



U.S. Department
of Transportation
Federal Highway
Administration

*Content of this webinar was developed
by Members & Friends of the
TRB Intersections Joint Subcommittee*



Overview of Innovative Intersections

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Mainstreaming Innovative Intersections

Roundabouts



Source: FHWA

Median U-Turns



Source: FHWA-RD-09-060

Diverging Diamond Interchange (DDI)



Restricted-Crossing U-Turn (RCUT)



Displaced Left-Turn (DLT)



Why Innovative Intersections?

An aerial photograph of a busy multi-lane intersection. The roads are filled with cars in various colors. A yellow rounded rectangular text box is overlaid on the center of the intersection. The background shows green trees and a clear sky.

Intersections represent about $\frac{1}{4}$ of all traffic fatalities...

...and **HALF** of all severe crashes

Intersections are a major safety issue and may become bottlenecks along high volume roadways



Intersection Safety Facts

- » Angle crashes account for over 40% of fatal crashes at intersections
- » Left turn crashes account for over 20% of fatal crashes at intersections
- » Ped/Bike crashes account for 25% of fatal crashes at signalized intersections



Source: Mark Doctor, FHWA



Source Isebrands, FHWA



Innovative Intersections Benefits

SAFETY

- Fewer and less severe conflict points
- Speed management benefits
- Significant crash reductions

MOBILITY

- Synchronized movements
- Reduced delay and congestion
- Pedestrian and bicycle opportunities



VALUE

- Less right-of-way impact
- Decreased capital and lifecycle costs
- Quicker construction
- Higher B/C



Outreach & Education

<http://www.youtube.com/USDOTFHWA>



<http://safety.fhwa.dot.gov/intersection/>

Talking Freight Seminar



Accommodating Freight in Innovative Intersections and Interchanges

(aka J-turn, Superstreet)

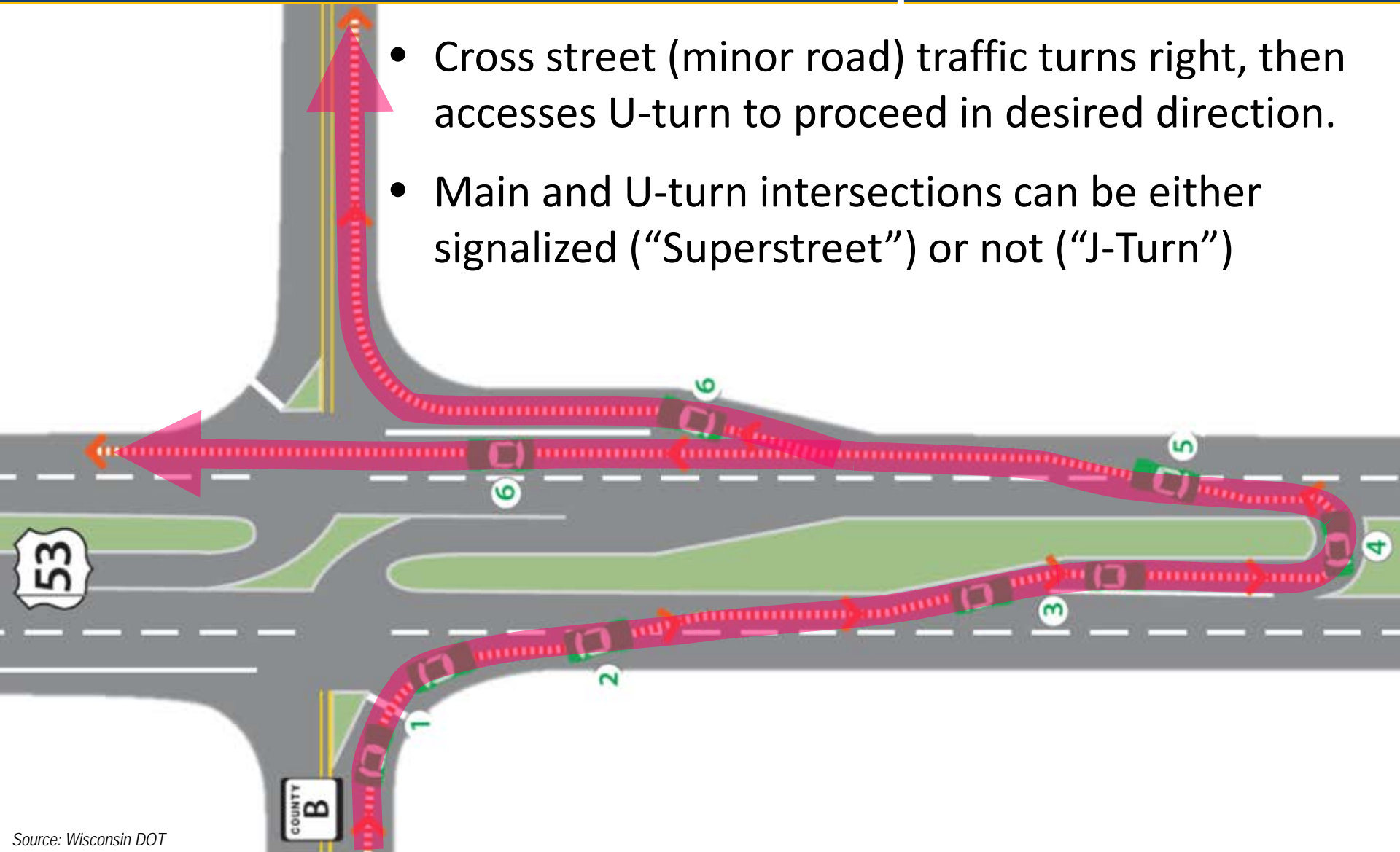


At-grade intersections with directional medians such that the minor road traffic must turn right and make U-turn back to cross or make the left-turn maneuver.

Major road typically allows all maneuvers (some options limit left-turns).

