

Pedestrian Issues in Traffic Signal Operations

Workshop Accommodating Pedestrians at Signalized Intersections

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Simple Truths

- Walking is the oldest form of transportation
- Traffic Signal design dictates operations boundaries
- Pedestrians behavior relative to signal timing has not been well documented
- Guidance on “Traffic Signal Operations” is sparse

The Problem is Ancient



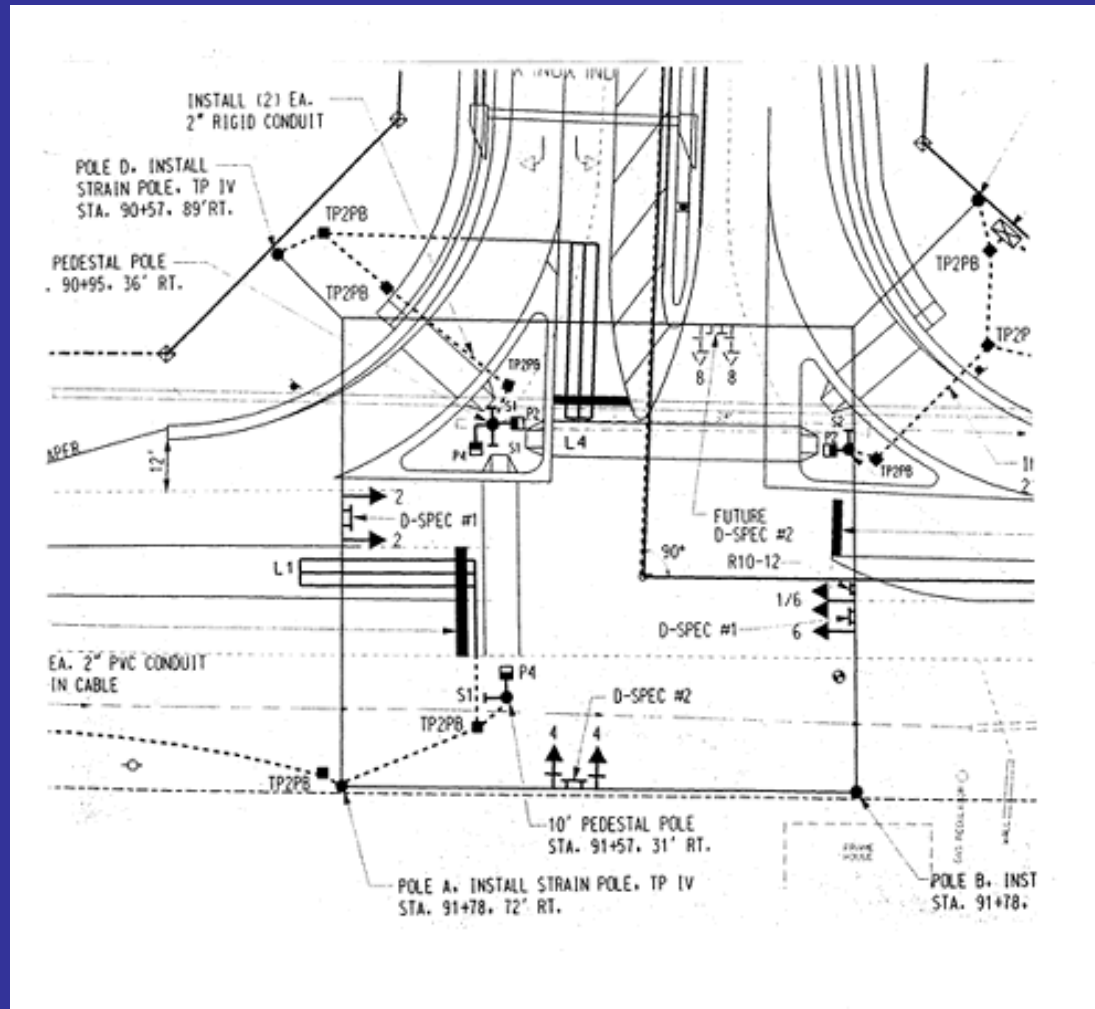
"What's with kids nowadays? Walking upright's not good enough for you?"



