

Leading Pedestrian Interval (LPI)

**SAFE TRANSPORTATION
FOR EVERY PEDESTRIAN**

COUNTERMEASURE TECH SHEET



Leading Pedestrian Intervals (LPIs) are low-cost adjustments to signal timing to increase pedestrian safety at signalized intersections. An LPI gives pedestrians a typical 3- to 7-second head start before vehicles in the parallel direction are given the green signal indication. LPIs can help reduce conflicts between pedestrians and left- or right- turning vehicles. The LPI works to position the pedestrian within the crosswalk thereby decreasing the likelihood of a conflict or crash with a left- or right-turning vehicle ahead of the turning traffic. Agencies will often consider restricting Right Turns on Red (RTOR) in association with LPIs to better control for conflicts with right-turning vehicles.

The Manual on Uniform Traffic Control Devices (MUTCD) offers guidance on signal timing when LPI is used. The MUTCD says an LPI “should be at least 3 seconds in duration and should be timed to allow pedestrians to cross at least one lane of traffic or, in the case of a large corner radius, to travel far enough for pedestrians to establish their position before the turning traffic is released.” Using Accessible Pedestrian Signals (APS) with LPI provides indications for persons with disabilities. MUTCD guidance also offers considerations for accessible pedestrian signals when LPIs are used.²

 LPIs reduce conflicts between pedestrians and vehicles.

 LPIs improve visibility of pedestrians in the crosswalk.

LPIs can reduce pedestrian crashes by¹

13%



FEATURES:

- Increased likelihood of driver yielding.
- Enhanced safety for slower moving pedestrians.

COMPLIMENTARY TREATMENTS:

- Right Turn on Red (RTOR) Restrictions.
- Accessible Pedestrian Signals.
- Parallel Vehicular Green Extension Interval.²

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STEP: https://safety.fhwa.dot.gov/ped_bike/step/

LPI LENGTH

Researchers have developed formulas to help agencies calculate a desirable duration of an LPI, calculating the minimum time required for pedestrians to cross the first travel lane or halfway across one direction of travel. Streets with wide or multiple lanes may result in pedestrian crossing phases that are longer than the concurrent vehicle phase. This situation may lead the agency to consider elongated LPIs to reduce conflicts with left-turning vehicles.³

COST

LPI installation requires reprogramming the traffic signal to accommodate the advance pedestrian interval. In rare cases, agencies may need to upgrade signal controllers. The cost associated with LPI can range from \$200 (controller setting changes only) to \$1200 each (pedestrian/vehicle study, retiming analyses, incorporating the formers setting changes).¹



Source: FHWA

SELECTING SITES FOR LPI

Several cities across the U.S. have decided to install LPIs across systems of signalized intersections to improve pedestrian safety. Agencies prioritize the intersections where they install LPIs to maximize limited resources and after considering several common factors:

- **Crash history.** A review of 3 or more years of crash data for intersections with multiple crashes or a history of severe injury/fatal crashes are often a priority. Cities also use information from observed conflicts to supplement crash data.
- **Pedestrian crossing volumes.** Cities may look for pedestrian volumes exceeding traditional pedestrian signal warrants when considering LPIs. The estimated exposure (product of pedestrian and turning traffic volumes) may be another consideration.
- **Vulnerable populations.** Agencies often prioritize LPIs where school-aged children or older adults are expected to cross. These pedestrians may enter the crosswalk more slowly than other pedestrians.
- **One-Way Streets or at T-intersections.** Where left-turning vehicles aren't typically expected to yield to oncoming vehicles, LPIs may be useful to increase yielding to pedestrians in the crosswalk.
- **Intersection Visibility.** LPIs may be prioritized where the visibility of a crosswalk is limited or restricted. General examples are geometry, location of stopped vehicles, vegetation, and streetside features.

References

¹ Goughnour, E., Carter, D., Lyon, C., Persaud, B., Lan, B., Chun, P., ... Signor, K. (2018). Safety Evaluation of Protected Left Turn Phasing and Leading Pedestrian Intervals on Pedestrian Safety, Federal Highway Administration, Report No. FHWA-HRT-18-044. Washington, D.C.

² Federal Highway Administration. (2009). Part 4, Chapter 4E Manual on Uniform Traffic Control Devices. Federal Highway Administration. Washington, D.C.

³ Dittberner, R., & Vu, N. (2017). How Long Is Your LPI?: Balancing Pedestrian Comfort and Traffic Impacts with an Elongated Leading Pedestrian Interval. ITE Journal. Washington, D.C.