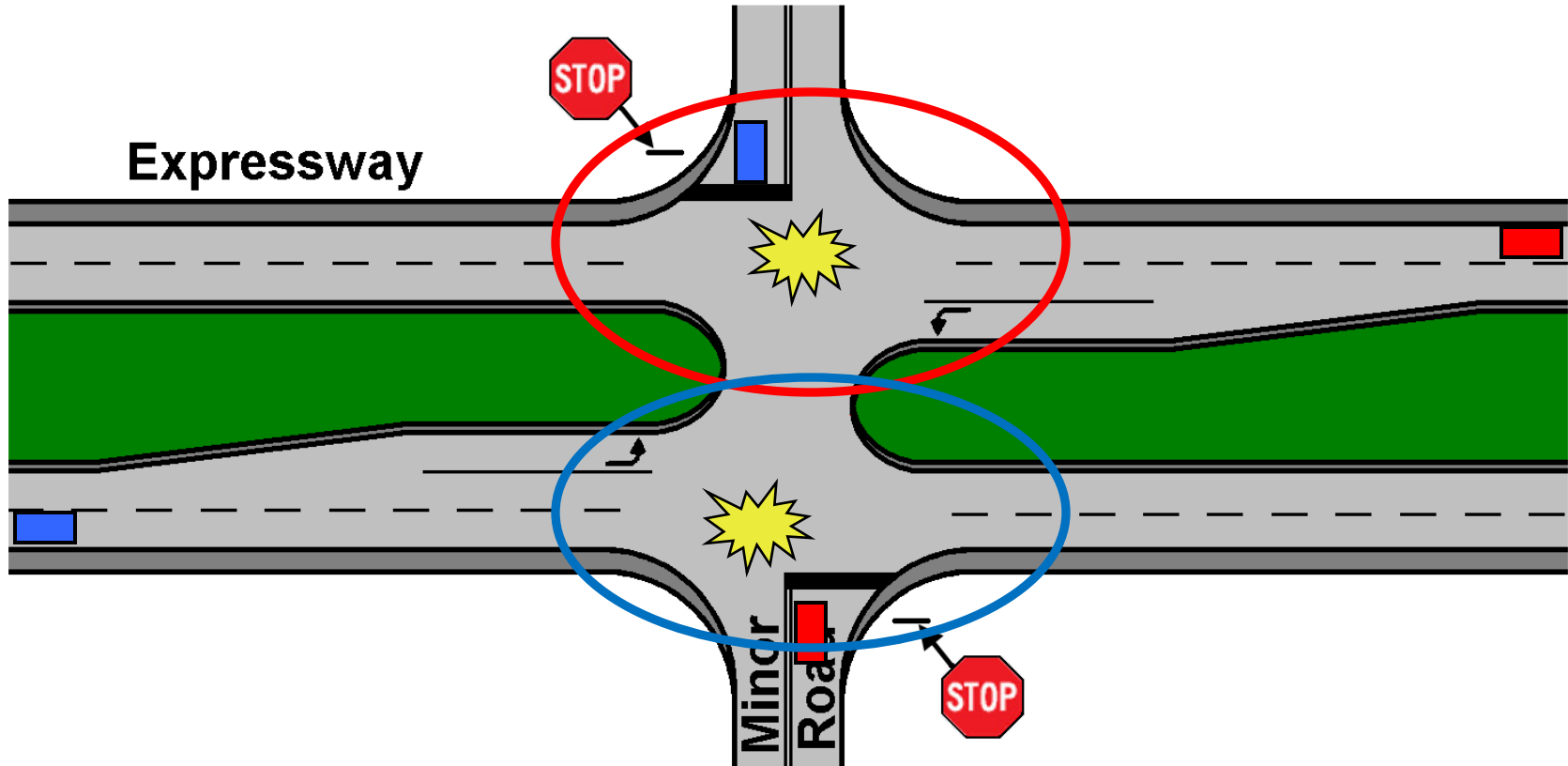
Restricted Crossing U-Turns (RCUT) Superstreets / J-Turns

- Cross street (minor road) traffic turns right, then accesses U-turn to proceed in desired direction.
- Main and U-turn intersections can be either signalized (“Superstreet”) or not (“J-Turn”)



Source: Wisconsin DOT

Far-Side Right-Angle Collisions



Accommodating Truck Movements



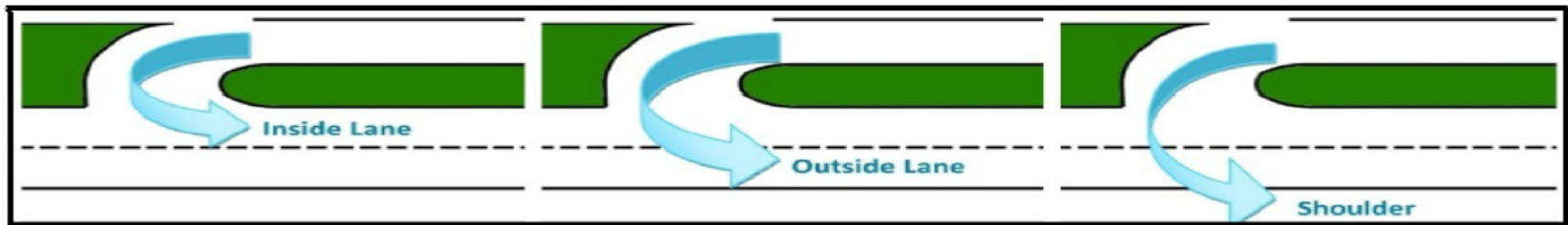
Design Vehicle U-Turns Lane Destinations by Median Widths

DESIGN VEHICLE (length, ft)	MEDIAN WIDTH		
	40'	64'	101' +
BUS (40')	Shoulder	Inside Lane	Inside Lane
WB-40 (40')	*	Outside Lane	Inside Lane
WB-50 (50')	*	Shoulder	Inside Lane
WB-62 (62')	*	Shoulder	Inside Lane
WB-67 (67')	*	Shoulder	Inside Lane

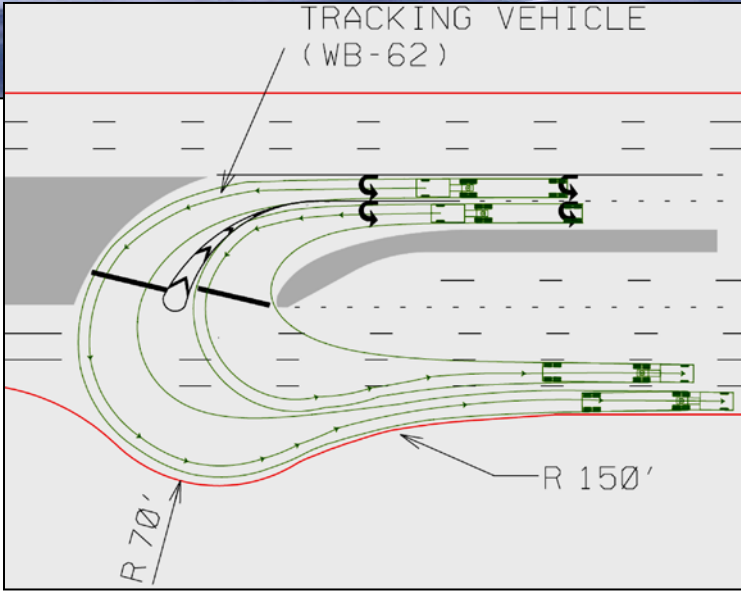
* U-turn cannot be completed within usable roadway width.

