

DATE: October 6, 2021

SUBJECT: Leading Pedestrian Interval Policy

TO: District Executives

FROM: T Jay Cunningham, P.E., Acting Director
Bureau of Maintenance and Operations



This Strike-off Letter (SOL) is time and resource neutral and establishes policy for implementing Leading Pedestrian Interval (LPI) timing at new and existing traffic control signals. This SOL will supersede the current language for LPI and will be incorporated in a future update of Publication 149: *Traffic Signal Design Handbook*.

Effective immediately, LPI may be incorporated into traffic signal designs as follows:

- New and future signal designs shall fully comply with this policy.
- Projects already under design should comply with this policy to the maximum extent feasible without requiring significant modification to design work already completed.
- Implementations of LPI prior to the date of this letter should be reviewed for operational consistency with this policy during the next revisions to the traffic signal permit.

Should you have any questions or require additional information, please contact Stephen Gault, P.E., PTOE, Chief, TSMO Arterials and Planning Section, at 717.787.6988.

Attachment

4940/SAG/hmq

cc: PennDOT Local Technical Assistance Program
Municipal Advisory Committee
Assistant District Executives – Construction
Assistant District Executives – Design
Assistant District Executives – Maintenance
Emmanuel Anastasiadis, Acting Assistant District Executive – Operations, District 6
Maintenance Services Executives
District Traffic Engineers
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LEADING PEDESTRIAN INTERVAL (LPI) POLICY FOR TRAFFIC SIGNALS

1. PURPOSE

To establish guidance for implementing leading pedestrian interval (LPI) signal applications at new and existing signalized intersections.

2. BACKGROUND

- (1) LPI is a low-cost countermeasure for pedestrian and vehicular traffic control at signalized intersections. LPI is also known as “pedestrian head start” or “delayed vehicle green” that gives pedestrians an advance walk signal indication before a concurrent green signal is provided to vehicles. This allows pedestrians to establish a presence in the crosswalk, thereby increasing their visibility to drivers and potentially reducing conflicts with turning vehicles.
- (2) LPI has been recommended as an FHWA “Proven Safety Countermeasure” to reduce pedestrian–vehicle crashes at signalized intersections. According to the Crash Modification Factor (CMF) Clearinghouse, the [estimated LPI crash reduction factor for vehicle-pedestrian crashes in suburban and urban areas](#) is 19%.

3. IMPLEMENTATION

- (1) The decision process for LPI implementation should be documented using the [TE-672 “Pedestrian Accommodations at Signalized Intersections” Form](#).
- (2) Prior to implementing a new exclusive pedestrian phase, LPI should be implemented and evaluated for effectiveness.
- (3) The decision to implement LPI should be based on engineering judgement. The following are some of the considerations that may influence an engineering judgement decision:
 - a) *Local Experiences*: Citizen complaints about turning vehicles not yielding to pedestrians.
 - b) *Crash Data/Conditions*: Historical crashes between vehicles turning on green and pedestrians in the crosswalk with the pedestrian walk signal indication illuminated (or the presence of conditions that could potentially lead to such crashes - including, but not limited to, those described in sub-sections 3(c), 3(d), and 3(e)).
 - c) *Land-Use Context*: LPI can be particularly useful in pedestrian generator locations such as playgrounds, parks, schools, recreation centers, urban areas, hospitals, retirement/assisted-living communities, transit stops, etc.
 - d) *Intersection Type and Operation*: Intersections with a high proportion of vehicle turning movements that conflict with pedestrians, such as T-intersections or one-way streets.
 - e) *Visibility Issues*: Concerns for reduced pedestrian visibility by drivers, due to obstructions or poor sight distance. At a minimum, the following should be considered:
 - Sun angle
 - Lighting
 - Intersection geometry
 - f) *Controller Capabilities*: Prior to recommending LPI, confirm that the controller can support LPI programming.
- (4) LPI can unnecessarily increase vehicle delay when there is no pedestrian actuation (i.e., when pedestrian recall is present), since the LPI is called every signal cycle, even when pedestrians are not actively crossing. When pedestrian actuation with LPI is present and utilized, the LPI is called as needed without unnecessarily delaying other modes of traffic.

4. DESIGN AND CONSIDERATIONS

- (1) LPI signal applications shall comply with Section 4D.05(F) "Application of Steady Signal Indications" and Section 4E.06 "Pedestrian Intervals and Signal Phases" of the MUTCD.
- (2) LPI timing should allow pedestrians to clear at least the width of one lane of traffic, in addition to the width of a parking and/or bicycle lane, or in the case of a large corner radius, to travel far enough for the pedestrian to establish their position ahead of the turning traffic before the turning traffic is provided a green indication. A minimum of 3-second LPI duration is required by the MUTCD and LPI durations generally fall within a 3 to 6-second range.

