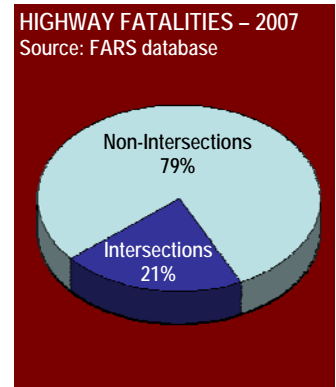


## Intersection Safety

Intersections are among the most hazardous components of the roadway system because they involve inherent traffic conflict points and require critical judgments by all road users. Safe travel through intersections requires road users to understand, and comply with, clear assignment of right-of-way. The FHWA Intersection Safety Initiative offers publications, CDs, training courses, analysis programs and tools, and technical assistance programs to support agencies in selecting and deploying the best available safety technology for various types of intersection settings and configurations.

**Why Intersection Safety Matters** – Improving the safety of intersections is a key strategy for increasing roadway safety because about one-half of all highway crashes and injury crashes occur at, or are related to, intersections. Intersection crashes accounted for 8,657 fatalities in 2007, or approximately 21 percent of total U.S. highway fatalities. The majority of intersection fatalities (61 percent) occur in urban areas and primarily on arterials.



## Signalized Intersections (including Red-Light Running)

Signalized intersections are associated with a disproportionately high number of fatal crashes. Although approximately 10 percent of the Nation's estimated 3 million intersections are signalized, roughly one-third of intersection-related fatalities occur at or near signalized intersections. Over 30 percent of signalized intersection fatalities involve red-light running, which can result in very severe right angle crashes. Right-angle crashes account for 42 percent of fatal crashes at signalized intersections. Rear-end, left-turn, sideswipe, and pedestrian crashes also are concerns at signalized intersections. The FHWA offers guidance on selection of strategies for reducing various types of crashes at signalized intersections. Strategies include signal timing enhancements (including the yellow and all-red intervals) and other operational improvements; geometric and other infrastructure improvements; construction of roundabouts; enhanced signing and marking; improved driver awareness measures; improved access management; and enhanced enforcement.

## Unsignalized Intersections

Approximately two-thirds of all intersection fatalities occur at unsignalized – primarily stop-controlled – intersections, split relatively evenly between urban and rural areas. Over 70 percent occur on two-lane roadways. Countermeasure options include improved access management; geometric design improvements; construction of roundabouts; sight distance improvements; improved driver awareness measures; traffic control improvements; adding turn lanes, and enhanced signing and marking.

## Roundabouts

Modern roundabouts improve safety by minimizing potential traffic conflict points, changing potential collision angles, and forcing drivers to reduce speeds. Left turns, which can result in high-angle severe crashes, are eliminated in roundabouts. The four features that differentiate a modern roundabout from similar roadway configurations such as rotaries, traffic circles, and neighborhood circles are: (1) a one-way, circular intersection

in which traffic flows counterclockwise around a center island (other configurations may have two-directional flow); (2) entering traffic yields; (3) approaches are channelized to deflect traffic into the flow; and (4) a design to slow the speed of vehicles. Converting a signalized intersection to a modern roundabout can reduce crashes by up to 67 percent and fatal/injury crashes by 78 percent. Converting a two-way stopped intersection to a roundabout can reduce crashes by an estimated 72 percent and fatal/injury crashes by 87 percent.

## Crash Reduction Factors

State and local highway agencies can compare the relative costs and benefits of highway safety improvements using crash reduction factors (CRFs). Based on research results, CRFs quantify crash reduction countermeasure benefits as the estimated percentage reduction in crashes. Table 1 shows examples of crash reduction factors and other decision criteria for three sample countermeasures at signalized intersections.

Countermeasure	Crash Severity	Area Type	Control	CRF		
				All Crashes	Left-Turn Crashes	Right-Angle Crashes
Provide Protected Left-Turn Phase	Fatal/Injury	Urban	Signal		16	19
Install Larger Signal Heads (12 in)	All		Signal	11		46
Install Signal Backplates Only	All		Signal	13		50

**Table 1: Example CRFs for Sample Countermeasures at Signalized Intersections (Source: Toolbox of Countermeasures and Their Potential Effectiveness for Intersection Crashes, Issue Brief #8, FHWA, August 2008).**

## Intersection Safety Action Plans

FHWA provides technical assistance to States in the development of Intersection Safety Action Plans. By systematically applying appropriate, low-cost, effective countermeasures at a large number of intersections experiencing relatively high numbers of crashes, States can significantly reduce statewide intersection fatalities and injuries. The first step is to identify intersections with crash levels at or above identified crash level thresholds. The second step is to apply the most cost-effective countermeasure(s) at the identified intersections. FHWA has developed CRF tables and other guidance to assist highway agencies in selecting countermeasures for various types of intersections. States should incorporate Intersection Safety Action Plans as implementation components of their Strategic Highway Safety Plans (SHSPs). Projects addressing the priorities in the SHSP are available for funding through the Federal Highway Safety Improvement Program (HSIP).

## For More Information

For more information, visit <http://safety.fhwa.dot.gov> or contact:

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