



U.S. Department of Transportation
Federal Highway Administration



Safe Roads for a Safer Future
Investment in roadway safety saves lives

Red-Light Running



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Traffic Signals

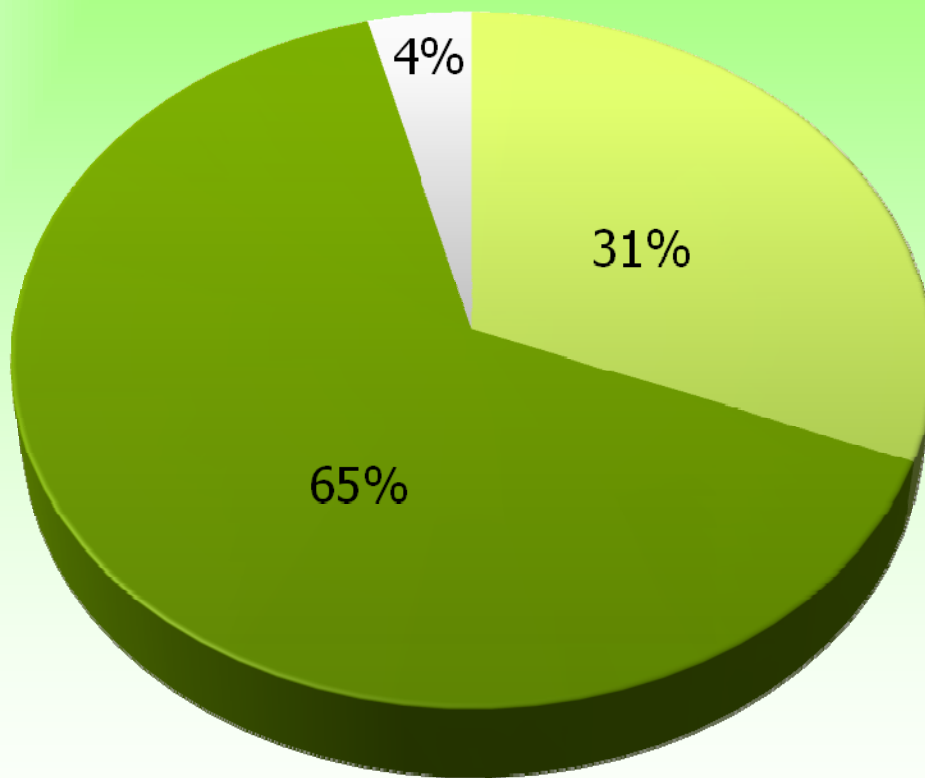
There are at least 3 million intersections in the United States.

At least 300,000 are signalized.



