U.S.Department
of Transportation
Federal Highway
Administration

Provide Longer Left-Turn Lanes at Intersections

WHERE TO USE

Unsignalized intersections with existing left-turn lanes that are not long enough to store all left-turning vehicles and have a high frequency of rear-end crashes resulting from the conflict between vehicles waiting to turn left and following vehicles.

Photo by: FHWA

DETAILS

The length of a left-turn lane is among its most important design elements. Left-turn lanes should be designed to accommodate vehicle deceleration and storage. In particular, the left-turn lane length should allow for the removal of slow or decelerating vehicles from through-traffic, thus reducing the potential for rear-end collisions. The length of a left-turn lane consists of three components: (1) entering taper, (2) deceleration length, and (3) storage length. Design criteria for selecting an appropriate left-turn lane length are presented in the *AASHTO Policy on Geometric Design for Highways and Streets* and in the policies of individual highway agencies.

KEY TO SUCCESS

Make sure that a longer left-turn lane is warranted or justified on the basis of left-turn volumes or an existing pattern of left-turn related rear-end crashes.

ISSUES

If a left-turn lane is excessively long, drivers proceeding through the intersection may enter the lane by mistake without realizing that it is a left-turn lane. This difficulty may be remedied by effective signing, marking, and/or median geometrics at the upstream end of the left-turn lane.

Also, if a decision is made to provide a longer left-turn lane by restriping a shoulder and through lane, part of the safety benefits from the improvement may be lost because of the loss of shoulder and the greater proximity of through or right-turning traffic to roadside objects, and possibly because of a reduction in intersection sight distance.

Lengthening of a left-turn lane on an intersection approach may involve restricting left turns in and out of driveways on that intersection approach. Such restrictions may be implemented by signing or by provision of a raised median adjacent to the left-turn lane (see Strategy A2 fact sheet).

TIME FRAME ●●○

Implementation time may vary from 3 months to 4 years. At some locations, left-turn lanes can be lengthened simply by restriping the roadway. Others may require widening the roadway, cutting further into a median, or acquiring additional right-of-way. Such projects require a substantial time for development and construction. Where right-of-way is required or where the environmental process requires analysis and documentation, the time will be longer.

COSTS ●●○○

Costs are highly variable. Where restriping within an existing roadway is possible, the costs are nominal. Where widening and/or reconstruction are necessary, costs over $100,000 per intersection approach may be incurred.

EFFECTIVENESS

TRIED: This strategy will reduce rear-end collisions resulting from conflicts between vehicles waiting to turn left and following vehicles during periods when the left-turn demand exceeds the existing storage capacity of the left-turn lane. When a queue of vehicles overflows the left-turn lane and extends into the through lanes of the intersection approach, rear-end collisions are likely. Such overflows may also result in operational delays to through or right-turning vehicles. Lengthening of left-turn lanes may also reduce the potential for rear-end collisions between left-turning vehicles by providing longer entering taper and deceleration lengths.

There is no consensus on a quantitative estimate of the safety effectiveness of lengthening left-turn lanes. This effectiveness is likely to depend on the existing length of the left-turn lane, the proportion of time during which the storage capacity of the left-turn lane is exceeded, the volume and speed of traffic on the intersection approach, and the available sight distance upstream of the left-turn queue. Further research to quantify the safety effectiveness of lengthening left-turn lanes is needed.

COMPATIBILITY

This strategy can be used in conjunction with other strategies for improving safety at unsignalized intersections.

SUPPLEMENTAL INFORMATION

Optimal operation and safety of left-turn lanes require appropriate design. This includes sufficient length of lane and taper.

For more details on this and other countermeasures: http://safety.transportation.org

For more information contact:

FHWA Office of Safety Design
E71, 1200 New Jersey Avenue SE
Washington, D.C. 20590
(202) 366-9064
http://safety.fhwa.dot.gov

FHWA Resource Center - Safety and Design Team
19900 Governor's Drive, Suite 301
Olympia Fields, IL 60461
(708) 283-3545
http://www.fhwa.dot.gov/resourcecenter

U.S.Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
Investment in roadway safety saves lives

2/08