How are we doing?

- Pedestrian Safety Report to Congress
- 4,784 Pedestrian fatalities
 - 542 at signalized intersections
 - 3,388 at mid-block locations
- Assessment of developmental and pre-deployment technologies

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Design References

- Agency Design Policy Manual
- Agency Standard Plans
- MUTCD
- AASHTO Green Book
- Highway Capacity Manual
- ITE Manual of Traffic Signal Design
- Traffic Engineering Handbook

Agency Design Manuals and Policies

- **Reference**
 - AASHTO Green Book
 - MUTCD
- **Agency Experience**
 - Training
 - Interaction with the public
 - Exposure to liability

AASHTO Green Book

- Section on pedestrians added 1973
- General Considerations & Characteristics
 - Urban Areas
 - Anecdotal Observations
 - Measures for older pedestrians
 - Walking speeds
- Reference *AASHTO Guide for Planning Design and Operation of Pedestrian Facilities*

MUTCD

- Define meaning of signal indications and intervals
- Describes
 - Walking Speed
 - Operation during preemption
 - Accessible Pedestrian Signals
 - Countdown Pedestrian Signals
 - Pedestrian Detectors
 - Intervals & Signal Phases

MUTCD

- **Warrant 4, Pedestrian Volume.**
 - The pedestrian volume 100 or more for each of any 4 hours or 190 or more during any 1 hour
 - Does not consider number of lanes
 - Volume can be reduced if walking speed is less than 4ft/sec

