



# Field Evaluation of Detection Control System (D-CS)

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# Detection-Control System (D-CS)

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- Developed by TTI (2002-2004)
  - Suitable for isolated, rural, high speed ( $\geq 45$  mph), signalized intersections
  - Intended benefits
    - Reduce red light violations
    - Reduce # of vehicles trapped in dilemma zone
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# Concept of Dilemma Zone

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- A distance upstream of the intersection or a time period before entering the intersection, a vehicle cannot make a full stop before the stop bar when the signal turns red, or cruise through the intersection before the cross street traffic gets green.
  - A range in distance or time before entering the intersection, 10%-90% drivers elect to stop when seeing the signal change from green to yellow.
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# Background of Project Initiation

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- 21% of all crashes occur at signalized intersections
  - Crashes at rural, high speed, signalized intersections tend to be more severe.
  - Different strategies have been developed to treat dilemma zone
    - Basic green extension
    - Enhanced green-extension
    - MOVA (England)
    - LHOVRA (Sweden)
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# TTI's D-CS (Jim Bonneson, et.al.)

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- Defines dilemma zone as the time period between 5.5 and 2.5 seconds before a vehicle enters the intersection
  - Requires 2 loop detectors in speed trap configuration be installed 1000 ft upstream of the intersection
  - Use a 2-step gap out strategy to “eliminate” sudden green phase termination by max out
  - No more than one car and no trucks will be trapped in dilemma zone
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# TTI's D-CS Evaluation

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- D-CS deployed at 8 sites in TX
  - 39% crash reduction rate
  - Up to 70% reduction in red light violations
  - Benefit/cost ratio of 15:1 per intersection per year
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# FHWA's Field Evaluation

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- More rigorous and thorough
  - Use third party field experts when possible
  - 12 to 15 sites in different states
  - Try to define the limits (based on before and after data) of the applicable range of D-CS
  - Document the unique issues encountered at each site
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# Objectives

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- Use verifiable instrumentation to capture the number of vehicles trapped in dilemma zone and running red light
  - Quantify the effectiveness and limitations of D-CS on safety, red light violation, and operation efficiency
  - Produce guideline for broad implementation of D-CS
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# Criteria of Evaluation Sites

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- 2 or more through lanes and left turn lane on major approaches
  - 45 mph or higher post speed
  - 1400+ VPH on major approaches
  - 5% or more truck traffic
  - 3+ years traffic and speed related crash data
  - Intersection with a consistent history of red light violations
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# FHWA responsibilities

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- Provide up to \$10,000 per site for equipment
  - Provide site specific detail design and instrumentation design
  - Develop and execute QA/QC checklist
  - Assign field expert to retrofit existing signals into D-CS
  - Collect and analyze traffic and safety data for a minimum of 2 years
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# Local Partner Responsibilities

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- Cover remaining cost (about \$40,000/site) to retrofit existing signals into D-CS
  - Provide communication line to monitor the D-CS sites
  - Facilitate timely acquisition of crash and traffic data
  - Help schedule the field installation
  - Assign local staff (if possible) to help with data collection and trouble shoot
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# Contact information

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