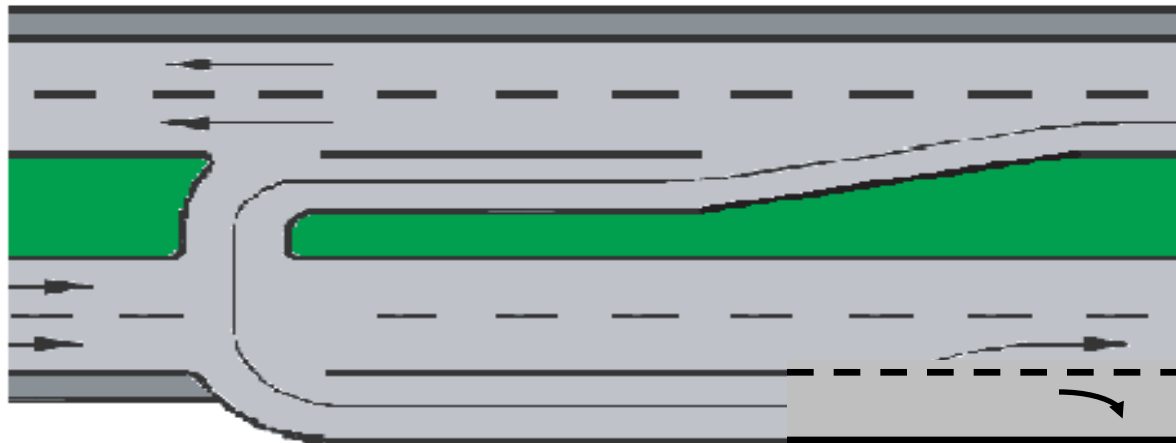
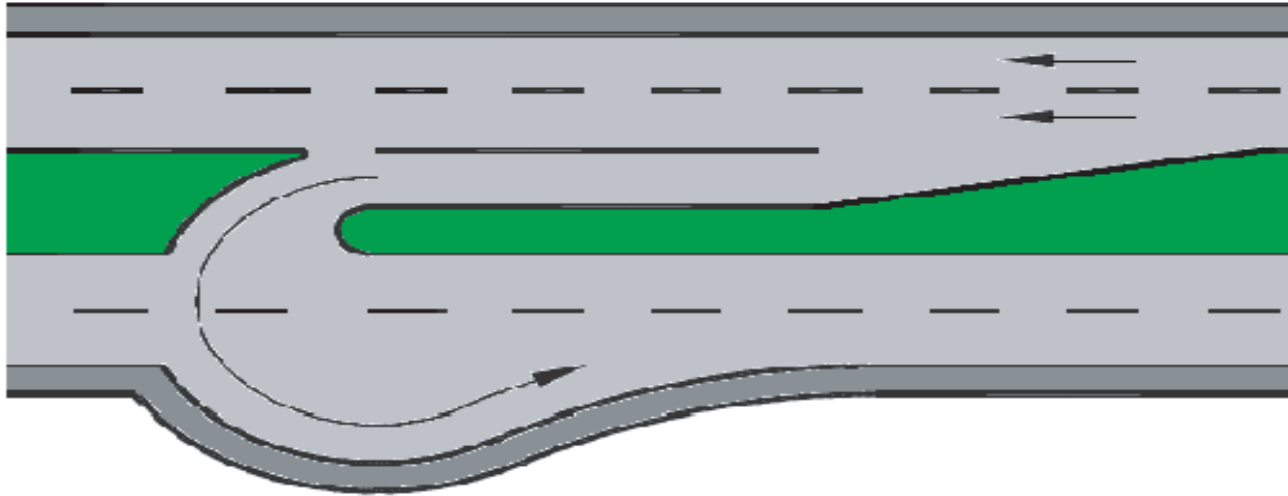
- 12 foot-wide lanes have been assumed. All turns begin from median u-turn lane.

- U-turn lane destinations shown on roadway without improvements.



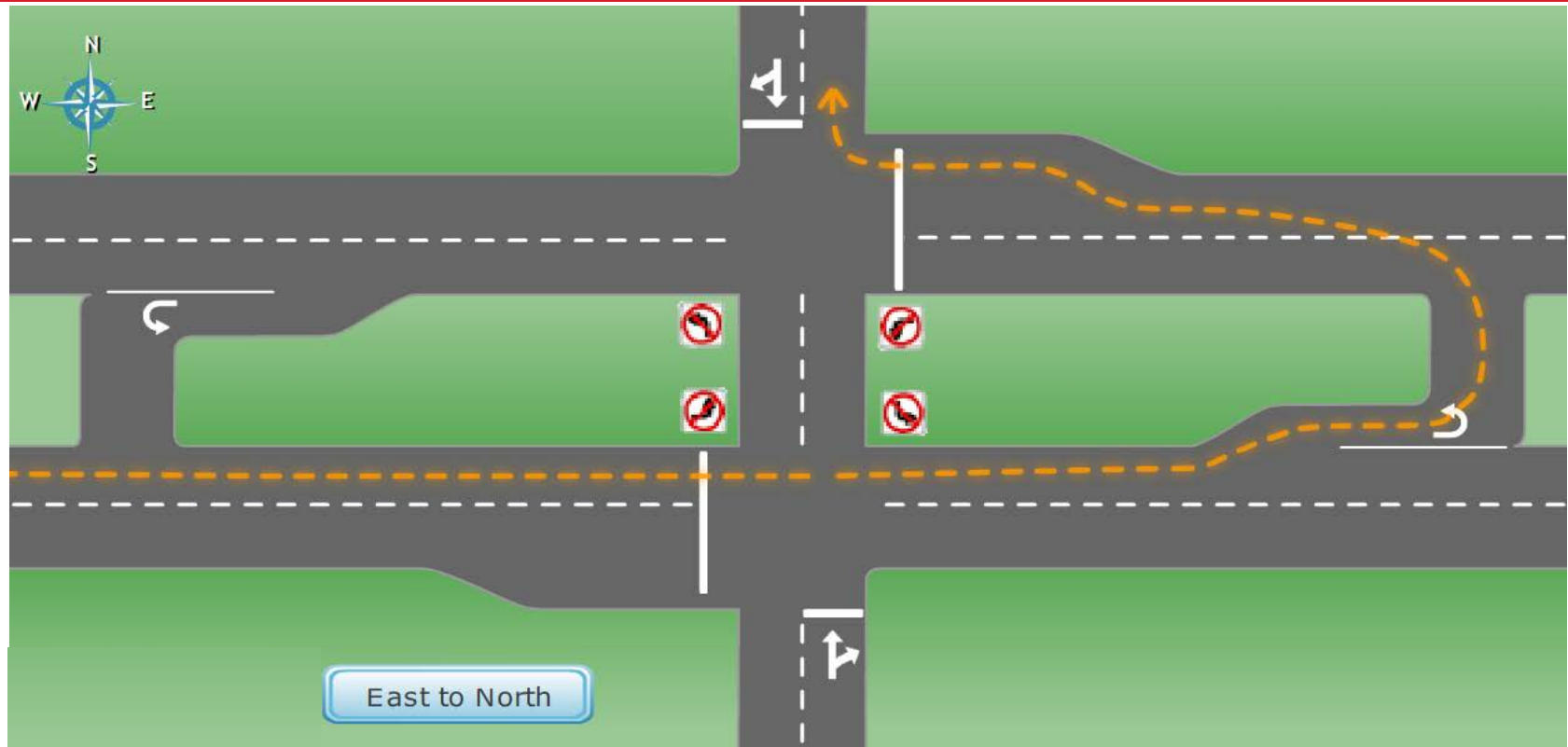
Source: Mississippi DOT Synthesis of J-Turn Design Standards and Criteria, December 2010



