

CITY OF LOS ANGELES
INTER-DEPARTMENTAL MEMORANDUM

Date: August 17, 2026

To: Honorable City Council
c/o City Clerk, Room 395
Attention: Honorable Heather Hutt, Chair, Transportation Committee

From: Laura Rubio-Cornejo, General Manager 
Department of Transportation

Subject: **TRAFFIC SIGNAL TIMING AND OPERATIONAL STRATEGIES TO IMPROVE PEDESTRIAN SAFETY**

SUMMARY

As directed by Council File (CF) 23-1210, this report outlines the Los Angeles Department of Transportation's (LADOT) efforts to improve pedestrian safety through traffic signal timing and operational strategies.

RECOMMENDATIONS

That the City Council DIRECT LADOT to update its guidelines for signal operations, Leading Pedestrian Intervals, scramble crosswalks, and No Turn on Red restrictions and report back once these guidelines are updated.

BACKGROUND

LADOT is responsible for the design, implementation, operations, and maintenance of traffic signals, which are a core component of the City's transportation system. LADOT currently operates and maintains 4,923 traffic signals (inclusive of Pedestrian Hybrid Beacons) throughout the City. Traffic signals themselves are tools to improve safety through the orderly assignment of right-of-way for all users at the intersections where they are in place, and that can offer opportunities for additional pedestrian safety benefits, subject to specific operational characteristics and features. These include signal timing, phasing, actuation, and the allowance or prohibition of specific movements.

The California Manual on Uniform Traffic Control Devices (CA MUTCD) establishes standards, recommendations, and guidance for the design and operation of traffic control devices that local agencies in California, including the City of Los Angeles, must adhere to. Where the CA MUTCD allows flexibility, local agencies can develop their own standards, recommendations, and guidance.

In December 2023, Council directed LADOT to report back with the following:

1. A plan to inventory signalized intersections, identifying the timing plans and other pertinent information for each intersection for each specified period of the day as part of any future DOT asset management system creation or integration.

2. A draft policy and implementation plan to modify signal timing citywide to run traffic signals free or with reduced cycle lengths as appropriate to reflect a priority for people crossing the street by means other than motor vehicles- balancing this need with speed and reliability objectives of public transit buses and trains.
3. An inventory of signalized intersections with pedestrian recall instituted during the COVID-19 Pandemic, and a draft policy and implementation plan to make permanent as appropriate, intersections converted to operate with pedestrian recall during that period, and to consider future locations for such conversions as well as any prioritization method.
4. Draft updated guidelines for the use of Leading Pedestrian Intervals (LPI), scramble crosswalks, and NO RIGHT TURN ON RED restrictions, taking into account the appropriateness of longer LPI duration, a more liberal set of criteria for scramble crosswalks, and increased usage of restricting right turns on red to reduce vehicle-pedestrian conflicts.

This report describes the specific traffic signal operational characteristics and features identified in the Motion under CF 23-1210, their respective requirements as outlined in the CA MUTCD, the existing guidelines and protocols LADOT has developed for the use of these features, and proposed changes to maximize the safety benefits these characteristics and features can provide.

DISCUSSION

Traffic signals govern intersection movement for all road users - vehicles, transit, pedestrians, and bicycles. Most signalized intersections dictate both vehicle and pedestrian movements, while some also have special dedicated signal phasing and indications for buses/trains and bicycles. The more individual, separate movements controlled by signal at a given intersection, the more complicated the signal timing can become, as each phased movement must be served and organized within each cycle of the signal's operation. LADOT implements various signal timing strategies and treatments to manage all intersection movements while maximizing safety and minimizing delay. LADOT also implements specific pedestrian safety treatments.

Signal timing, phasing, and actuation

Traffic signals can be fully-actuated, semi-actuated, or pre-timed (fixed-time).

- A fully-actuated traffic signal requires detection or activation for any individual signal phase to be activated, and the signal will only serve a particular movement when a vehicle or bicycle is detected, or when a pedestrian presses the push-button.
- A semi-actuated traffic signal will provide green to one direction by default (the "main phase") while the other street will only be served when a vehicle or bicycle is detected or when a pedestrian presses the push-button.
- A pre-timed traffic signal will serve each movement on a fixed schedule, regardless of the presence of vehicles, bicyclists, or pedestrians.

The CA MUTCD does not provide guidance on what type of operation to employ at a given intersection or intersection type, except to recommend fully-actuated operation for rural high-speed highways.

The National Association of City Transportation Officials (NACTO) Urban Street Design Guide recommends fixed-time signals in dense urban areas, to provide predictability while reducing delay for any particular road-user, and recognizes that actuated signals may be appropriate in less-trafficked environments such as suburban arterials. It recommends limiting the use of semi- and fully-actuated signals in urban environments, minimizing signal phases where they are implemented, and maximizing responsiveness.

LADOT operates traffic signals in all three modes depending on the characteristics and desired outcomes of each intersection. When LADOT installs a new traffic signal or makes a decision to adjust the operation of an existing traffic signal, LADOT's District Engineering, Timing, and Design staff typically work together to determine the desired operation of the signal including the use of actuation or pre-timed operation. However, LADOT does not have a documented protocol or standard for this decision-making process.

