used in contexts in which research has shown positive safety benefits. Continuing to recommend engineering judgment at signalized intersections allows for flexibility and cost savings.

This study identified the existence of a potentially underutilized safety benefit of bar pair HVC crosswalk markings. In addition, this study identified that pedestrian signal actuation data represent a large dataset of surrogate pedestrian activity data that could be further explored.

Principal Research Scientists

Afrida Raida, Ph.D.

*Graduate Research
Assistant*

**Erin M. Robartes,
Ph.D.**

Research Scientist

**T. Donna Chen,
P.E., Ph.D.**

Associate Professor

Research Findings

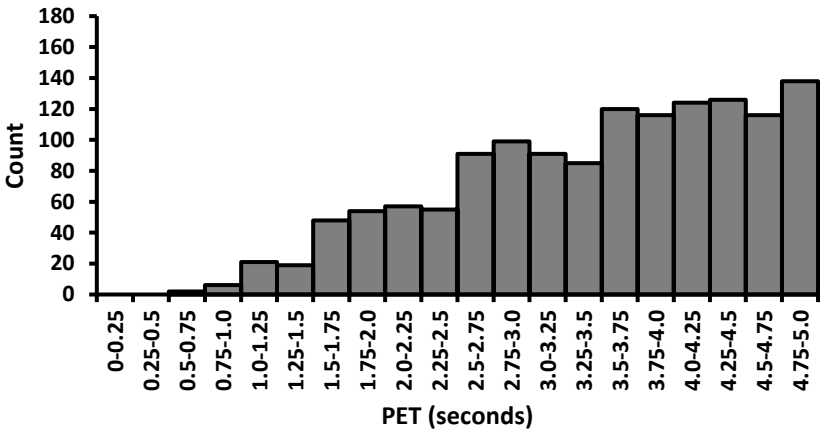
Study Findings Support Current VDOT HVC Guidance

Based on the review of HVC literature and the results of this study, VDOT should continue to recommend the use of HVCs as described in VDOT IIM-TE-384.1 and continue to recommend engineering judgment regarding crosswalk marking type at signalized intersections as described in VDOT IIM-TOD-400.

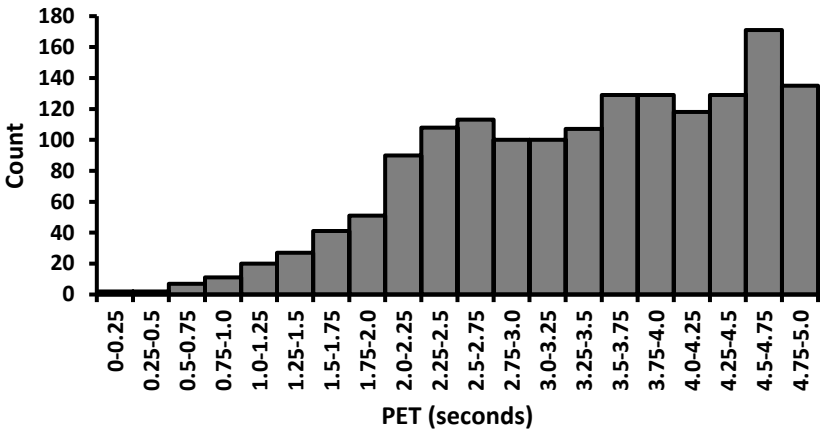
Signalized Intersection Near-Miss Event Analysis

An analysis of near-miss events at six signalized intersections in Virginia found that right turning vehicles and higher pedestrian speeds were associated with lower (more severe) PET values. Skewed intersections and nighttime hours were associated with higher rates of near-miss events.

Histogram of PET Values at All Transverse Crosswalks



Histogram of PET Values at All High Visibility Crosswalks



Percentage of Near Misses that Occur During Dawn, Daytime, Dusk, and Nighttime for High Visibility and Transverse Crosswalks