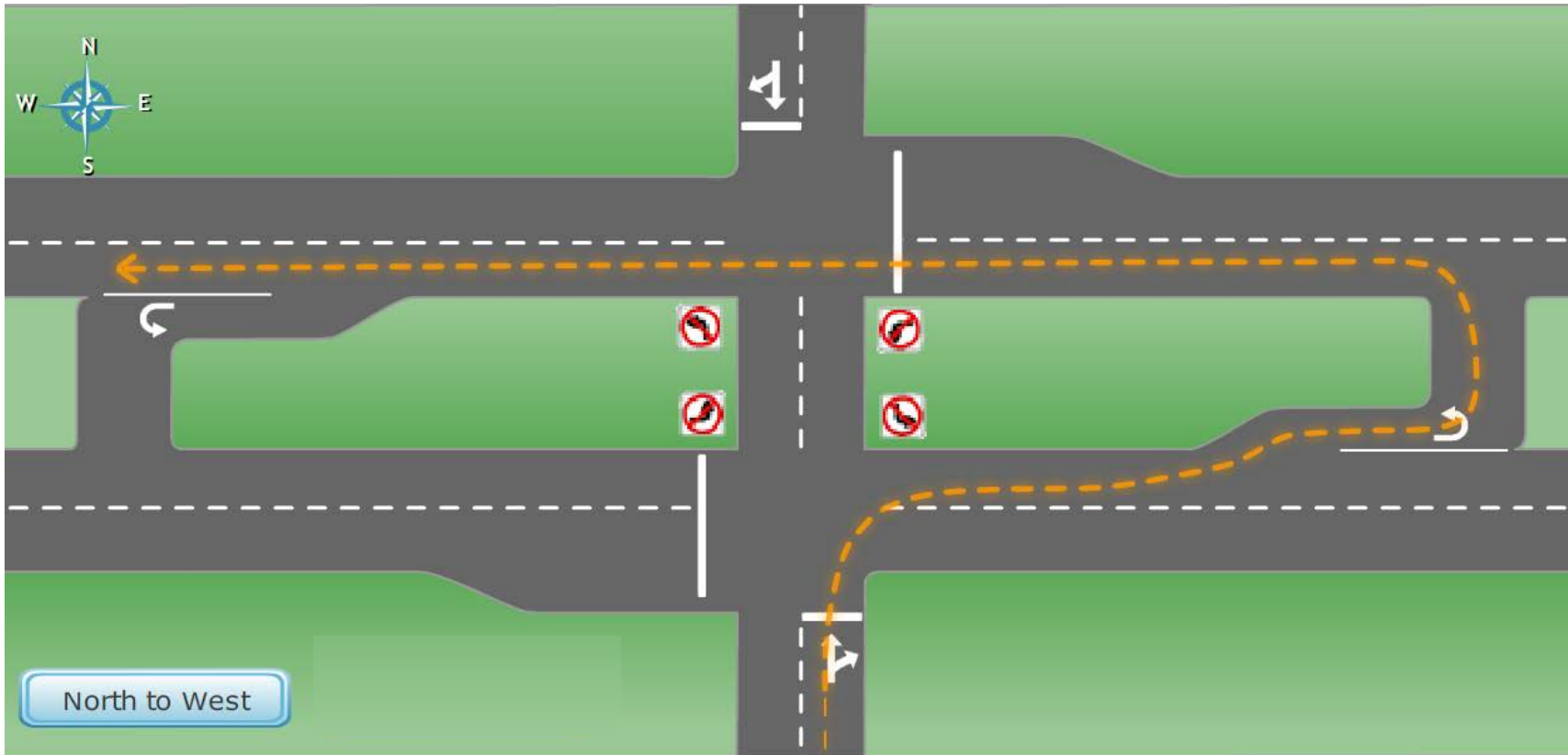


Could begin
right turn lane



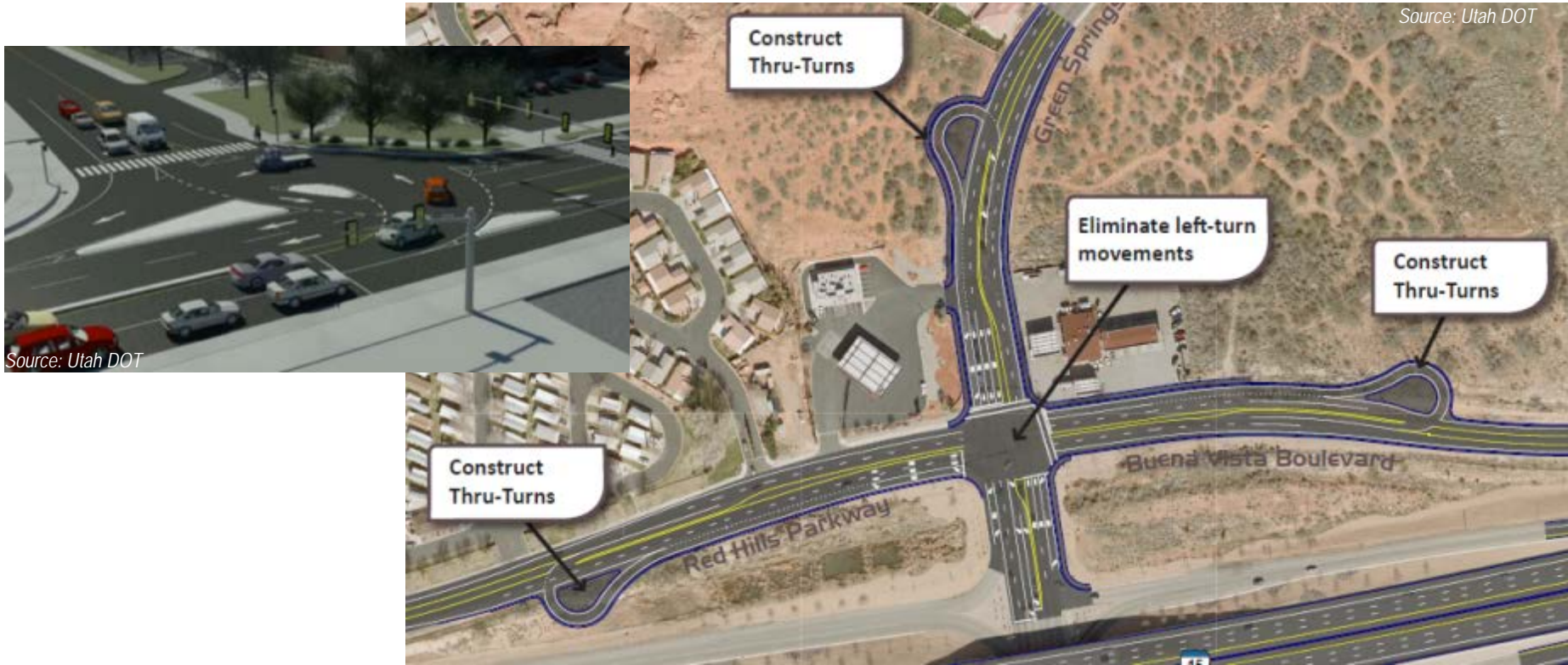


Vehicles on the major street (or the street with the median) that want to turn left are directed through the main intersection to a U-turn movement at a downstream directional crossover (usually signalized), and proceed back to the main intersection to then turn right onto the minor street.



Vehicles on the minor street that wish to turn left at the major street are directed to turn right, make a U-turn movement at the same crossover, and then proceed through the main intersection.