Intersection Fatalities

There were 8,657 intersection fatalities in 2007



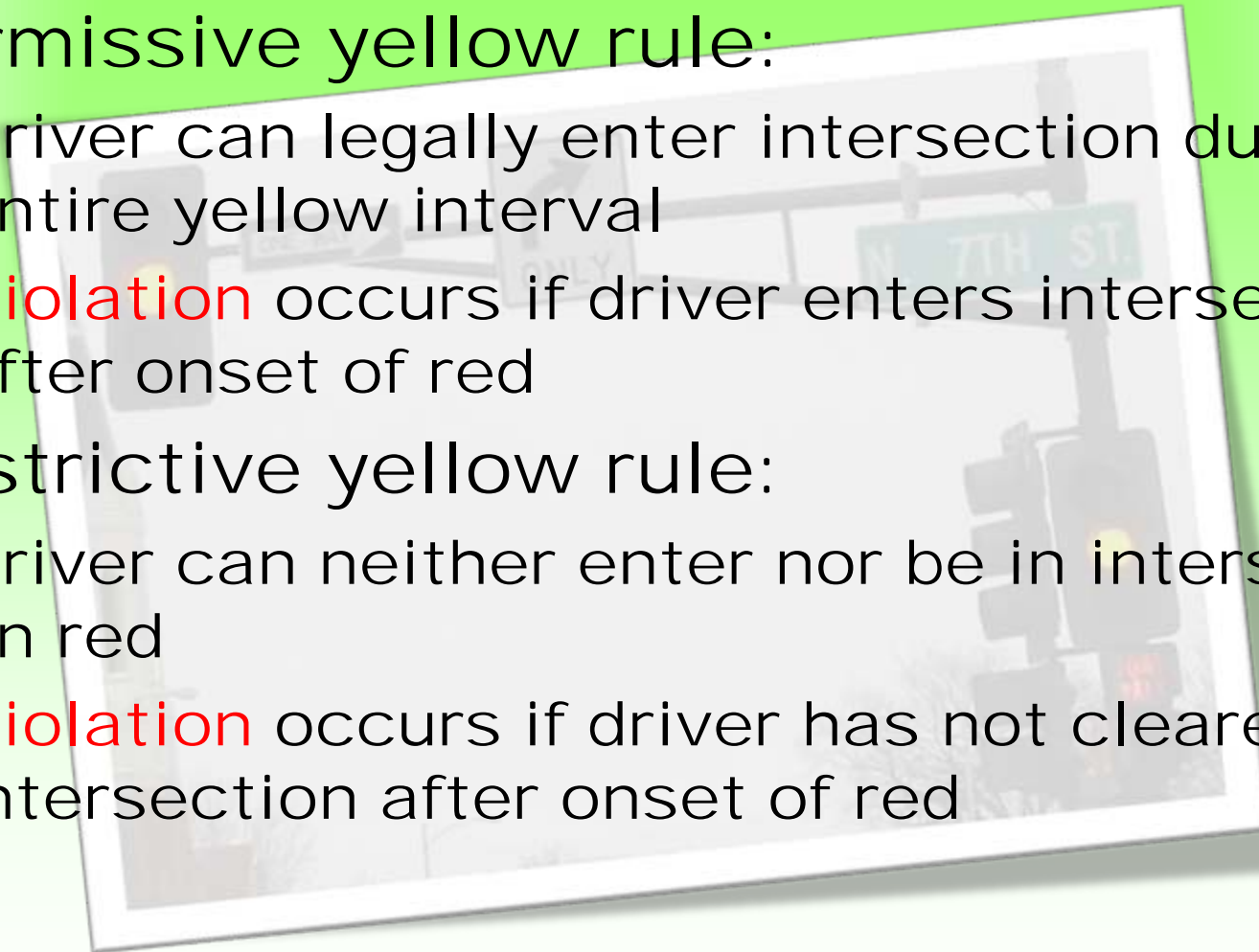
Fatality Location

- Signalized Intersection
- Unsignalized Intersection
- Unknown

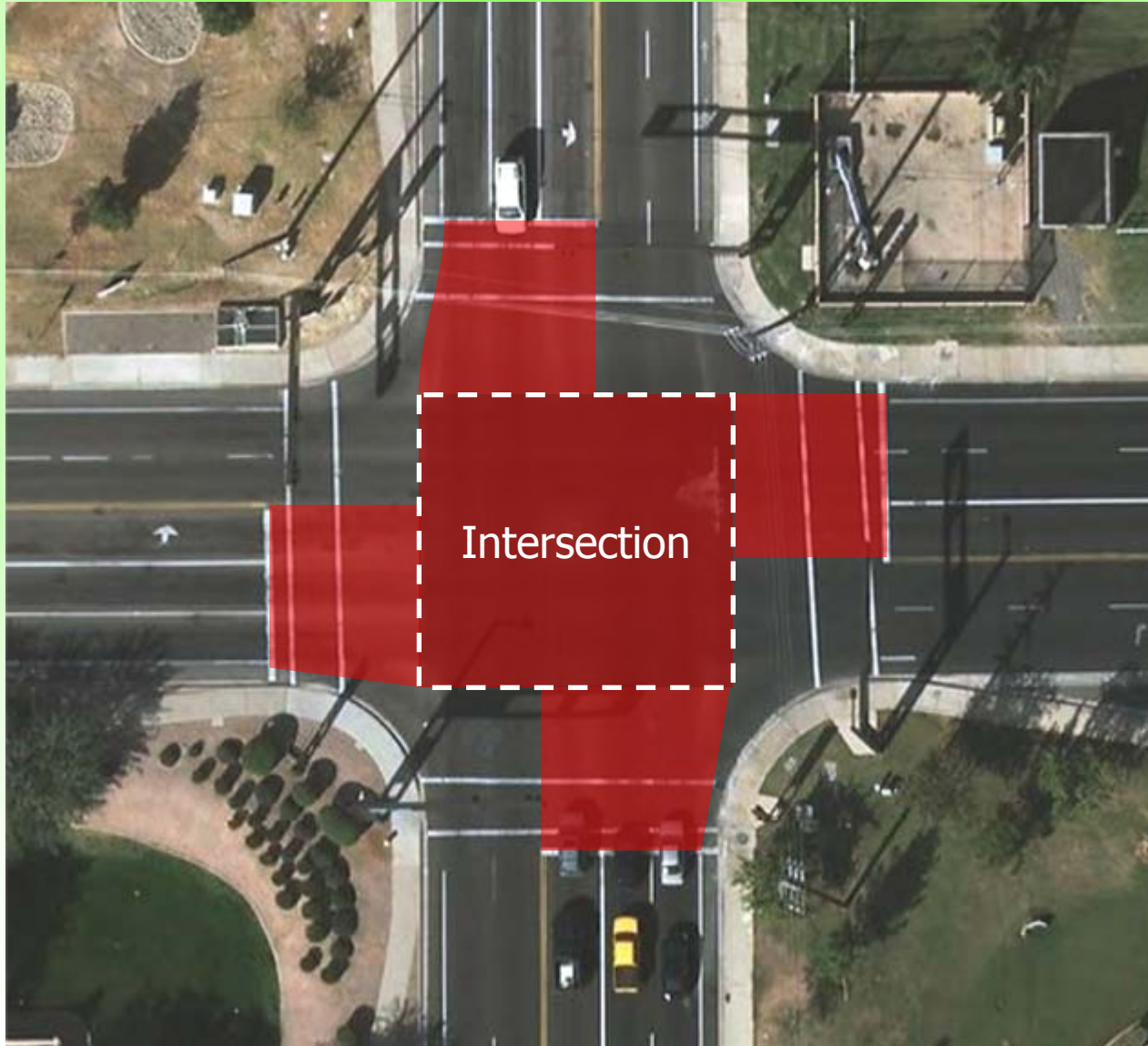


What is Red Light Running?

- Permissive yellow rule:
 - Driver can legally enter intersection during entire yellow interval
 - **Violation** occurs if driver enters intersection after onset of red
- Restrictive yellow rule:
 - Driver can neither enter nor be in intersection on red
 - **Violation** occurs if driver has not cleared intersection after onset of red

