Photo Credit: Getty Images.

U.S. Department of Transportation
Federal Highway Administration

WORK ZONE MANAGEMENT PROGRAM

FACT SHEET

IMPROVING COMMERCIAL MOTOR VEHICLES' ABILITY TO NAVIGATE WORK ZONE LANE SHIFTS

BACKGROUND

Temporary lane shifts are commonly required in roadway construction projects, moving travel lanes laterally on available pavement width to provide space for work activities to occur. Guidance included in the *Manual on Uniform Traffic Control Devices for Streets and Highways*[1] defines the appropriate length of shifting tapers as at least the following:

$$L = 0.5 * (W * S^2) / 60,\ S \leq 40 \text{ mph}$$

$$L = 0.5 * W * S,\ S \geq 45 \text{ mph}$$

Where:
L = shifting taper length (ft)
W = required lateral offset width (ft)
S = posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed through the lane shift (mph)

THE ISSUE

Typically, work zone lane shifts are deployed by starting at the beginning point of the shift, measuring the required taper length and the required offset shift required at that point, and drawing a straight line from the beginning of the shift to that offset point (***figure 1***). This method can create challenges for drivers trying to maintain proper lane positioning, especially for large commercial motor vehicle (CMV) operators of truck tractor-trailer combinations. Larger lane shift offsets can be particularly challenging. These difficulties in maintaining lane position result in vehicle encroachments into adjacent lanes or into the buffer space for temporary roadside barriers and can increase sideswipe crashes and impacts with the barrier.

Slightly wider lanes within the transition could be more desirable for CMVs to better accommodate the off-tracking tendencies of combination truck tractor-trailers. Wider lanes can also reduce lane encroachments and the associated sideswipe and barrier collisions.

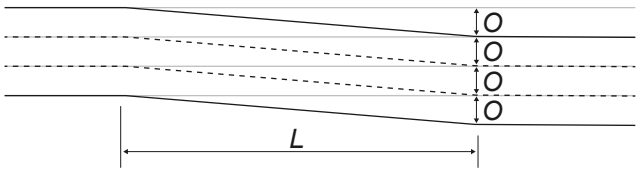
A SOLUTION

The Indiana Department of Transportation (DOT) is using a method to improve the ability of CMV drivers and other motorists to navigate through work zone lane shifts more easily.[2] Specifically, offsetting the start of the shift for each lane or edge line slightly widens the width of the lanes within the transition. A wider lane through the transition can make it easier for a CMV driver to accommodate the lane shift, especially for truck tractor-trailer

[1] Federal Highway Administration (FHWA)."Chapter 6B Temporary Traffic Control Elements," "Section 6B.08 Tapers" in *Manual on Uniform Traffic Control Devices for Streets and Highways*, 11th ed. (Washington, DC: FHWA, 2023).

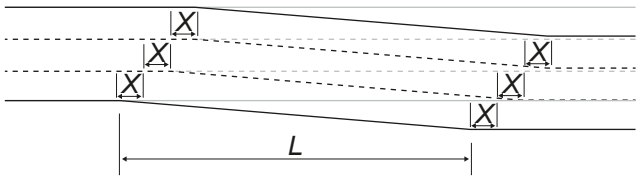
[2] Indiana Department of Transportation. Long-Term Stationary Freeway Right Lane Closure. Standard Drawing No. E 801-TCLC-02, September 2022.

combinations that experience some degree of off tracking. As shown in ***figure 2***, rather than starting the shift at the same location for all edge and lane lines, the shift starts with the edge line closest to the direction of the shift. The shift for each lane and edge line in sequence is staggered a distance of "*X*" downstream of the previous lane shift line starting location. The length of each lane line shift remains the same, and so the end of the shift taper is also staggered for each edge and lane line.



L = lane shift taper length (ft)
O = lane shift offset (ft)

Source: Texas A&M Transportation Institute.
Figure 1. Illustration. Lane shifts can be challenging for some commercial motor vehicle drivers to navigate.



L = lane shift taper length (ft)
X = lane shift start stagger distance for each edge or lane line (ft)

Source: Texas A&M Transportation Institute.
Figure 2. Illustration. Staggering the start of edge and lane line shift tapers in sequence will increase the effective lane width through the transition.

Using this method of laying out a lane shift, a 12-ft lane width on a roadway can be increased to more than 13 ft within the transition by staggering the start of each edge or lane line shift by 40 ft (i.e., *X* = 40), the common distance between successive lane skip lines. This staggering distance length is used by Indiana DOT for roadways with operating speeds of 55 mph or higher. This method also works if it is necessary to also reduce the lane widths beyond the lane shift so long as the lane width reduction is 1 ft per lane or less.

ADDITIONAL RECOMMENDATIONS

In addition to the previously suggested installation method, it is desirable to avoid putting lane shifts near or within horizontal and vertical curves. Lane shifts (as well as lane closures) on curved sections are more difficult for drivers to perceive correctly, making it difficult for drivers to properly adjust their speed and steering to safely navigate the curve (***figure 3***). Similarly, it is desirable to avoid putting lane shifts near or within system interchanges, entrance ramps, and construction workspace access points.

Source: Purdue University.
Figure 3. Photo. Lane shifts within horizontal curves can be difficult for commercial motor vehicle drivers to navigate.

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