Source: Utah DOT



- Similar to MUT in that direct left-turns are eliminated from main intersection
- Substitutes a paved bump-out or “loon” beyond the outside lane (or coinciding with a sidestreet tee intersection or driveway) for the wide median of a MUT

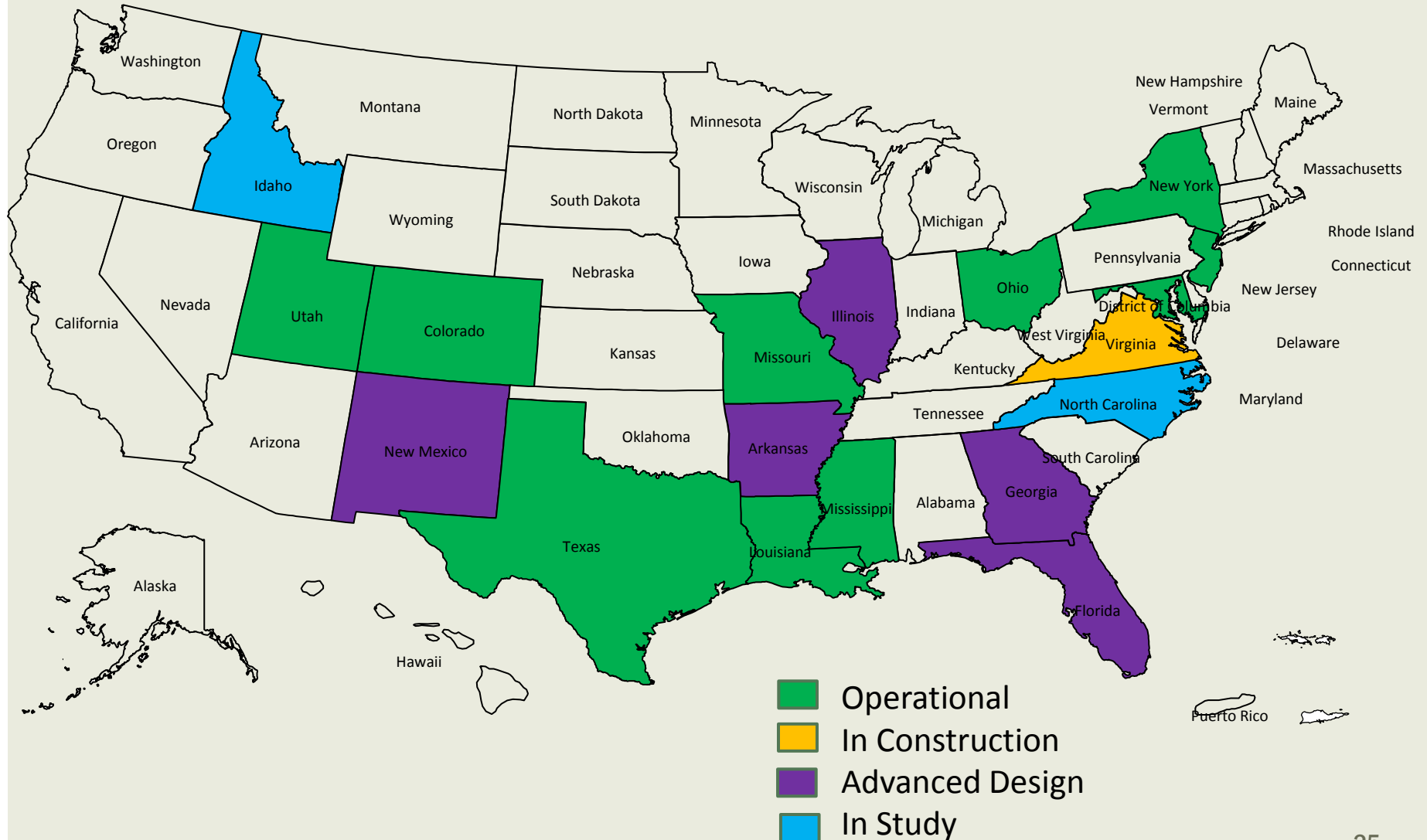
Distinguishing Feature:

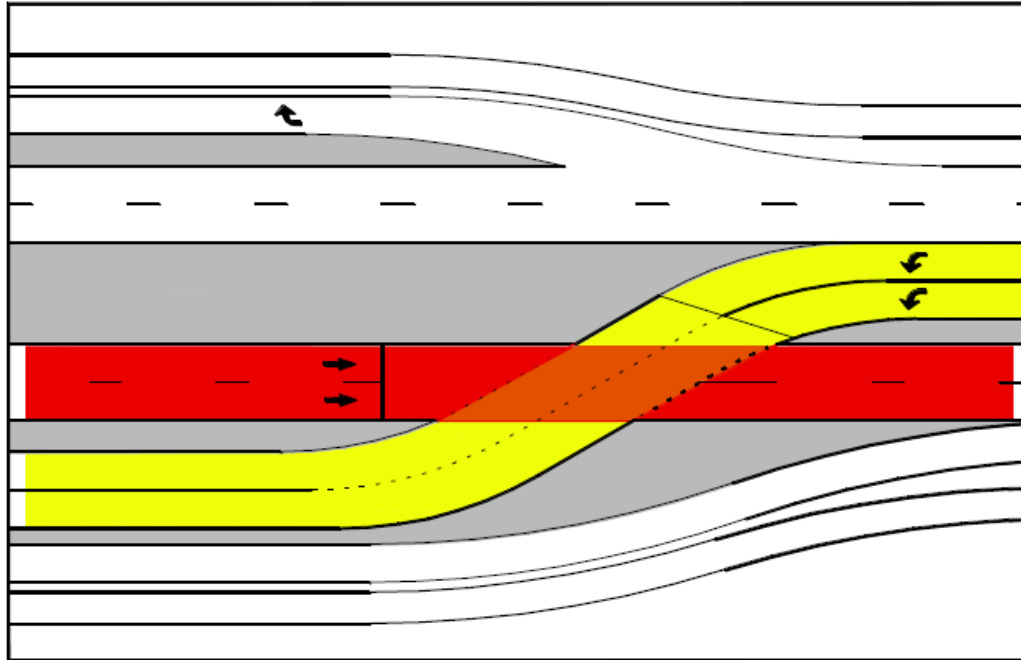
Left-turn movement (on one or more approaches) strategically relocated to the far-side of the opposing roadway via interconnected signaled crossover in advance of the main intersection



