Use of Protected/Permitted Left-Turn Signal Control in the U.S.

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Today’s Presentation

- Brief overview of NCHRP 3-54 project
- Survey tool to collect data
- Results
Introduction to NCHRP 3-54
Evaluation of Traffic Signal Displays for the PPLT Control

- **Project objective:** evaluate the safety and effectiveness of different signal displays and phasing for PPLT control

- **Project deliverables:** recommend display(s) for uniform use across the U.S.
  - No guidelines

- **Milestone dates:** Interim report August 1999, Final report December 2000
NCHRP 3-54 Project Tasks

- Agency Survey
- Static Driver Survey
- Operational and Conflict Study
- Crash Analysis
- Interim Report and Panel Meeting
- Animated Driver Survey
- Panel Meeting and Final Report
Agency Survey

- **Task objective** - identify and quantify the different types of PPLT displays used in the U.S.

- **Administered to** - mailed to State DOT T.E.’s in all 50 states, City and County T.E.’s within metro areas of greater than 180,000 population, and others as identified (see project web page)
Agency Survey Results

- 325 surveys mailed out, representing 250 of the largest city and county transportation agencies
- 180 surveys returned (55%), of which 168 were used in analysis
Survey Tool

- **Section I - General Information**
  - How many signalized intersections
  - How many use PPLT phasing

- **Section II - PPLT Signal Displays**
  - Head arrangement, head location, signal indication, signing

- **Section III - Geometry and Phasing**
  - Wide median and narrow intersections
  - Shared, exclusive, and combination lanes
  - Leading/Lagging left turn phasing
  - Use of special phasing
  - Laws and ordinances that effect PPLT usage
107,219 signalized intersections represented in 168 surveys analyzed

29% of those intersections use PPLT phasing on at least one approach
Examples of Head Arrangements

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Signal Head Arrangement

Signal Display Arrangement

Returned Surveys

5 sec hor 5 sec vert 5 sec clust 4 sec hor 4 sec vert 4 sec clust 3 sec vert
Predominant PPLT Signal Display Used by each State

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Mounting Locations - Overall

- Percent of Responses
- Location

- Center: 34.5%
- Between: 46.4%
- Other: 0.07%
- Vary: 11.9%
Use of Supplemental Signs

- Number of Agencies: 90
- Categories: No, Always, Under Certain Cond., Diff Signs for Diff Cond.
- Values: 28, 82, 52, 7

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Supplemental Sign Usage

PROTECTED LEFT ON GREEN ARROW: 5.0%
LEFT TURN SIGNAL: 6.9%
LEFT TURN YIELD ON GREEN: 3.8%
LEFT TURN YIELD ON GREEN: 75.5%
OTHER: 8.8%
Permitted Left-Turn Indication

Number of Agencies

- Solid Green Ball: 165
- Flash Green Arrow: 0
- Flash Yellow Ball: 1
- Flash Yellow Arrow: 1
- Flash Red Ball: 4
- Flash Red Arrow: 3
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Geographic Location of Unique PPLT Indications
Left Turn Lane Type

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Left-Turn Phase Sequence

Percent of PPLT Signal Phasing

- Lead: 83%
- Lag: 11%
- Lead/Lag: 6%
Phasing Methods

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Number of Agencies

- None: 95
- Dallas/Arlington Phasing: 8
- Exclusive Left Lead/PPLT Lag: 30
- Other: 42

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Examples of Unique Displays
Cupertino, California
Flashing Red Ball

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Dallas, Texas
Dallas Display

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Dover, Delaware
Flashing Red Arrow
Dover, Delaware
Flashing Red Arrow

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Seattle, Washington
Flashing Yellow Ball

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Detroit, Michigan
Flashing Red Ball
Questions?