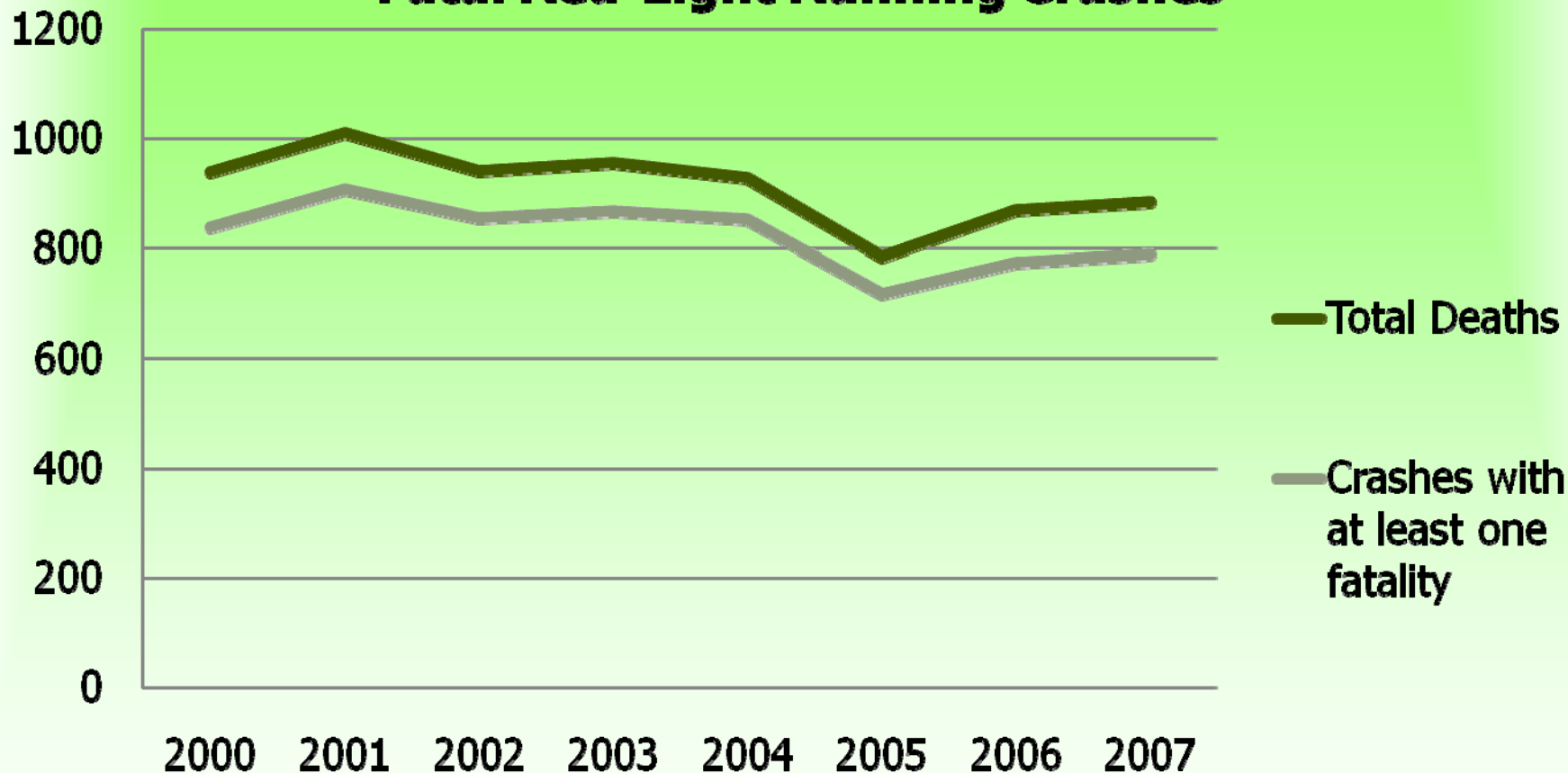


Intersection Definition



Safety Facts About Red-Light Running

Fatal Red-Light Running Crashes

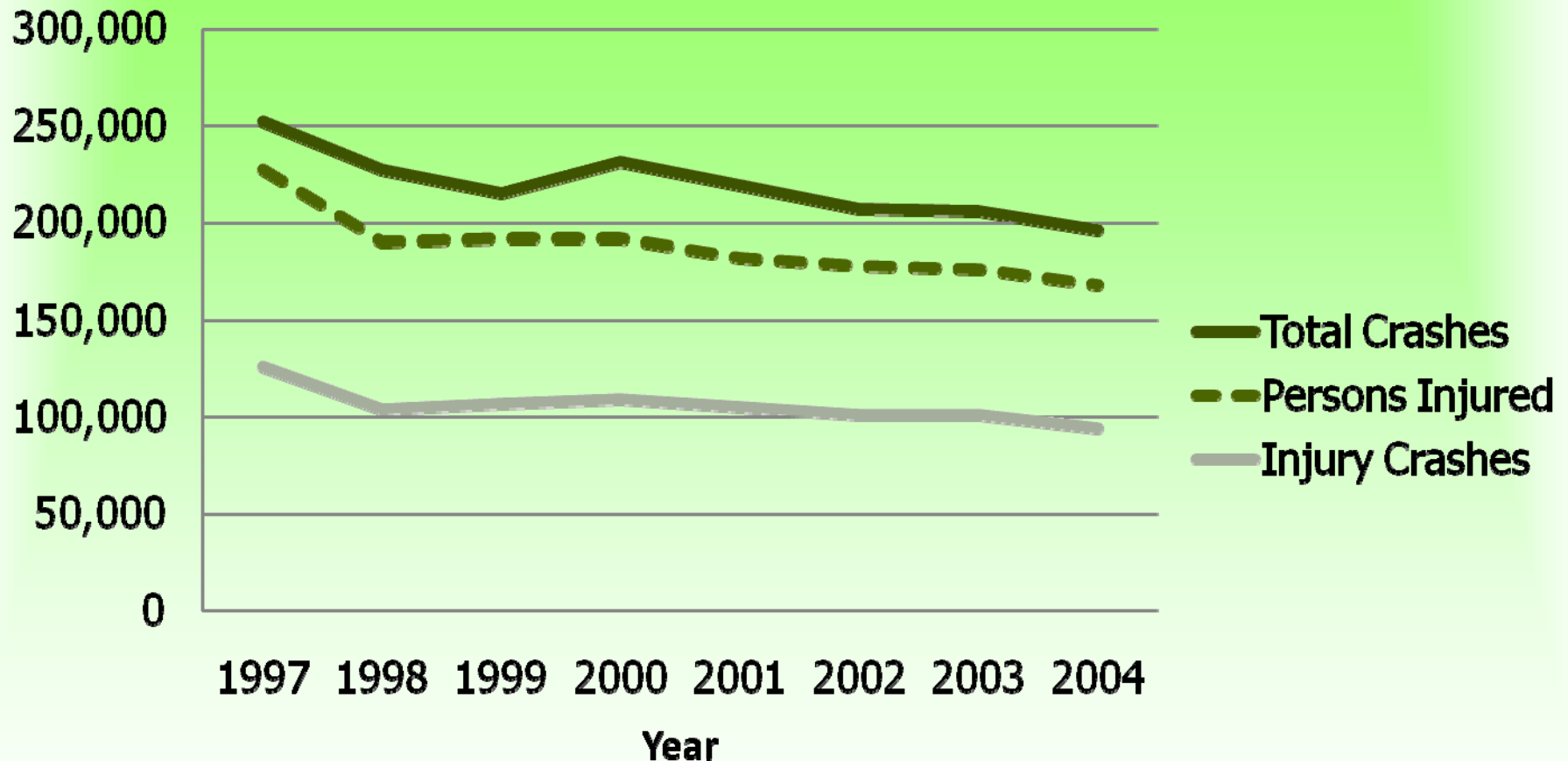


Source: Fatality Analysis Reporting System (FARS), <http://www-fars.nhtsa.dot.gov>