The City's traffic signals are operated and managed through LADOT's Advanced Transportation System and Coordination (ATSAC). Each traffic signal runs a specific timing plan depending on time of day and day of the week. That timing is captured in a timing chart within the ATSAC software; those timing charts are also kept in digital and paper form which are updated when the signal timing for a specific traffic signal is updated. While individual locations can be queried to determine their associated signal timing and plans, the system does not readily allow for batch querying or running reports to determine how many traffic signals run a specific timing plan.

LADOT is working with Cartegraph to develop an asset management system for all LADOT assets, including traffic signals. This system will allow for a cataloguing of traffic signal assets including physical features such as poles, heads, and push buttons, and signal features such as left turn phasing. However, similar to the ATSAC system's limitations, the asset management system will not capture or allow for querying as described.

These limitations do not prevent LADOT from enacting policies or strategies related to the implementation of specific timing plans or operation under certain conditions, but any such modifications must be made on an individual intersection basis.

Pedestrian safety

LADOT has many tools at its disposal to improve pedestrian safety. These include running signals "free", pedestrian recall, Leading Pedestrian Intervals (LPI), exclusive pedestrian phasing (scramble crossings), and right-on-red restrictions.

Free-running signals

Most of the City's traffic signals are operated in a coordinated fashion, meaning that the signals along a given corridor are timed collectively to help vehicle traffic make efficient forward progress. In order to accomplish this, signals are often timed with consistent cycle lengths regardless of intersection type, and intersections between arterials and local or collector streets will typically be semi-actuated with the local or collector street only being served when a vehicle or pedestrian is present. This can result in long wait times for the local or collector street traffic, including for pedestrians wishing to cross. To minimize wait times for minor streets and pedestrians, LADOT runs some traffic signals uncoordinated, or "free" which allows for the local or collector street traffic to be served more readily by not requiring it to fall into a set time window optimized for progression along the major street.

In most cases, free operation is limited to nighttime (virtually all traffic signals run free at night) and the middle of the day between morning and evening peak periods. Reducing wait times for cross traffic, pedestrians, and bicyclists has been demonstrated to improve signal compliance and safety, and in turn encourage more walking and bicycling. Free operation can also reduce speeding on the arterial street during periods when traffic volume is lighter. With these benefits in mind, LADOT will continue to consider and use mid-day free running traffic signal operation as a tool to improve safety, both as part of safety projects and in response to community concerns.

Pedestrian recall

Pedestrian recall is another way to reduce wait times for pedestrians crossing arterials at minor street intersections while also providing more predictability and avoiding the need for pedestrians to push a button to cross where they otherwise would need to. Recalling the pedestrian phase for a street of an intersection can simulate pre-timed operation by bringing up the pedestrian phase automatically, even if no person has pressed the push-button. During the Covid-19 Pandemic, LADOT rapidly implemented pedestrian recall at high-use signalized intersections to minimize contact with frequently touched surfaces as a public health measure. LADOT developed a broad methodology to identify those intersections assumed to have high pedestrian pushbutton use, based on land use and proximity to hospitals and other pedestrian generators. Subsequently, LADOT temporarily implemented pedestrian recall at 1,360 intersections (Attachment A) in an effort to slow the spread of COVID-19. This also had the effect of simulating pre-timed operation at over one quarter of the City's traffic signals, introducing both the benefits of consistent operation and the trade-offs of increased delay for vehicles, transit, and other users when pedestrians are not crossing the street.

Some of these intersections have since been restored to their pre-COVID operation, either deliberately in response to a request from the community or via an internally-initiated individualized examination, or inadvertently during maintenance, as the implementation of recall during COVID was not permanently updated in each signal's timing chart. To maximize safety benefits moving forward, LADOT will reassess all of the original COVID-related Recall locations. Through its Complete Streets Committee (CSC), LADOT will develop a set of guidelines for operation type selection, using NACTO guidance as a foundation. Upon adoption of those guidelines, LADOT will also convene a working group made up of signal timing staff and District staff to assess the locations placed on pedestrian recall during the Pandemic. Those determined to operate most appropriately with pedestrian recall will be made permanent, which requires a comprehensive review and update of the intersection timing. Without dedicated funding for this effort, staff will seek opportunities to incorporate these updates as soon as possible through funded projects or other routine work.

Leading Pedestrian Intervals (LPI)

In an intersection with LPI, a WALK signal indication is displayed a few seconds earlier than the start of green for the concurrent vehicular movement. LPI reinforces the priority that pedestrians have over turning vehicles and increases pedestrian visibility by allowing pedestrians to arrive at the conflict point before the first turning vehicle. This improves pedestrian safety by promoting yielding compliance on the part of turning motorists and reducing pedestrian-vehicle conflicts.

The CA MUTCD states that if an LPI is used, it 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 ahead of turning traffic before turning traffic is released.