Continuous Flow Intersections

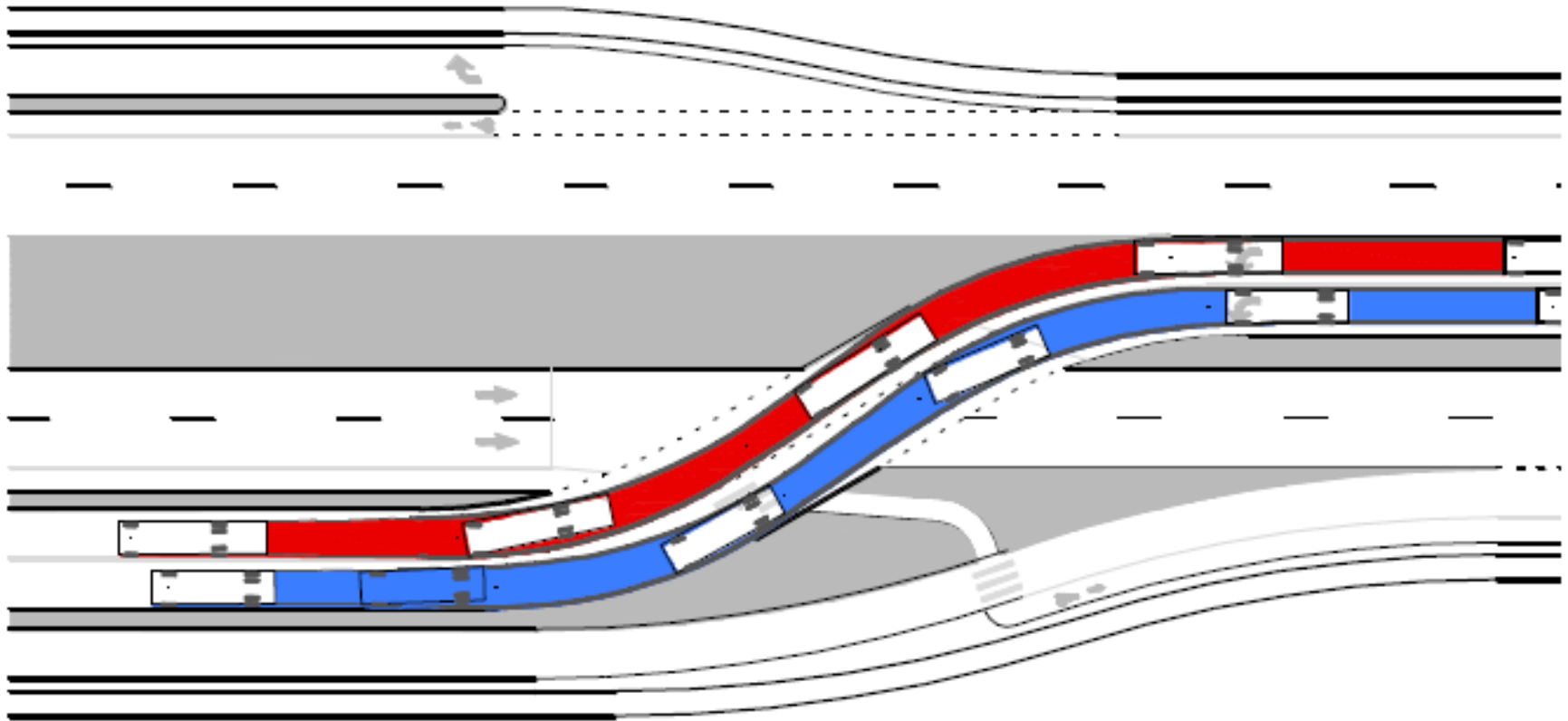
Known information as of Sep 1, 2016

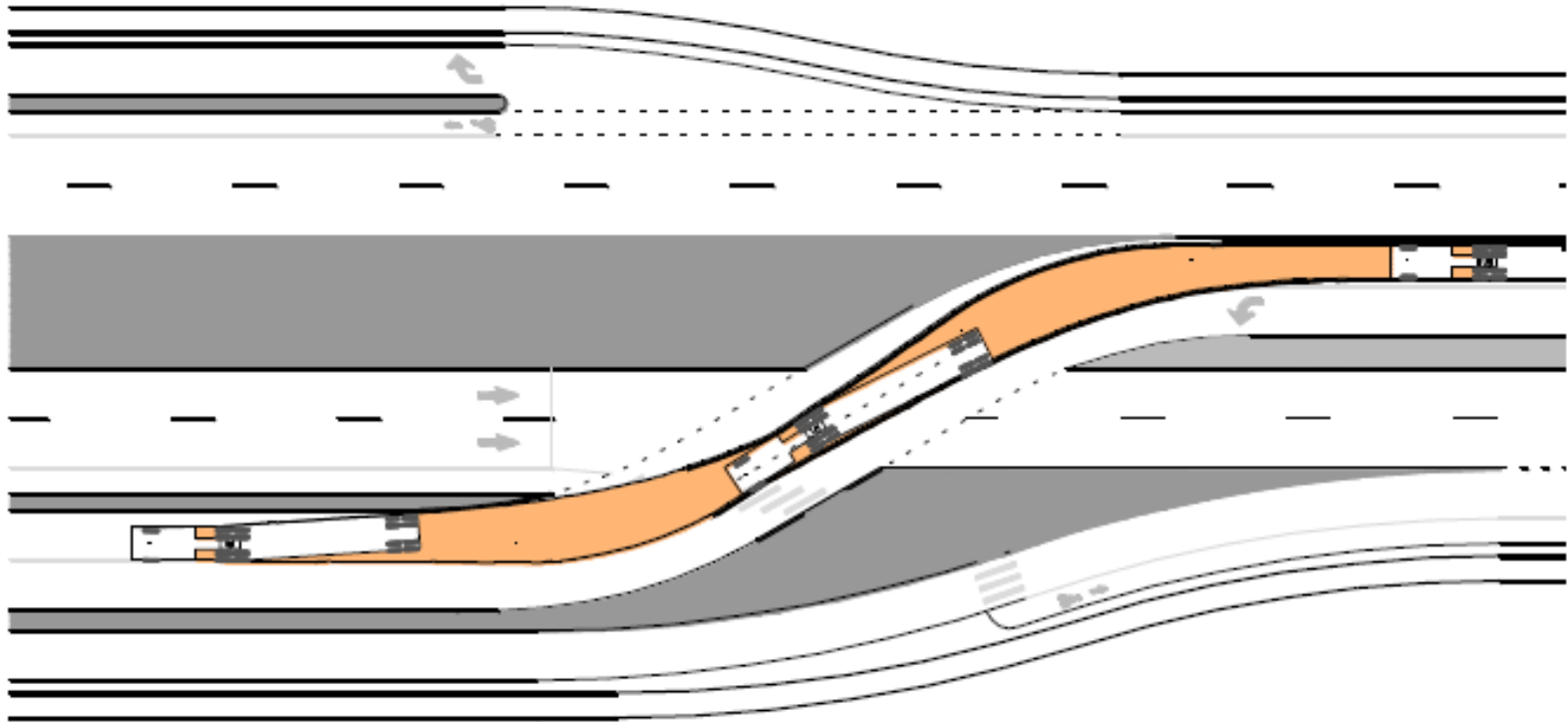




The objective is to provide a smooth alignment for the through traffic.

Align the left turns at the stop bar with the receiving lanes (for the displaced left turn pockets) to reflect desirable vehicle path alignment to minimize path overlap.