Safety Facts About Red-Light Running

Red-Light Running Crashes



Source: *Establishing a Uniform Definition of Red-Light Running Crashes*, ITE Journal, March 2006

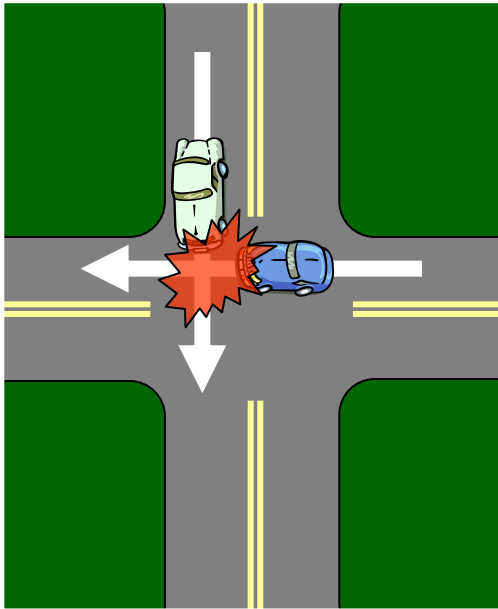
Safety Facts About Red-Light Running

- Red-light running crashes are more likely than other crashes to cause injury
- On urban roads, fatal RLR crashes are more likely than other fatal crashes
- Fatal RLR crashes are somewhat more likely to occur during the day

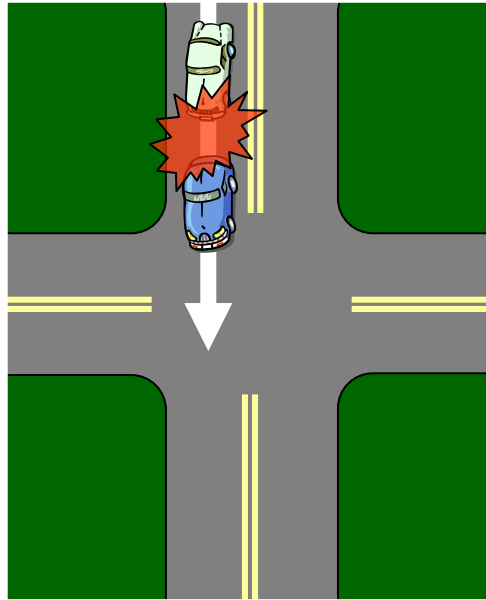
Source: *Prevalence and Characteristics of Red Light Running Crashes in the United States, Accident Analysis and Prevention, 1999*



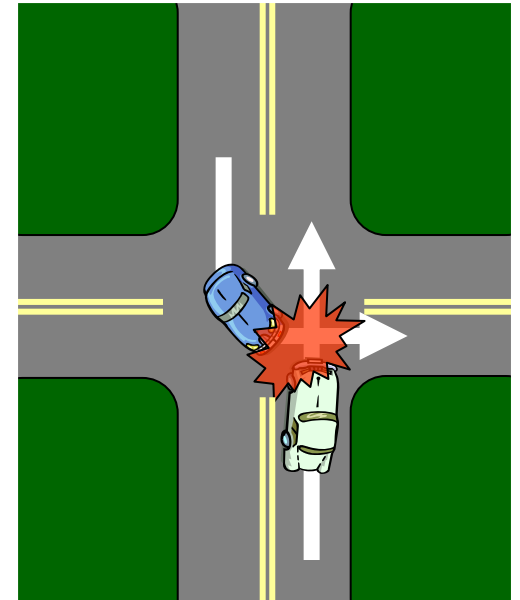
Types of Crashes



Right angle



Rear end



Left turn



Red-Light Running Studies

- ✓ 4% of Americans reported running red lights
 - ✓ 1% run them "often"
 - ✓ 3% run them "sometimes"
- ✓ 97% of drivers feel that other drivers running red lights are a major safety threat
- ✓ 1 in 3 people claim they personally know someone injured or killed in a red light running crash