In 2016, LADOT introduced LPI as a pilot at 22 designated locations. Since then, LADOT developed guidelines to determine where to implement LPI (Attachment B) and rapidly deployed LPI at many more locations as part of safety projects, District requests, and other opportunities. Citywide there are currently more than 2,000 intersections with LPI. LADOT continues to expand the use of, and implement LPI at new and existing signals, subject to the established guidelines.

In 2022, the Transportation Research Board (TRB) published Traffic Signal Control Strategies for Pedestrians and Bicyclists, National Cooperative Highway Research Program (NCHRP) Report 969. Section 6.5 of this report addressed LPI by providing an equation to calculate the appropriate LPI duration with the same objective of allowing pedestrians to cross one lane or establish their position as described in the CA MUTCD. LADOT now uses this equation for new LPI installations and adjusts any prior installations when the timing of those intersections is modified. To formalize its application, LADOT will also update the LPI guidelines to include the formula to calculate duration.

Exclusive Pedestrian Phase (Scramble Crossing)

A scramble crossing temporarily halts all vehicular traffic, providing an exclusive pedestrian phase that allows pedestrians to cross the intersection in every direction simultaneously, including diagonally. It completely separates foot traffic from turning vehicles, significantly reducing the risk of pedestrian-vehicle collisions. In order to provide dedicated and separate time for pedestrian and vehicle movements, each individual signal phase must allow for complete and isolated movement which increases wait times for all road users.

LADOT's CSC approved guidelines for the suitability and use of scramble crossings (Attachment C). Those guidelines recommend scramble crossings when there is both a high volume of pedestrians and a pattern of pedestrian-involved collisions. LADOT has implemented several scramble crossings in Los Angeles, before and since the adoption of those guidelines, including in Hollywood, near USC and UCLA, and in Venice and Westlake.

Since the adoption of those guidelines, LADOT has improved its countermeasure selection process and toolbox for pedestrian-involved collisions. When pedestrian volumes are not very high, there are other tools that work just as well or better than scramble crossings to mitigate collisions without the potential for substantial added delay. These tools include LPI, NO TURN ON RED, protected turn phasing, or a combination of these. As such, through the CSC, LADOT will revise the scramble crossing guidelines to focus primarily on pedestrian volume as the main criteria, instead of emphasizing crashes.

No Turn on Red (NTOR)

A NTOR restriction at a signalized intersection prohibits turns when a red signal indication is displayed. The CA MUTCD provides the following guidance for NTOR:

A No Turn on Red sign should be considered when an engineering study finds that one or more of the following conditions exists:

- A. Inadequate sight distance to vehicles approaching from the left (or right, if applicable);*
- B. Geometrics or operational characteristics of the intersection that might result in unexpected conflicts;*
- C. An exclusive pedestrian or bicycle phase;*
- D. An unacceptable number of conflicting pedestrian movements with right-turn-on-red maneuvers, especially involving children, older pedestrians, or persons with disabilities;*
- E. More than three right-turn-on-red crashes reported in a 12-month period for the particular approach;*
- F. The skew angle of the intersecting roadways creates difficulty for drivers to see traffic approaching from their left (or right, if applicable).*

NTOR is implemented through the use of posted signs, and may be in effect during all times of the day and days of the week, or only during specific hours and days depending on intersection characteristics. Historically, LADOT has implemented NTOR under the conditions described in A., B., C., and F. More recently, LADOT has expanded the use of NTOR to include locations with the conditions described in D. and E. as part of safety projects and in response to community concerns. LADOT is currently evaluating the effectiveness of NTOR at 20 traffic signals adjacent to schools in order to establish a new LADOT NTOR policy to guide implementation moving forward. LADOT will develop guidelines via the CSC which will expand upon the CA MUTCD guidance and include quantitative thresholds for criteria D.

Next steps

LADOT is advancing several steps to assess and inventory its traffic signals and develop new guidelines to improve safety.

1. LADOT is working with Cartegraph to develop an asset management system for all LADOT assets, including traffic signals. This system will be rolled out for part of the City in June 2027, with the remainder of the City planned for future deployment.
2. LADOT will continue to consider and use mid-day free running traffic signal operation on a case-by-case basis as a tool to improve safety, both as part of safety projects and in response to community concerns.
3. LADOT will develop a set of guidelines for signal operation type selection (fully-actuated, semi-actuated, pre-timed), using NACTO guidance as a foundation. Upon adoption of those guidelines, LADOT will also convene a working group made up of signal timing staff and District staff to assess the locations placed on pedestrian recall during the Pandemic.
4. LADOT will update the LPI guidelines to include the adopted formula to calculate duration, and will also adjust any prior LPI installations when the timing of those intersections is modified.
5. LADOT will update the scramble crossing guidelines to focus primarily on pedestrian volume as the primary criteria.
6. LADOT will develop a set of guidelines for No Turn on Red that will expand upon the CA MUTCD guidance and include quantitative thresholds for conflicting movements and vulnerable users.

LADOT will report to Council on these steps as progress is made.

FISCAL IMPACT STATEMENT

There is no impact to the General Fund since this report is informational.

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attachments