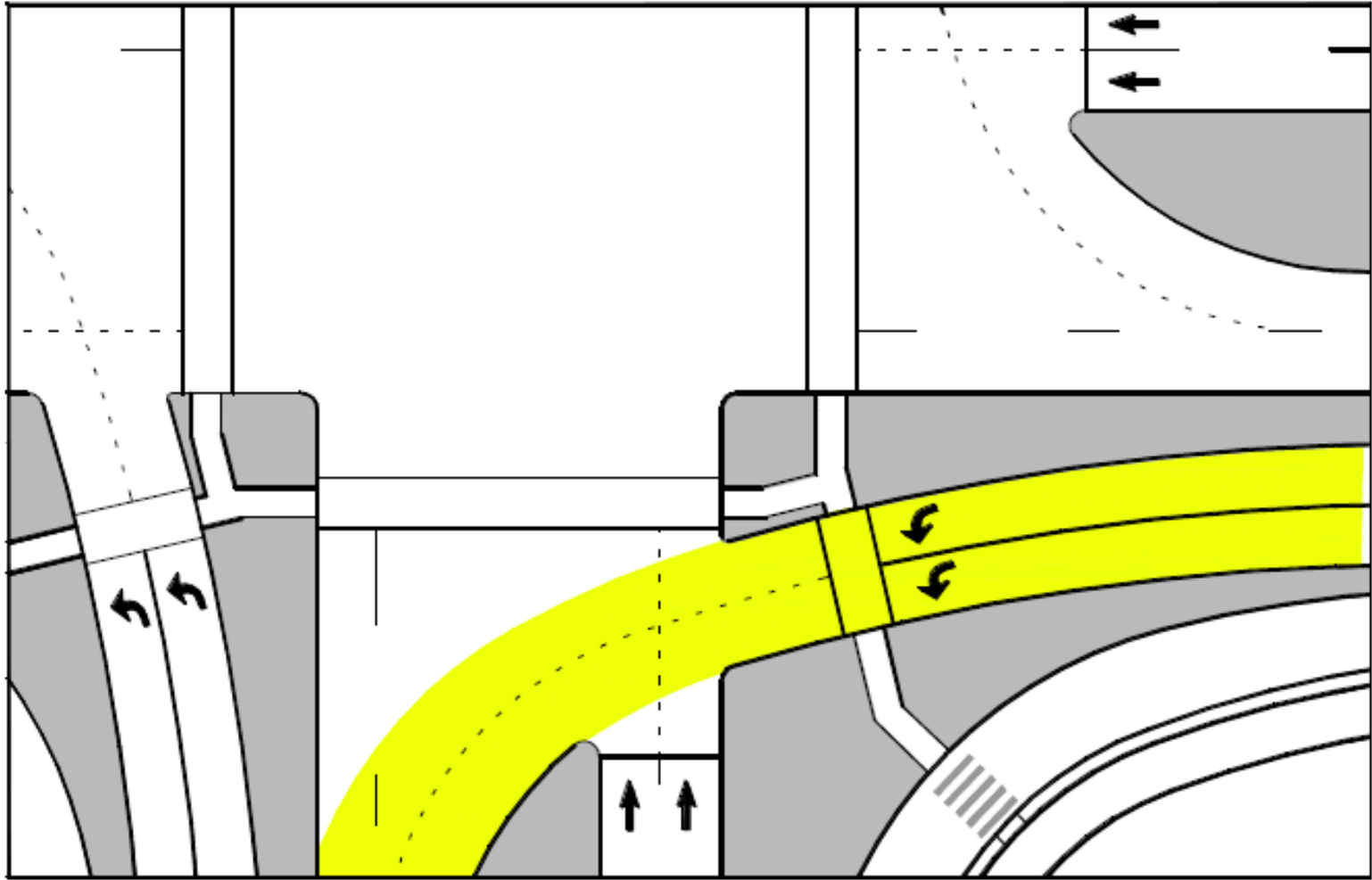


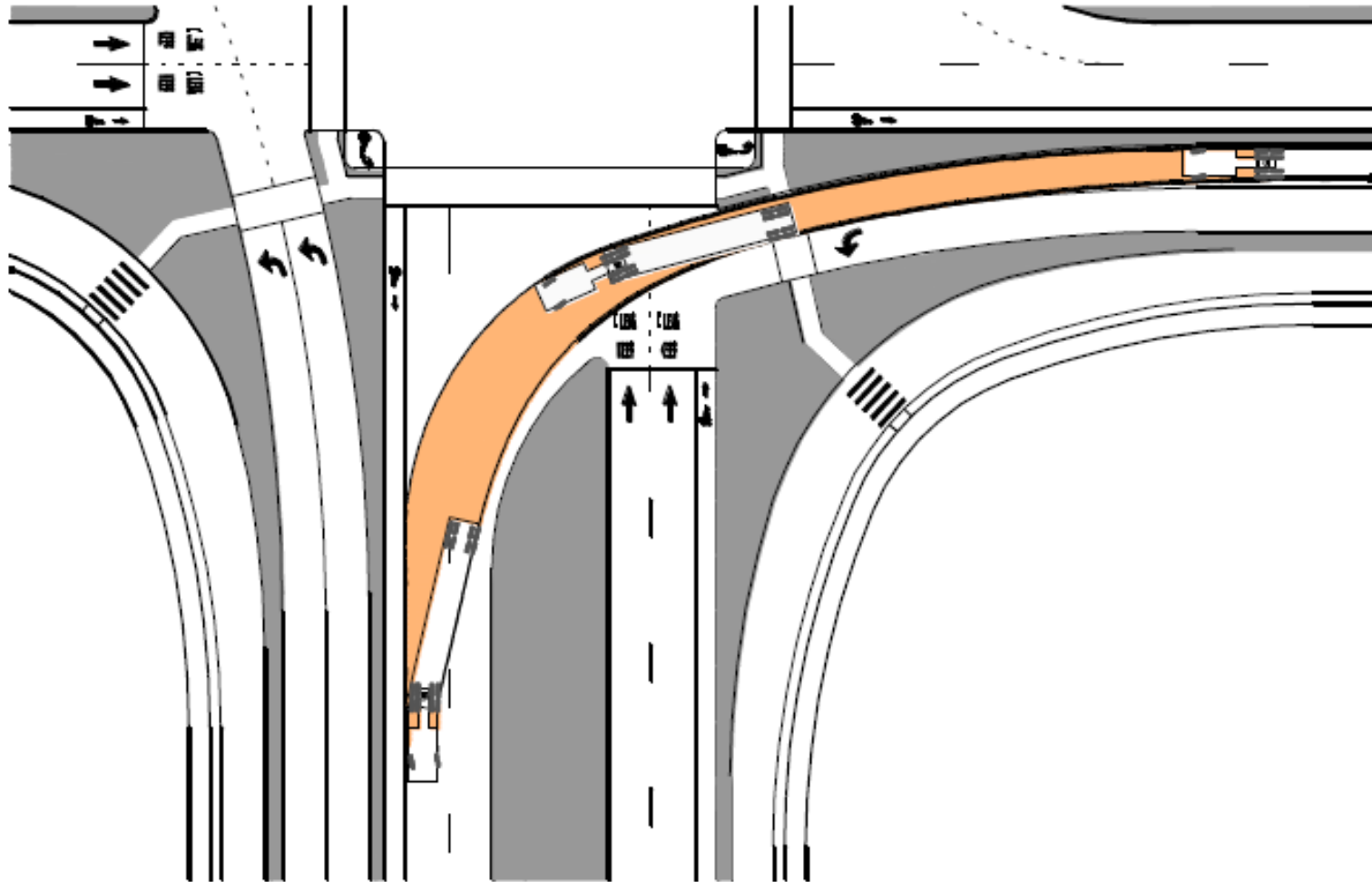


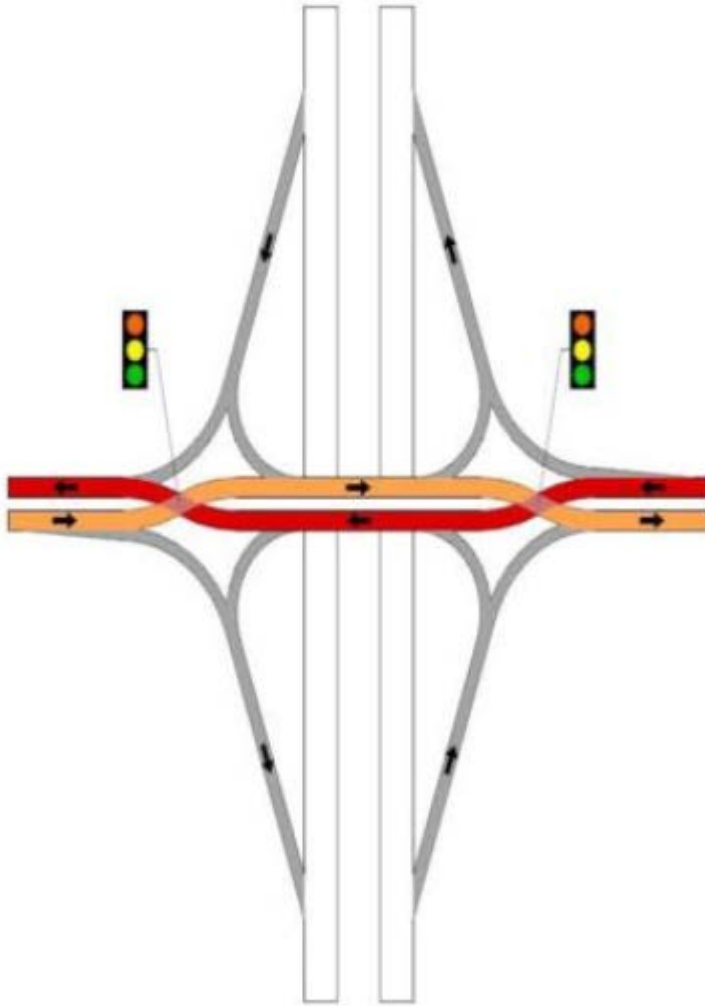
Accommodating a WB-67 (67-foot tractor-trailer truck) may require using both lanes (if that is a legal maneuver within the given jurisdiction).



