Signal Hardware/Technology

Consider installation of Pedestrian Countdown Signals

A pedestrian interval countdown display may be added to a pedestrian signal head in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval.

Pedestrian Intervals and Signal Phases

The pedestrian clearance time should be sufficient to allow a crossing pedestrian, who left the curb or shoulder during the WALKING PERSON signal indication, to travel at a walking speed of 4 ft. per second to make it to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait. Where pedestrians, who walk slower than 4 ft. per second or use wheelchairs, routinely use the crosswalk, a walking speed of less than 4 ft. per second should be considered in determining the pedestrian clearance time.

The Three E-Approach: Engineering Alone is Not Sufficient

Improved pedestrian safety at intersections requires coordination among public authorities, professional engineers, media, education experts and vehicle designers to reduce both the number and severity of pedestrian collisions. Pedestrian safety cannot be improved by traffic engineering alone; it is a partnership between the driver, pedestrians, parents of young children, schools, police departments and others.

From an enforcement perspective, we need to ensure motorist compliance with traffic control devices, posted speeds and pedestrian safety laws. Pedestrians need to understand and obey intersection traffic control. Pedestrians need to make themselves more visible during evening and night-time hours. One way to do this is to wear reflective clothing and accessories. All partners need to develop a sustained and comprehensive intersection safety public awareness campaign that reaches both motorists and pedestrians.

HRC Traffic Tips

Pedestrian Safety at Intersections has been brought to you courtesy of Hubbell, Roth & Clark, Inc. - *Consulting Engineers since 1915* and adapted from *Intersection Safety Issue Briefs*, Federal Highway Administration, April 2004.

For more information on HRC's traffic engineering services, please contact:

Mr. Richard Beaubien, P.E., PTOE
Hubbell, Roth & Clark, Inc.
555 Hulet Drive
Bloomfield Hills, MI 48302
(248) 454-6300
dbeaubien@hrc-engr.com
www.hrc-engr.com

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Pedestrian Safety at Intersections

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Although intersections represent a very small percentage of U.S. surface road mileage, more than one in five pedestrian deaths is the result of a collision with a vehicle at an intersection. Annually, an average of 5,381 pedestrians died in traffic crashes between 1990 and 2002.

Pedestrian Safety Problems at Intersections

The types of intersections likely to be hazardous for pedestrian crossings include high-volume, high-speed and multi-lane intersections with complex signal phasing or without any traffic control at all.

Pedestrians are at risk even at simple STOP or YIELD sign intersections because of the common disregard of traffic control devices by both motorists and pedestrians. Roadways should be designed to accommodate the needs of all road users. Roadway modifications that include widening streets, adding lanes and using traffic

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engineering solutions that increase vehicular efficiency need to consider pedestrian safety as well.

Many pedestrians, especially in large urban areas, violate pedestrian traffic controls and place themselves at risk for collisions with motor vehicles. About one-third of fatal crashes involving pedestrians are the result of pedestrians disobeying intersection traffic control or making misjudgments while attempting to cross a street.

Pedestrian and driver traffic control violations generally receive low levels of enforcement.

Intersection reconstruction projects and traffic control installations can increase the distance that pedestrians must walk to cross an intersection. As a result, intersection signal timings may be too short to permit safe intersection crossing. Assumptions of walking speeds for signal timing may be too fast for many pedestrians to cross to the other side of the curb. Also, there appears to be a poor understanding of pedestrian signal displays by pedestrians.

Crash data consistently show that crashes with pedestrians occur far more often with turning vehicles than with straight-through traffic. Left-turning vehicles are more often involved in pedestrian collisions than right-turn vehicles, partly because drivers are not clearly able to see pedestrians on the left.

Right-turn-on-red (RTOR) can potentially contribute to pedestrian crashes because it creates conflicts between pedestrians and motor vehicles and can reduce pedestrian opportunities to cross intersections, even though pedestrians have the right-of-way over the right-turning vehicles.

Pedestrian visibility to drivers is worse during hours of darkness, especially in areas where there is poor lighting on the road. This is a common shortcoming of rural and suburban intersections. Studies of pedestrian and driver reactions indicate that pedestrians generally perceive that they are visible to drivers before they are actually visible.

Pedestrian Safety Countermeasures

Possible pedestrian safety countermeasures include crosswalk improvements, intersection design/physical improvements, intersection operations and signal hardware/technology. Modifications to pedestrian control devices from the 2003 *Manual on Uniform Traffic Control Devices* (MUTCD) can also be considered.

Crosswalk Improvements

- Use a ladder or cross-hatched marking pattern that is more visible to motorists;
- Use "Pedestrian Crossing" warning signs with pedestrian-actuated flashing beacons, which alert oncoming traffic to pedestrians in the crosswalk;
- Move the vehicle STOP line farther back from crosswalk AND add STOP HERE FOR PEDESTRIANS sign;
- Install raised crosswalks;
- Sign and mark crosswalks. For greatest effectiveness, include curb ramps or curb extensions;
- Use in-pavement lights to alert motorists to the presence of a pedestrian crossing or when someone is preparing to cross the street. Transportation professionals should review the new Chapter 4L of the 2003 MUTCD that provides guidance on the use of in-pavement lights at crosswalks;
- Consider using MUTCD Sign R1-6: STOP FOR PEDESTRIANS or YIELD TO PEDESTRIANS signs that can be placed at crosswalks without signals in central business districts and other areas of high pedestrian activity to reinforce and remind drivers of the laws regarding the right-of-way of pedestrians; and
- Use MUTCD Sign R1-5(a): YIELD HERE TO PEDESTRIANS signs in advance of unsignalized marked mid-block crosswalks.

Intersection Design/Physical Improvements

- Install barriers such as fences or shrubs to discourage pedestrians from crossing at unsafe locations;
- Install bulb-outs at intersections to reduce pedestrian crossing distance;
- Provide wide refuge islands and medians;
- Construct pedestrian overpasses/underpasses;
- Install raised medians; and
- Reduce corner radii.

Intersection Operations

- Reassess traffic signal operations, including consideration of pedestrian walking speeds/pedestrian signal timing and pedestrian-only phasing;
- Consider restricting right-turn-on-red;
- Upgrade illumination;
- Consider mid-block traffic signal; and
- Install far-side bus stops.