Reversible Lanes in Work Zones

Description

A reversible roadway is one in which the direction of traffic flow in one or more lanes is changed to the opposite direction for some period of time (weekday peak hours, weekend recreational traffic, special events, etc.). Their utility results from the advantage they take of the unused capacity of the minor-flow direction lanes to increase the roadway capacity in the major flow direction.

How This Will Help

- Reduce congestion during periods of high and unbalanced directional travel demand.
- Eliminate the need to increase capacity through conventional lane additions, which is perhaps not possible because of right-of-way or other limitations.

Application Techniques

- Should meet the standards and policies set forth in *A Policy on Geometric Design of Highways and Streets* (American Association of State Highway and Transportation Officials, AASHTO), *Manual on Uniform Traffic Control Devices* (MUTCD), and other applicable state-specific documents.
- Design of termini transitions is crucial as these areas have the highest levels of driver confusion.
- Departments of transportation (DOTs) must give additional consideration to controlling pedestrian movements, if any, across reversible lanes.
- Traffic control can be accomplished one of three ways: (a) use lane-use control signals (LUCS) that indicate lanes open (or not open) in a particular direction (refer to 2009 MUTCD Chapter 4M for more information), (b) use channelizing devices such as drums, tubular markers, cones, and vertical panels to separate the opposing traffic, or (c) use movable barriers that are capable of being repositioned laterally by a transfer vehicle that travels along the barrier. The 2009 MUTCD Figure 6H-45 shows a typical application for a temporary reversible lane using movable barriers.
- The 2009 MUTCD (Section 2B.26 and Section 3B.03) contain current standards for design and placement of signs and pavement markings for reversible roadways

Implementation Considerations

The Institute of Transportation Engineers (ITE) *Traffic Engineering Handbook* suggests that DOTs examine the following criteria before implementing reversible lanes:

- The traffic congestion problem under investigation should be both periodic and predictable.
- The ratio of a major-to-minor traffic count should be at least 2:1, preferably 3:1.
- Limited right-of-way (or ability to acquire it) to construct additional lanes.

Enforcement and incident management are other important considerations to control and manage reversible roadways. Because reversible lane use limits the overall cross-section width of a road, shoulders along many segments are often narrow or nonexistent, which eliminates the ability to use roadside traffic enforcement vehicles. It also greatly limits the ability of vehicles to make emergency stops and of service vehicles to respond to incidents.

Implementation Examples

- **Rehabilitation of Arlington Memorial Bridge in Washington, DC (2018–ongoing).** Existing six travel lanes are reduced to three travel lanes (one eastbound, one westbound, and one center-reversible lane). The reversible lane is reconfigured daily and traffic is controlled by overhead LUCS. *Using reversible lanes, construction reduced expected completion date to 2 years as compared to 3 years if using permanent two-lane closure. Average daily bridge traffic is approximately 50-60,000 vehicles per day, a 70/30% peak period direction split.*
- **US-131 between 10 Mile and 14 Mile roads near Rockford, Kent County, MI (2018)**. Used reversible lane with moveable barrier to accommodate daily rush hour traffic (a.m. and p.m.). *Construction was completed within one season as opposed to two seasons, resulting in significant cost savings.*
- **I-75 and I-675 Reconstruction in Zilwaukee, Kochville, and Frankenlust Townships, Saginaw and Bay Counties, MI (2017)**. Used reversible lane to accommodate heavy tourist traffic when the lanes on I-75 were reduced from four to three. The reversible lane provided three lanes north Wednesday through Saturday, and three lanes south Sunday through Tuesday. *NB traffic across the three lanes reached 70,000/day.*
- **Reconstruction of I-75 from Dixie Highway to Hess Road, Saginaw County, MI (2015 and 2016)**. The four lanes in each direction of I-75 have heavy weekend tourist traffic. Using a reversible lane with moveable barrier, MDOT kept three lanes open in the peak direction at all

times (three lanes north Wednesday through Saturday, and three lanes south Sunday through Tuesday). *MDOT estimated this operation saved $30 million in user delay. NB traffic across the three lanes reached 70,000/day.*

- **I-75 Linwood to Pinconning project in Bay County, MI (2012)**. Reversible lane using moveable barrier accelerated the construction schedule, *reducing the construction time from 2 years to 1 year*. Michigan DOT moved the moveable barrier twice each week to keep two lanes open for heavy tourist traffic in one direction (northbound on Fridays and Saturdays, southbound on Sundays).
- **I-94 between East 7th Street in St. Paul and Hwy 120/Century Ave. in Maplewood, MN (2017)**. Reversible lane using movable barrier allowed contractors to maintain three lanes of travel open during peak volumes (three lanes westbound in the morning and three lanes eastbound in the afternoon).
- **MD 140 Westminster Pike/Baltimore Boulevard Bridge Reconstruction, MD (2015).** To avoid excessive traffic back-ups from reducing lanes on the bridge from four to three, Maryland DOT used a reversible lane using movable barrier and LUCS signal.

Highlights

1. **Reversible lane capacity can range between 1,600 and 2,250 vph.**
2. **Travel times improved.**
3. **Understanding traffic demand—**
   - **Weekday reversible lane applicable to recreational and/or holiday traffic (outbound from Wednesday, inbound from Saturday)**
   - **Daily peak a.m./p.m. changes to accommodate commuting traffic.**
4. **Construction project schedule reduced by as much as one-third to one-half.**
5. **Safer work zone, improved productivity.**

Reversible lane operation can maintain capacity. Image below shows how the ability to change time of day or day of week, depending on traffic demand, is crucial.