Improving the Safety of Moving Lane Closures

Presented by:
Doug Steele, P.E.
Moving Lane Closures

• Any operation using trucks, arrowboards, and signs to provide continuously moving or intermittent operations
  • Primarily maintenance activities
  • Applications to construction work zones, too
• Focus: multi-lane, high-speed highways, urban and rural settings, day and night activities
Why Moving Lane Closures?

• Increasingly common temporary traffic control technique
• Inherently hazardous
  - Trying to do a lot with a little
  - Dynamic operation, constantly changing environment
• Has not been heavily researched
What do drivers respond to?
Study the effect of typical traffic control components and procedures on driver behavior through videotaping and speed monitoring of field tests.
Locations

• I-90 at Meacham Road, Schaumburg (Urban)
• I-88 at Somonauk Road, Dekalb (Rural)
• I-290 at Laramie Avenue, Chicago (Ramps)
• I-90 at Barrington Road, Hoffman Estates (Night)
Results
Work Area
Buffer Area Tests - Urban

Legend

- PCMS
- TMA w/arrowboard
- Safety Barrel

Inner Shoulder
- Lane 1
- Lane 2
- Lane 3
- Lane 4

Outer Shoulder
- Safety Barrel

Work Area

Meacham Road

1500-2500’
100’
50’
Var.

Short spacings to prevent intrusions in the taper and work zone
Buffer and Work Area Length
Buffer Test – No Barrel

Vehicles, percent

Distance downstream from end of work zone, ft

- Cars
- SU’s
- MU’s

Traffic Direction

Expanding the Realm of Possibility™
Buffer Test – Barrel @ 200 ft

Vehicles, percent

Distance downstream from end of work zone, ft

- Cars
- SU's
- MU's

10 Attempted Intrusions
Lead Truck to Increase Visibility

Legend
- PCMS
- TMA w/arrowboard
- Safety Barrel

Inner Shoulder
- Lane 1
- Lane 2
- Lane 3
- Lane 4

Outer Shoulder
- Lead Truck
- Buffer Space
- 1500-2500'
- 100'
- 50'
- Var.

Meacham Road

ARA
Expanding the Realm of Possibility™
At 100 ft attempted intrusions = 0
At 200 ft attempted intrusions = 0
At 300 ft attempted intrusions = 4
Results
Advance Warning and Transition Zones
Advance Warning Area - Setup

Legend

- PCMS
- TMA w/arrowboard
- Safety Barrel

Meacham Road Br.

Lane 1
Lane 2
Lane 3
Lane 4

Inner Shoulder

Outer Shoulder

1500-2500’

100’

50’

Performed with and without police
Advance Warning – Free Flow
Advance Warning – Congested
2-Truck Taper – Speed 20 MPH
2-Truck Taper – Speed 40 MPH
Results
Ramps
Nighttime
Weaving Traffic at Ramps
Weaving Traffic at Ramps

1 vehicle crossed from lane 3 to the off ramp between the TMAs
7 weaves in between TMAs 1 and 2
13 vehicles crossed from the off ramp to lane 3 between the TMAs
What Were They Thinking?
Additional Advance Warning
Truck

Without pickup

With pickup
Flash Vehicles Upstream

Vehicles per hour

Without pickup

With pickup

Scenario

Total Vehicles

Close Vehicles
Summary of Key Findings
Work Area

- Tradeoff between rollahead distance and intrusions
- Relationship between cut-in distance and traffic density/speed
- Buffer space – 100 ft minimum
  - Without lead truck – 150 ft maximum
  - With lead truck – 200 ft maximum
- Lead truck – significant benefit. Work truck can serve this purpose.
Advance Warning and Transition

- Cut-out distance is a function of traffic density/speed
- Tradeoffs between truck spacing, intrusions into the taper, and advance warning
- Truck spacings, recommend varying based on conditions and potential for intrusions
  - 200 ft minimum
  - 500 ft maximum
- Number of trucks in the taper can vary from 2 to 4
- Benefit of the blocker truck
- Additional advance warning truck (especially at night)
Thank You!

For more information, please contact:
Douglas Steele, ARA
dsteele@ara.com
217-356-4500