DI LEMMA ZONE PROTECTION

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Agenda

- What is Dilemma Zone Protection?
- Traditional Approach
- Texas Transportation Institute Detection Control System (D-CS)
- Wavetronics Dilemma Zone Protection Systems
What is a Dilemma Zone?

- A length of roadway on the approach to a signalized intersection within which drivers are indecisive as to whether to stop or continue on through when seeing the yellow indication.
Dilemma Zone

$D_{bz} = \text{distance to the beginning of the dilemma zone}$

$D_{ez} = \text{distance to the end of the dilemma zone}$
Traditional Approach

- Advanced Detector
- Multiple Detectors
- Advanced Warning Signs
- Additional Minimum Green Time
- Adjustable Vehicle Extension
Advanced Detection

Multiple Advance Detector System
55-mph design speed

Direction of travel

6' x 40' stop-line detector

Presence detection mode.
Passage time is 1.2 s.

- Dilemma zone: starts at 5.5 s and ends at 2.5 s travel time from the stop line.
- Clearance zone: length of roadway to clear before presenting the yellow indication.
Advanced Warning Sign
Outcome

- Reduced Crashes
- Reduced Red Light Running
- Does Not Adjust For Variable Speeds
- Tends to “Max Out” in medium to heavy traffic levels so protection is lost
New Options

- Texas Transportation Institute’s – Detection Control System (D-CS)
- Wavetronics - Dilemma Zone Protection Systems
TTI’s Detection Control System

- Developed by the Texas Transportation Institute
- Uses advanced loops for speed and classification.
D-CS

Vehicle Detection System

Traffic Control System

Detector Amplifiers

Industrial PC (7" x 7" x 10")

Digital I/O Interface

Detection-Control System
Observations

- Adjust dilemma zone to the speed of the vehicle
- Adjusts to look for smaller gaps
- Stop bar loop needed for added initial
- Speeds may change after crossing the loops
- Currently found only in a Naztec 2070 controller
- Cost
Previous Study

Eight Texas Locations

- Eight Texas Locations
- Results for D-CS Approaches
  - Red-light violations reduced by 58%
  - Severe crashes reduced by 39%
  - Approach delay reduced by 14%

Wavetronix Dilemma Zone Protection System

- Developed by the Wavetronics
- Uses microwave (SmartSensor) for speed and vehicle detection.
Observations

- Adjust dilemma zone to the speed of the vehicle
- Automatic lane configuration
- Can set up additional zone for queue clearance
- Interface to existing cabinets
- Maximum zone length 500 feet
- No second stage to minimize max outs
Further Study

- Two installations of TTI’s D-CS on US 24 in Tazewell County to be studied by Virginia Tech

- One installation of the Wavetronics system on US 24 in Tazewell County to be studied by Bradley University
QUESTIONS?

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