Types of Red-Light Runners

Unintentional

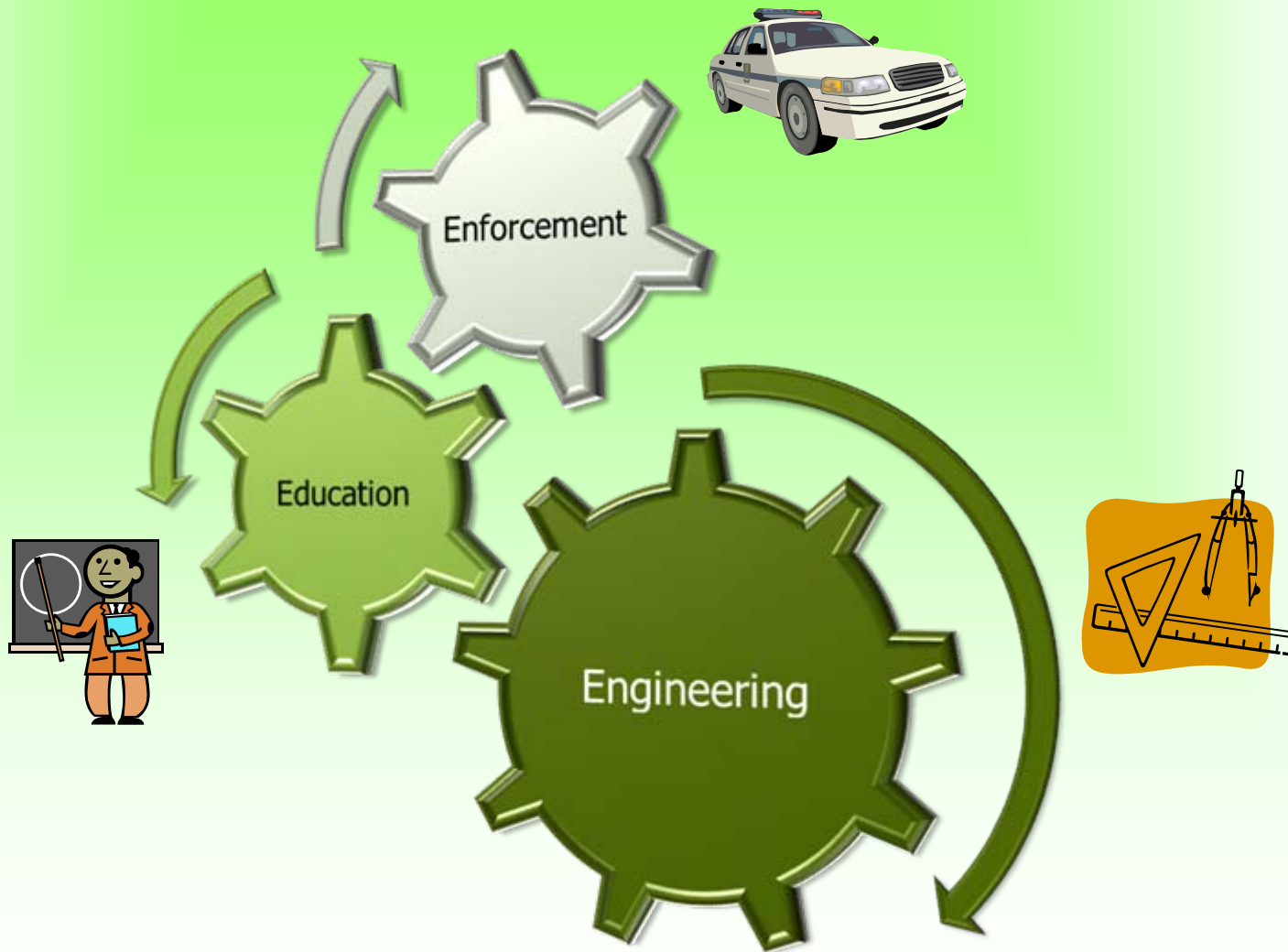
Engineering
Countermeasures

Intentional

Enforcement
Countermeasures



Effective Programs



Possible Causes and Countermeasures

Possible Cause of RLR	Engineering	Enforcement	Education
Did not see signal	●		◇
Tried to beat yellow	◇	●	●
Reported they had green	●		
Intentional violation	◇	●	●
Unable to stop vehicle	●		◇
Followed another vehicle	●	●	
Confused by signal	●		◇

● = Likely countermeasure
 ◇ = Possible countermeasure



The First Step

The first step to addressing red-light running is to conduct a thorough field review.

Sample Assessment Sheet: Engineering Countermeasures to Reduce Red-Light Running

Intersection: _____ with _____
Approach Name: _____ Direction Heading Lanes at Intersection: _____

CHECK SIGNAL CONTROL PARAMETERS

Yellow Interval Y = _____ seconds
All-red Interval AR = _____ seconds
Grade (in decimal) g = _____ (uphill is positive)

Approach speed V = _____ mph
Cross street width W = _____ feet
Cycle length C = _____ seconds

Calculate the needed change period (CP) for this approach using agency practice or the following equation:

$$CP = 1.0 + \frac{1.47 * V}{(20 + 64.4g)} + \frac{W + 20}{1.47 * V}$$

Calculated yellow: _____ Calculated all-red: _____ Are yellow and all-red adequate? Y N

CHECK SIGNAL VISIBILITY

Type of signal mounting: _____ Mast Arm _____ Span Wire _____ Pole _____

Can signal faces on other approaches be seen? Y N

Is anything blocking the view of the signals (e.g. utility lines or foliage)? _____

Measurement	Reference	Is Existing Adequate?
Distance upstream signal is visible on approach	feet MUTCD 4B-1	Y N
Distance from stop bar to signal	feet MUTCD 4D-2	Y N
Diameter of signal lenses	8 inch, 12 inch Y N	Y N
Four side signal	Y N	Y N
Number of signals	Per MUTCD, at least 2 signals for the major movement	Y N

CHECK SIGNAL CONSPICUITY

Is there visual clutter at the intersection that could detract from the signal? Y N At night? Y N

Are the signal indications confusing? _____ Could glare affect signal? _____

Is the left turn signal discernible from the through signal? _____

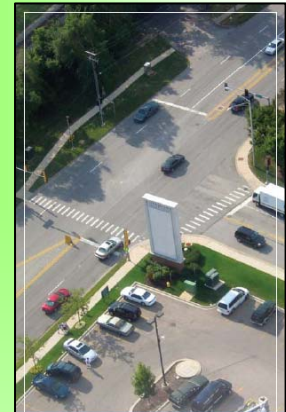
OPTIONS FOR CONSIDERATION

- Conduct signal warranting study
- Change yellow or red interval
- Provide dilemma-zone protection
- Modify cycle length
- Coordinate signal
- Remove/relocate sign obstruction
- Install double red signal
- Relocate signal
- Change signal mounting
- Install additional signals
- Install rear-side signal
- Install Advance Warning Flashers
- Install larger signal lenses
- Use programmable lenses
- Illuminate intersection
- Install backplates
- Install LEDs
- Install rumble strips on approach
- Use vipers or towers
- Install LEFT TURN SIGNAL sign
- Install SIGNAL AHEAD sign



