

0-6702: Development of Pedestrian Crash Countermeasures and Appropriate Crash Reduction Factors (CRF)

Background

In Texas, the average number of pedestrian fatalities for 2007–2011 was about 400 per year. Due to the high number of pedestrian crashes, the Federal Highway Administration (FHWA) considers Texas a focus state. To address these concerns, the Texas Department of Transportation desired to learn more about the characteristics of Texas pedestrian crashes, as well as appropriate countermeasures to those crashes.

What the Researchers Did

Research efforts began with an extensive literature review, which included four components:

- Characteristics of crossing pedestrians.
- Findings from previous safety evaluations.
- A summary of existing and proposed pedestrian crossing treatments (categorized as engineering, education, or enforcement).
- A summary of funding opportunities for pedestrian safety improvements.

The research team also asked for practitioners' assistance in documenting current pedestrian treatment practices in Texas, based on practitioners' professional experience in their respective jurisdictions.

Based on the information obtained through the literature review and assessment of current practice, researchers conducted six studies: four studies of crash records to identify characteristics of pedestrian crashes in Texas and two field studies to evaluate the effectiveness of selected treatments. One field study examined the relationship between roadway characteristics and driver yielding to pedestrians at crosswalks treated with traffic control signals, pedestrian hybrid beacons (PHBs) (Figure 1), or rectangular rapid-flashing beacons (RRFBs) (Figure 2). The other field study documented changes in driver yielding after a PHB or RRFB was installed.

The first two crash studies were an in-depth review of all pedestrian crashes and all fatal pedestrian crashes in Texas from 2007 to 2011. The third crash study was a



Figure 1. Example of Pedestrian Hybrid Beacon Installation.



Figure 2. Example of Rectangular Rapid-Flashing Beacon Installation.

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more detailed look at fatal pedestrian crashes on high-speed roads. The final crash study used a classification tree method to identify factors that significantly influence the severity of a pedestrian crash.

What They Found

Key findings from the project include the following:

- Every respondent in the five metropolitan areas noted an issue with uncontrolled midblock crossings without marked crosswalks. Midblock crossings in general—marked, controlled, or otherwise—were perceived as a safety issue.
- Driver yielding rates vary by type of treatment. Overall, traffic control signals in Texas had the highest driver yielding rates with an average of 98 percent. The average driver yielding for RRFBs in Texas was 86 percent, while the average for PHBs was 89 percent. These rates were similar to those found in other states.
- Driver yielding rates for staged pedestrian crossings at untreated sites were below 30 percent, including some sites with 0 yielding. Those rates increased noticeably after treatments were installed, as high as 89 percent for RRFBs and nearly 95 percent for PHBs.
- The number of treatments within a city may have a positive impact on driver yielding, and driver yielding improves as drivers become more familiar with these treatments over time.
- Two percent of all traffic crashes and 15 percent of all fatal crashes were pedestrian related.
- Most non-fatal pedestrian crashes were found to be associated with daylight, at intersections, and on city streets. Meanwhile, most fatal crashes were found to be associated with dark conditions, midblock locations, and high-speed roadways.
- Of all fatal pedestrian crashes, 21 percent occurred on high-speed access-controlled facilities, half of which involved a pedestrian attempting to cross the freeway.

What This Means

The research team suggests consideration of the following infrastructure improvements, traffic control devices, and education or enforcement campaigns:

- Proactively addressing pedestrian crashes on a system-wide basis would reduce the risk of and the potential for the occurrence of future crashes. As a focus state, Texas is eligible for training and technical assistance from FHWA to implement the systematic approach for pedestrian safety.
- Traffic control devices (e.g., traffic control signals, PHBs, and RRFBs) that attract pedestrians to cross at marked locations would generate the needed gap in traffic to permit a pedestrian to cross the road. A jurisdiction that decides to install these devices should look for multiple places at which to install them, to provide more opportunities for both pedestrians and drivers to become accustomed to their presence and their expected operation.
- Educational and enforcement programs that address the following findings would be beneficial:
 - Driver yielding to PHBs and RRFBs improved with higher user experience with the devices.
 - Pedestrians involved in 61 percent of all crashes and 72 percent of fatal crashes were male, despite an equal proportion of the male and female population in Texas.
 - Fifty percent of fatal pedestrian crashes occur over the weekend (Friday through Sunday), with more than half of them occurring between 8 p.m. and 4 a.m.
 - Twenty-one percent of fatal pedestrian crashes occurred on access-controlled facilities. Most of these crashes involved a pedestrian attempting to cross the road.

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