LPI timing should also take into consideration the following scenarios:

- a) approaches with large portions of users with slower crossing speeds (children, older adults, persons with physical disabilities)
 - b) approaches where the pedestrian detector location is not immediately adjacent to the curb (or, if no pedestrian detector is present, allocation of 6-feet from the face of the curb or from the edge of the pavement may be considered for calculating extended LPI)
- (3) Consider whether the all-red clearance interval for the phase preceding the LPI provides sufficient time for a vehicle to advance through the far side of the associated crosswalk prior to the LPI walk indication being displayed.
 - (4) At locations where LPI is used without Accessible Pedestrian Signals (APS) (Sections 4E.09–4E.13 of the MUTCD), the minimum required time for the walk Interval shall be provided in addition to the time provided for the leading pedestrian interval, as vision-impaired pedestrians use the sound of moving traffic to start crossing. Vehicles should not be moving during the LPI portion of the pedestrian phase, so vision-impaired pedestrians typically won't begin crossing until the LPI portion of the pedestrian phase has come to an end and vehicles start moving.
 - (5) If LPI is used, consideration should be given to turning movements across the crosswalk during the LPI.

- a) Protected/Prohibited Left Turn

The LPIs shall not be timed with the opposing protected left-turn interval. For opposing leading left-turn movement, the LPIs shall be timed prior to the green interval for through vehicle movements and after the opposing protected left-turn movement.

For opposing lagging left-turn movement, the LPI shall also be timed prior to the green interval for through vehicle movements.

Example signal timings for the use of LPI with left turns are illustrated in Figure 1.

- b) Protected/Permissive Left Turn

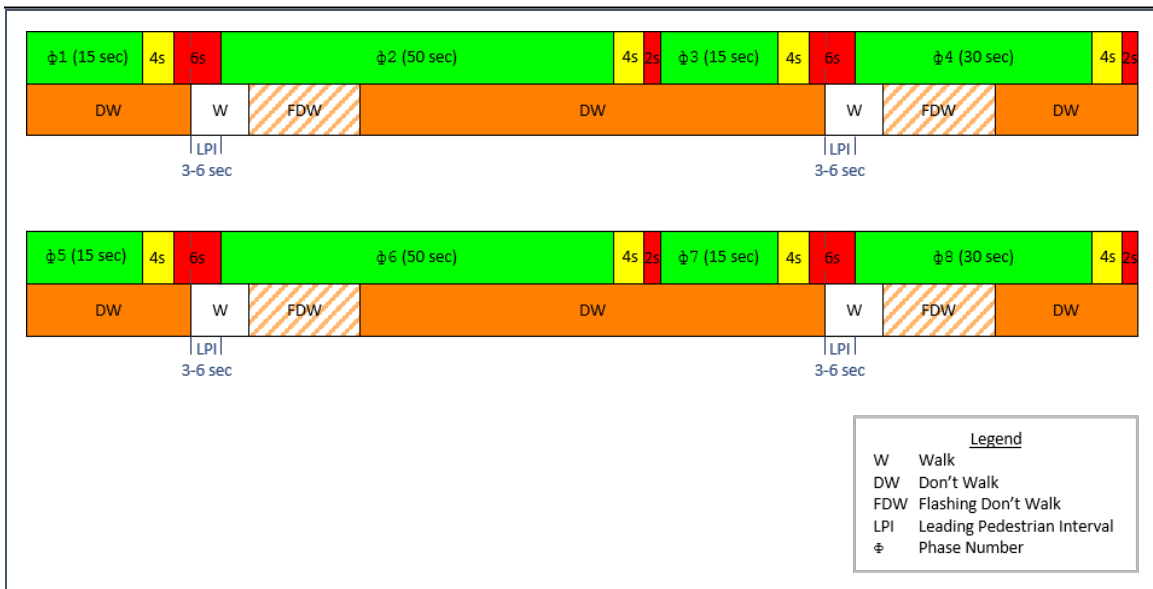
Under situations with protected/permissive left turns, LPIs should not be considered without mitigation of the conflicts with the advanced left turns, particularly under non-concurrent terminations of the left-turn phases. Some potential mitigation efforts for when the left turns don't end concurrently include replacement of five-section shared signal heads with Flashing Yellow Arrow (FYA) signal heads, signage (such as the left "TURNING VEHICLES YIELD TO PEDESTRIANS" sign (R10-15L)), etc.

Example signal timings for the use of LPI with left turns are illustrated in Figure 1.

Figure 1. Schematic Diagram for Example Signal Timing with LPI

Please note that the below signal timing examples are illustrative only – the exact timings will vary, based on site conditions.

A - Lead/Lead Left Turn



B – Lead/Lag Left Turn



c) Right Turns on Red

Prohibition of right turns on red may be considered to enhance LPI implementation compliance. Prohibition of right turns on red can be accomplished through the use of a static or electronic blank-out “NO TURN ON RED” sign (R10-11). Implementation of the prohibition of rights on red shall comply with PennDOT Publication 212, Section 116. Consider the use of the electronic blank-out signs that are illuminated during the pedestrian intervals at locations with inconsistent pedestrian volumes, low/non-illuminated crosswalks, locations with high volumes that could see capacity issues with continual right-turn prohibitions, etc.

If right turns on red are not prohibited, the installation of supplementary “TURNING VEHICLES YIELD TO PEDESTRIANS” sign (R10-15R) should be considered.