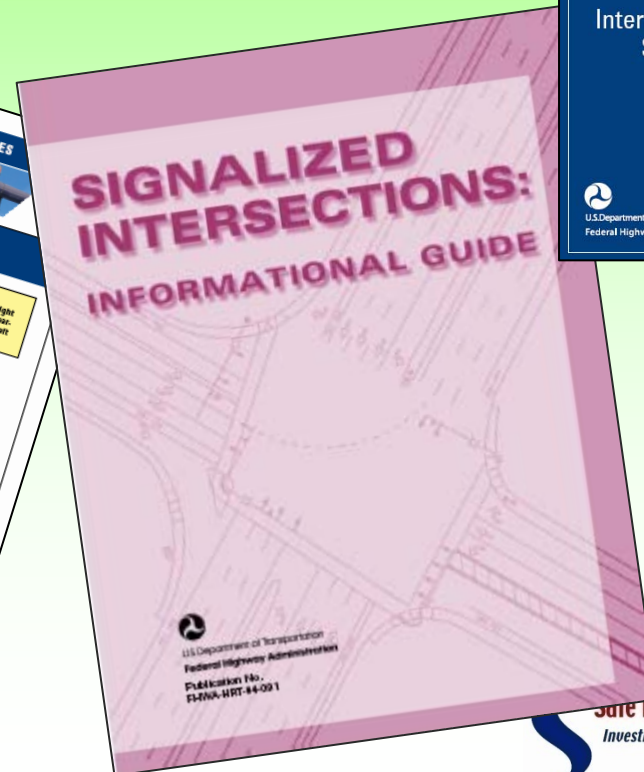
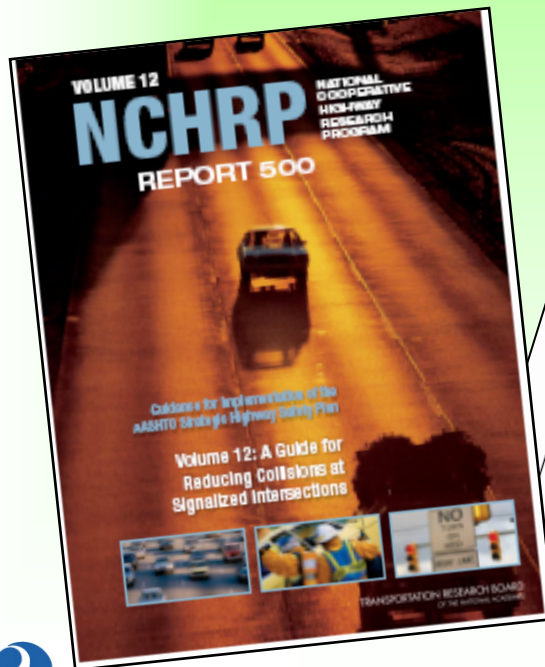
Intersection Safety Resources

- NCHRP Report 500 Volume 12
- Guide sheets
- Safety Strategies brochure
- Signalized Intersections: Informational Guide



Intersection Safety Strategies

U.S. Department of Transportation
Federal Highway Administration

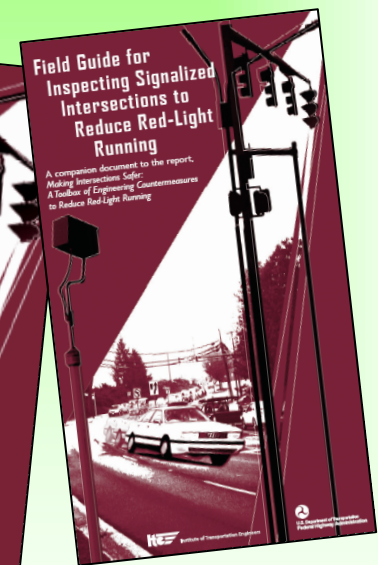
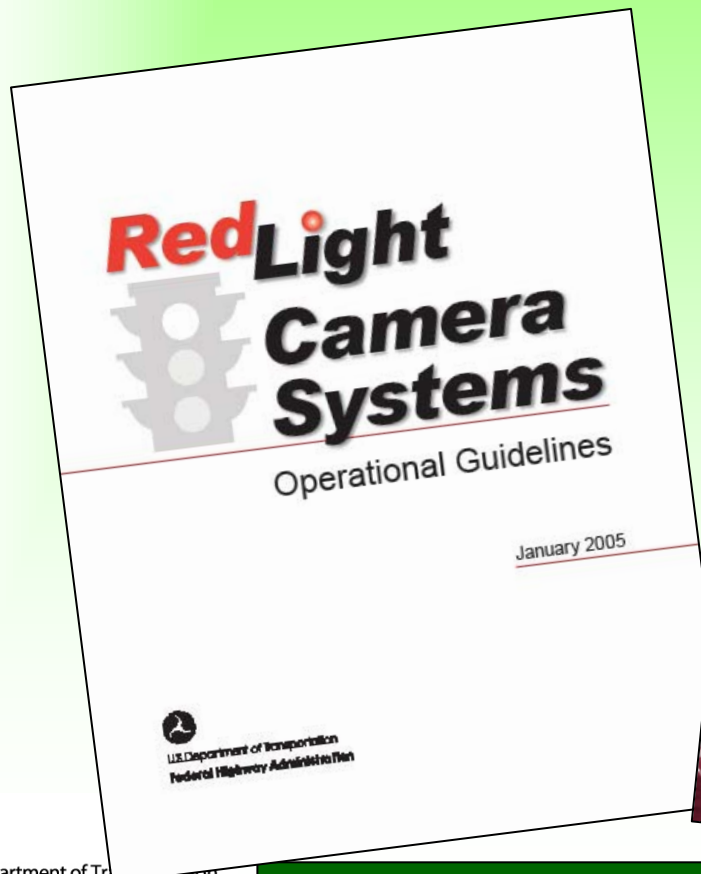


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Investment in roadway safety saves lives



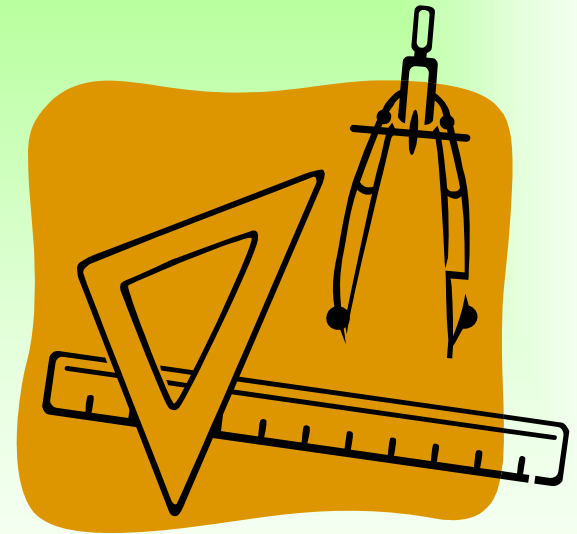
Red-Light Running Resources

- Red Light Camera Systems: Operational Guidelines
- Making Intersections Safer: A Toolbox...
- Field Guide for Inspecting Signalized Intersections...



