Lane Widths, Channelized Right Turns, and Right-turn Deceleration Lanes in Urban and Suburban Areas

NCHRP Project 3-72

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Research Team

- Midwest Research Institute
- Kittelson & Associates, Inc.
- Accessible Design for the Blind
- David Harkey, Consultant
Project Overview

• Start date: May 20, 2003
• Completion date: January 31, 2006
• Funding: $450,000
• NCHRP Staff: Ray Derr
Objective of Research

• To develop design guidance and criteria for addressing the safety and operational tradeoffs for motorists, pedestrians, and bicycles for three specific topics:
  – Selecting lane widths
  – Channelizing right turns
  – Using right-turn deceleration lanes at driveways and unsignalized intersections
Scope of Research

- Urban and suburban arterials
- Speeds of 45 mph or less
Research Approach

Phase I

• Task 1 – Synthesis on Lane Width
• Task 2 – Synthesis on Channelized Right Turns
• Task 3 – Synthesis on Right-turn Deceleration Lanes
• Task 4 – Assignment of Priorities and Development of Recommended Work Plan
• Task 5 – Interim Report

Phase II

• Task 6 – Data Collection and Analysis
• Task 7 – Refinement of Syntheses
• Task 8 – Final Report
Phase I

• Drafts of all three syntheses – completed, reviewed, and further revised
  – Current knowledge and practice
  – Literature review
  – Highway agency survey to document design standards, policies, and practices

• Syntheses will be revised again after Phase II research, and then published

• Development of work plan for Phase II
Interim Panel Meeting

- Panel meeting – March 2004
- Key issue: depth vs. breadth
  - Three topic areas (lane widths, channelized right turns, and right-turn deceleration lanes)
  - Three travel modes (motor vehicles, bicycles, and pedestrians)
- Budgeted funds were not sufficient for in-depth consideration of all three topic areas for all three modes
- Panel had to make difficult choices
Interim Panel Meeting

- After much debate, panel decided *not* to include channelized right turns in Phase II
- AASHTO SCOR meeting in March 2005
  - Considered adding funding for the channelized right turn work
  - In the end, decided not to do so
Phase II Activities

- Accident studies
- Traffic operational studies
- Traffic simulation modeling
- Analysis of accident and operational data
- Meta-analysis of bicycle studies
- Development of economic warrants for right-turn deceleration lanes
Phase II Activities
Lane Widths

KEY QUESTIONS:
• What traffic operational and safety benefits for motor vehicles would be lost by providing shorter crossing distances for pedestrians?
• What is the safety effect of lane width on bicyclists?

STUDIES:
• Cross sectional comparison of accident frequency and severity for intersection approaches and mid-block sections with a range of lane widths (in conjunction with NCHRP Project 17-26)
• Operational field study of saturation flow rates on intersection approaches with a range of lane widths
• Field study to measure vehicle speeds on arterial sections upstream and downstream of lane width transitions
• Meta-analysis to combine results from existing accident studies for bicyclists
Phase II Activities
Right-turn Deceleration Lanes

KEY QUESTIONS:
• In what situations should a right-turn deceleration lane be provided at an unsignalized intersection? At a major commercial driveway?
• Can warrants for right-turn deceleration lanes be established?

STUDIES:
• Traffic operational simulation modeling with VISSIM to evaluate specific scenarios at right-turn deceleration lanes
• Development of an economic warrant for right-turn deceleration lanes using operational results from simulation modeling and safety results from recent FHWA before-after study
Current Status of Phase II Research

Lane Widths

• Accident study of motor vehicles at intersections
  – Work under way in conjunction with NCHRP Project 17-26

• Accident study of motor vehicles at mid-block locations
  – Work under way in conjunction with NCHRP Project 17-26

• Operational field study of saturation flow rates at intersections
  – Data collected; analysis about to begin

• Meta-analysis of bicycle studies
  – In progress

• Speed studies
  – Data being collected
Preliminary Results
Right-turn Deceleration Lanes

Example of traffic simulation modeling results (VISSIM)
Questions?
Channelized Right-Turn Studies

• *Highway Capacity Manual* analysis
  – Determine the traffic operational effects of channelized right turns with varying traffic control configurations at signalized intersections

• Traffic operational simulation modeling with VISSIM or CORSIM
  – Evaluate the operational performance of motor vehicle and pedestrian movements at signalized intersections

• Cross-sectional comparison of motor-vehicle accident frequencies, severities, and collision types
  – For intersections with and without channelized right turns
  – For channelized right turns with and without deceleration lanes
Channelized Right-Turn Studies

• Before-after comparison of approximately 35 intersection approaches on which channelized right turns have been installed

• Cross-sectional comparison of pedestrian accident frequencies for intersections with and without channelized right turns

• Observational studies of pedestrian behavior and pedestrian-vehicle interactions at channelized right turns
  – Include observations of pedestrian-bicycle interactions and bicycle-vehicle interactions