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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:

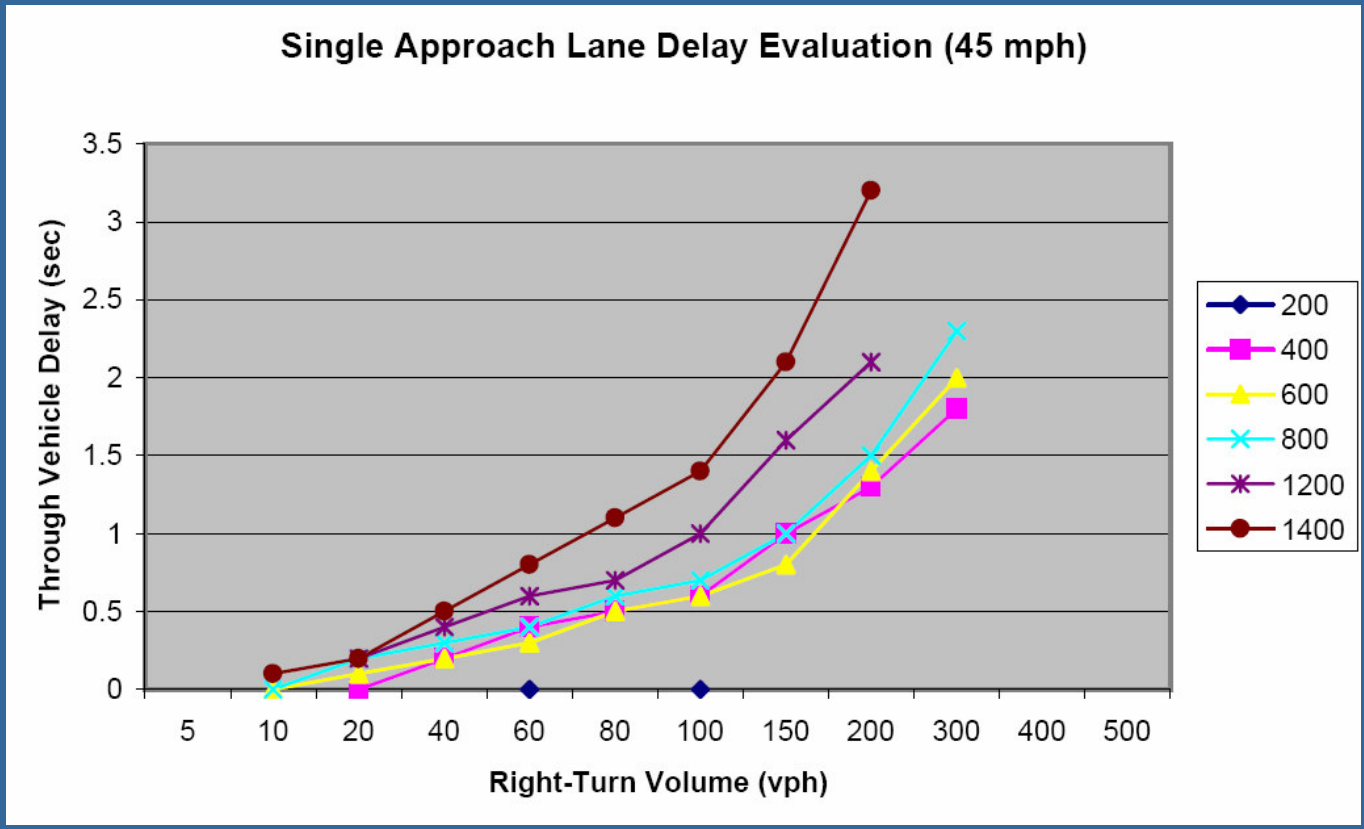
- Traffic operational simulation modeling with VISSIM to evaluate specific scenarios at right-turn deceleration lanes
- Development of an economic warrant for right-turn deceleration lanes using operational results from simulation modeling and safety results from recent FHWA before-after study

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