Engineering Countermeasures

- Improve signal visibility
- Improve line of sight
- Improve signal conspicuity
- Increase likelihood of stopping
- Improve signal timing
- Eliminate the need to stop



Improve Signal Visibility

Install one signal face per approach lane



Use 12-inch lenses



Improve Signal Visibility



Install supplemental signal heads

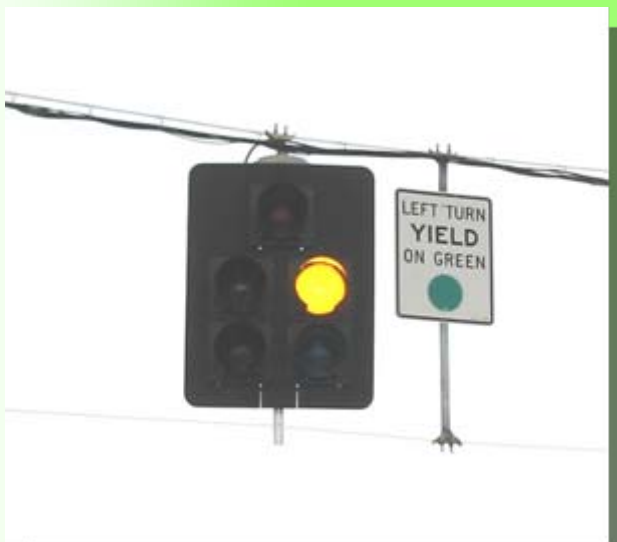
Improve Line of Sight



Use special signal face treatments



Improve Signal Conspicuity



Use backplates to increase target value of signal heads



Improve Signal Conspicuity



Install LED indications

Red-Light Running

Improve Signal Conspicuity

Use double-red indications for special cases



Increase Likelihood of Stopping



Use signal ahead signs to warn motorists of upcoming traffic control



Increase Likelihood of Stopping



Use dynamic warning
in special cases



Increase Likelihood of Stopping



Increase pavement friction



Improve Signal Timing



Ensure yellow change intervals are properly timed



Improve Signal Timing

$$Y = t + \frac{1.47 \times V_{85}}{2d + 2Gg}$$

where

Y = yellow duration in seconds

t = reaction time = 1 s

V_{85} = 85th percentile speed in mi/h

d = deceleration = 10ft/s²

G = grade in ft/ft

g = acceleration due to gravity = 32.2 ft/s²

Equation for determining
adequate yellow time



Improve Signal Timing

Retime signals to provide improved progression



Eliminate the Need to Stop

Use roundabouts
where feasible



Eliminate the Need to Stop

Remove unneeded traffic signals



The Next Step

- Follow up countermeasures with observation
- Number of red light runners can be surrogate for improved safety
- If unsuccessful, look towards enforcement countermeasures



Enforcement Countermeasures

- Increased enforcement
- Enforcement assistance lights
- Automated enforcement



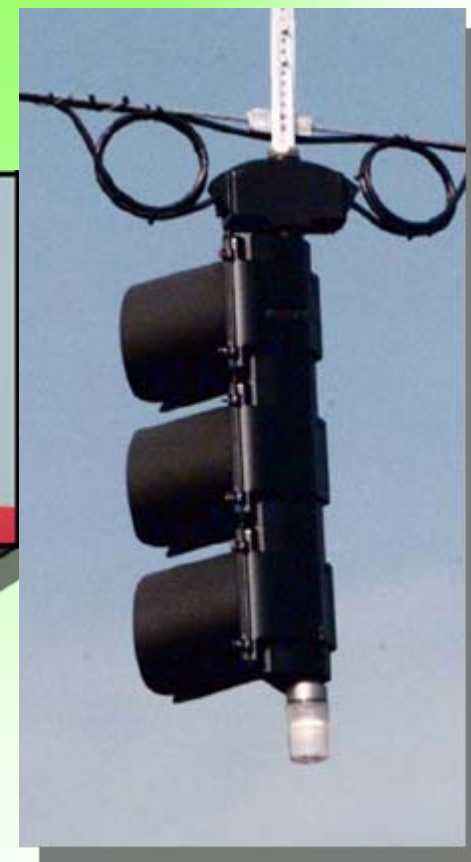
Increased Enforcement

After engineering countermeasures have been implemented and if they did not correct the problem