Note the tight turning radius for the crossover movement at this DLT in Fenton, MO serving the entrance into a shopping mall (primarily passenger cars)





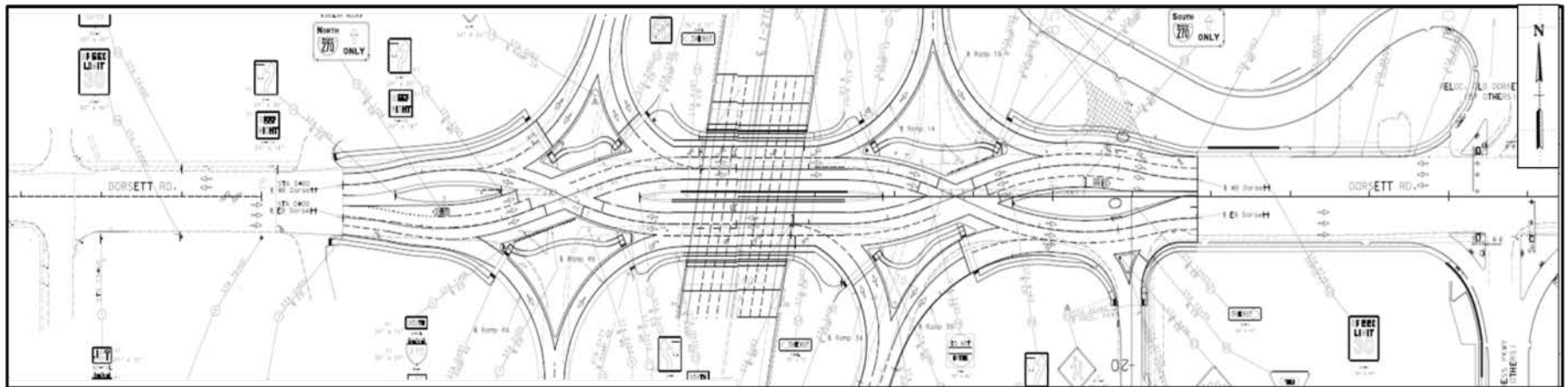


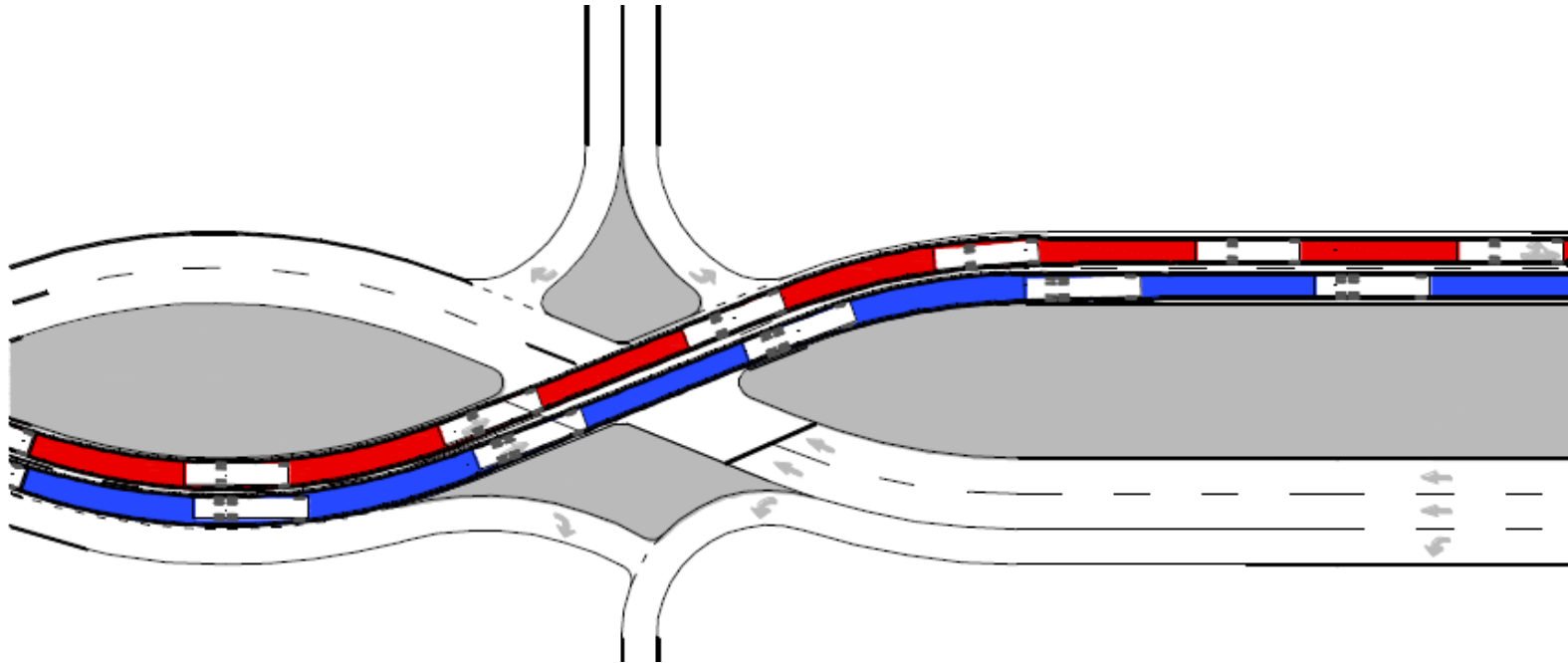
A diamond interchange form that allows the two directions of traffic on the crossroad to temporarily divide and cross to the opposite side to gain access to and from the freeway more easily

- Typically WB-67
- Lane width: 12' widened to 14'-16' in the crossover reverse curves and turning movements (especially on outside lanes)
 - Examine truck turning radii for acceptable operation
 - Consider curb choice and possible mountable curb in turning areas



- Design speed at a DDI affects the reverse curve radii through the two intersection crossovers
 - Typically ranging from 25 to 35 mph
 - Typical crossover angles of 25-50 degrees
 - The crossover angle is dictated by right-of-way constraints and available cross-section over or under the bridge





Path alignment at the crossovers should direct vehicles into the proper receiving lane. Drivers should be able to drive “straight” through the crossover intersection (tangent between the reverse curves). If the curve radii extends into the crossover (i.e. insufficient tangent), it makes for an awkward driving path and can lead to vehicle path overlap (encroachment into adjacent lane).

Vane Lane Channelizing Markings



Woods Chapel Road / I-70 DDI - Blue Springs, MO



Questions???

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