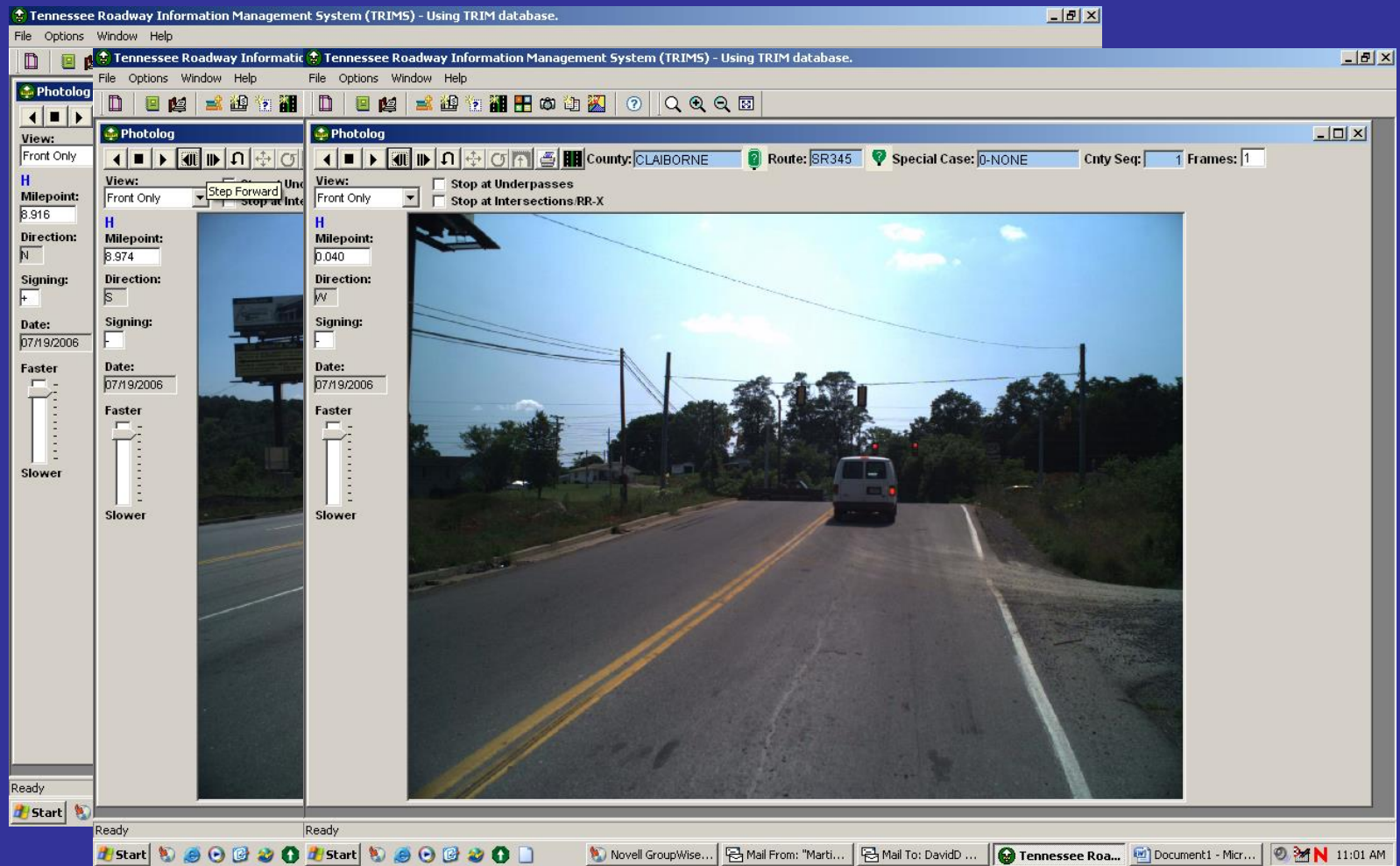
MUTCD

- **Section 4D.03 Provisions for Pedestrians**
 - Shall consider the needs of pedestrians
 - If engineering judgment indicates the need for pedestrian movements
 - Signal indications shall be provided
 - Provide sufficient timing every cycle or provide pedestrian detectors

State DOTs

- **4.3.1 Pedestrian Considerations**
- Unless specifically excepted by the Office of Traffic Safety and Design, pedestrian signal heads, pushbuttons, crosswalks, landings, and curb ramps shall be provided for all approaches to an intersection.

Always include Pedestrian Treatment During Design



Signal Timing Settings

- Design or Operations
- Signal Timing Charts
 - What level of authority for modifications
 - Approved by Licensed Engineer
 - What settings require study prior to modification

Are Issues Being Addressed



National Traffic Signal Report Card 2007	
Management	D-
Signal Operation at Individual Intersections	C
Signal Operation in Coordinated Systems	D
Signal Timing Practices	C-
Traffic Monitoring and Data Collection	F
Maintenance	C-
OVERALL	D

Resources for Operations & Maintenance Lacking

- GAO Report
- Traffic Signal Report Card
- Office of Program Review

Traffic Signal Operations

*On your own please write in 25 words or less: Please
write your definition of
“Traffic Signal Operations”*

*“Signals go Green, then Yellow, then Red, sometimes
they work sometimes they don’t”*

*“The establishment of Objectives and Performance
Measures to achieve safe and efficient management
of traffic signal infrastructure to maximize throughput
and minimize delay”*

Traffic Signal Operations

- Agency Policy Manual
- MUTCD
- Highway Capacity Manual
- Traffic Engineering Handbook
- Traffic Signal Timing Manual

Well Documented

- Pedestrian Intervals
 - Walking speeds
 - Walk, Flashing Don't Walk
 - Impact Minimum Cycle Length
 - Impact Minimum Splits
 - Impact coordination settings
- Accessible Pedestrian Devices
- Operation of Countdown Displays

Engineering Judgment

- Acceptable Pedestrian Delay
- Increases to Pedestrian Clearance
- Rest-in-Walk
- Leading & Lagging Pedestrian Intervals
- Exclusive Pedestrian Intervals
- Avoidance of Pedestrian conflicts with permissive left & right turning vehicles

Impacts to Capacity

- Multi-Lane arterials versus minor street and pedestrian phases
 - Capacity due to side street actuation
 - Coordination issues
 - $\frac{1}{2}$ cycles
 - Median Islands

Median Islands



Maintenance

- Failed Pushbuttons
 - Impacts to capacity
 - Stuck on
 - Impacts to Pedestrians
- Signal Indications
- Detection

There is much work to do



1920 – Detroit, MI
First 4-way three color signal in U.S.

Always consider pedestrians!



Even a caveman could do it!

Questions ????

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