Enforcement Assistance Lights

Install enforcement lights to assist police



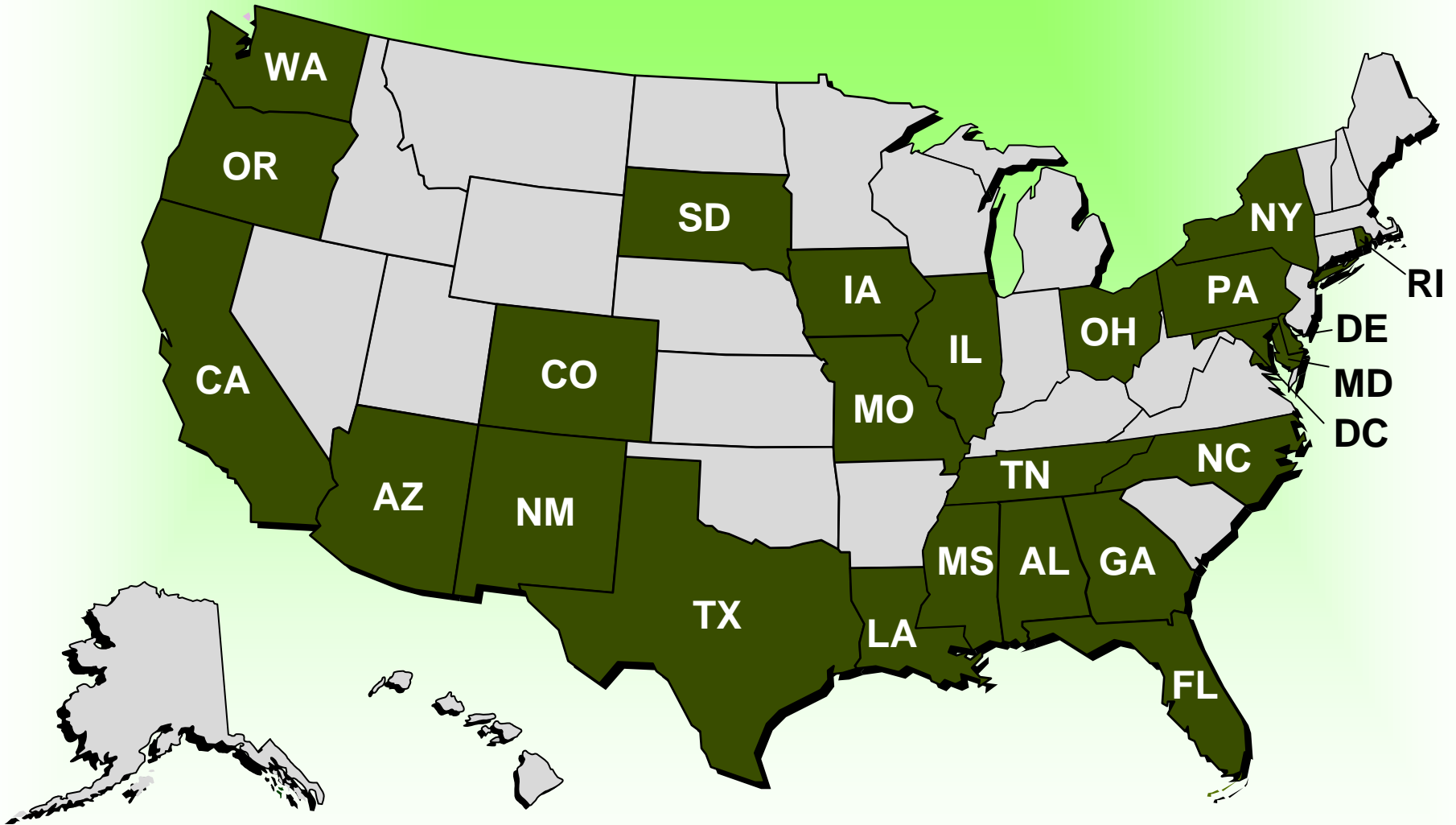
Automated Enforcement



Implement a red light camera safety program



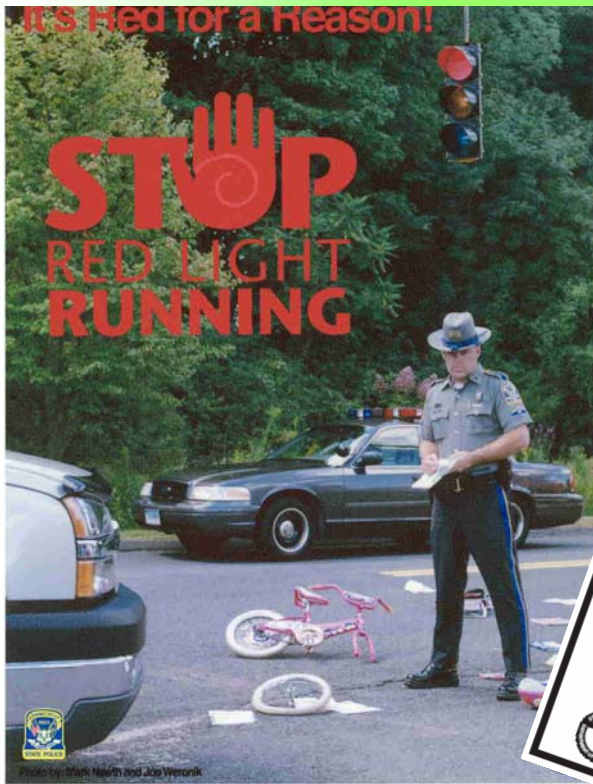
Red Light Cameras



Source: Insurance Institute for Highway Safety web site (www.iihs.org)



Education Countermeasures



Do you know the law?

1. When you approach a red light, stop before the stop bar or crosswalk, whichever is closer to you.
2. Do not "creep" into the intersection while waiting.
3. When making a right turn on red, you must first:
 - a. Come to a full stop.
 - b. Yield to all pedestrians and traffic with a green light.
4. You must come to a full stop and yield to any visually impaired pedestrian with a white/red cane or guide dog that is trying to cross the road.
5. If the traffic signal is inoperative, treat the intersection like a four-way stop.
6. With 2 convictions for red light running within 12 months, the Department of Highway Safety and Motor Vehicles will order you to attend driver improvement school.

Funding provided by the Florida Department of Transportation

RED MEANS STOP
It's the law!

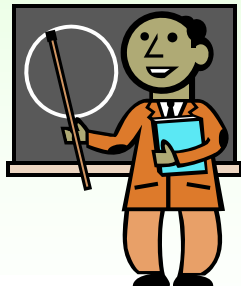
Red light running crashes destroy lives

Each year, red light running results in nearly 200,000 crashes, more than 100 deaths, and 100,000 injuries nationwide. Red light running crashes cost society over 1.4 billion annually.

Red Means Stop Coalition
www.redmeansstop.org

STOP RED LIGHT RUNNING

Stop Red Light Running Week
Statewide Enforcement Wave
August 4 – 11, 2007



For More Information

- FHWA Office of Safety
 - <http://safety.fhwa.dot.gov/>
- Insurance Institute for Highway Safety
 - <http://www.iihs.org/>
- Institute of Transportation Engineers
 - <http://www.ite.org/safety/>
- American Association of State Highway and Transportation Officials
 - <http://safety.transportation.org/>
- Red Means Stop Coalition
 - <http://www.redmeansstop.org/>

