

## Steps to make intersections safer

**NEARLY THREE MILLION** intersection crashes occurred last year, or about 44 percent of all reported road accidents. Specific steps can help cut this number.

New ways to improve intersection safety include:

- Use of best practices for selection, design and installation, operation, and maintenance of traffic control devices.
- Improved geometric design and lighting of intersections.
- Use of crash data to identify crash-prone locations that need work.
- Upgraded signal phasing, timing and coordination to smooth traffic flow.
- Use of intelligent controllers and detectors, as well as audible pedestrian signals.
- Use of techniques combined with access management policies.

### Human factor

Intersection safety is not the cut-and-dried engineering solution it might seem. Human nature plays a large and difficult-to-control role.

In a study of why roadway accidents happen, it was found that reasons for crashes overlap. Driver factors are involved in 93 percent of crashes. Roadway aspects are included in 34 percent of the accidents. Vehicle malfunctions can be included in 12 percent of crashes.

People hurry, speeding to work or appointments. Many are distracted by tasks or personal pressures, by cell phones or by kids fighting in the back seat. Some take out their frustrations on their driving, feeling powerful and secure inside their vehicles.

More than half of driver errors at intersections are decision making related. They include:

- Overestimating the yellow signal time remaining.
- Underestimating the time needed to reach an intersection.
- Underestimating the time needed to make a smooth stop.
- Underestimating the time needed to accelerate to speed after making a turn.

### Design and location

Some intersection design and location factors lead to more crashes than others.

Most fatal intersection accidents—about 85 percent—happen at junctions with no signals, according to an eight-state study. A little less than 75 percent of these were multiple-vehicle accidents, and most resulted from one or more drivers making a turn.

Left turns were found to be particularly dangerous and were involved in 47 percent of fatal intersection crashes.

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Right turns were involved only 2 percent of the time.

Two-way stop intersections were the most dangerous at four-leg intersections on rural roads, while similar urban intersections had markedly fewer fatal crashes.

Placing signals at intersections cut crashes by as much as 10 to one, the study shows.

### Engineering solutions

It is easier to engineer intersection solutions when new roads are being built. When designing for intersections without signals, separate traffic movements with bays. Be sure intersection details are visible at a distance.

For intersections with signals, modify the curb-corner radius design to make turns (especially left turns) easier and more visible.

Add pedestrian refuge islands.

Be sure to include traffic control in new or updated intersection designs. Use flashing beacons at rural intersections. Use intersection lighting, especially where no signals will be placed.

In signalized intersections add marked crosswalks and a protected left-turn phase.

### Signs as solutions

Proper signage helps with both intersection design and human response.

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Separate traffic movements with bays. East Washington Avenue, Las Vegas.



Pedestrian refuge island, corner of Las Vegas Boulevard and Harmon Avenue in Clark County.

Sign size is important. Make sure drivers can easily see both *Stop Ahead* and *Stop* signs or electronic signals.

Be sure trees and shrubs do not hide the signs you place.

Pavement markings and delineation should lead the driver through the intersection safely. Lane bays and turning lanes should be marked with reflective materials. Striping must be visible even in heavy rain and other adverse weather conditions.

Place signs and signals for maximum visibility.

Sign colors, placement and other factors must follow guidelines set out in the new edition of the FHWA's *Manual for Uniform Traffic Control Devices*.

## Driver attention

Drivers need help from highway engineers when they approach intersections. They need to:

- Maintain speed. Agencies can help by setting signal timing correctly.
- Maintain lateral position. Lane and turning-lane markings help most.
- Be aware of surveillance. Red light running cameras, long used in Europe, have become an increasingly

## “OPTIMUM SIGNAL PLACEMENT CAN HELP TURN DRIVER ATTENTION FROM IN-CAR DISTRACTIONS TO THE ROAD.”

popular way to keep drivers from speeding up when they see yellow signals and from running red lights.

- Pay attention. Optimum signal placement can help turn driver attention from in-car distractions to the road.
- Determine lane for down-road maneuvers. Advance signage helps guide the driver who wants to turn, find a

specific adjoining route or be sure of continuing through the roadway.

- Enter the correct lane. Overhead signs, combined with lane markings, work well.
- Decelerate for a stop. Advance signage can help, especially at busy urban intersections where signals often compete with commercial signs and buildings.
- Reinforce or obtain information about regulations. Signs, including permanent Intelligent Transportation Systems with changeable message boards, can help inform drivers about intersections and related problems such as rush hour congestion.
- Adjust speed in anticipation of a signal. Warning signs, such as *Stop Ahead*, help the most.
- Search for path guidance. Medians, striped lanes and turn lanes, plus good signage, keep drivers on the correct path.

## Funding

Increased sign and marking use, as well as other intersection devices, mean spending more money.

Where to find that funding is a focal point of the proposed “National Agenda for Intersection Safety” developed during the 2002 National Intersection Safety Workshop. Key strategies for programs and legislation recommended by workshop participants include:

- Actively promote increased safety funding in reauthorization.
- Create safety program funds for use by local governments.
- Make the current program more helpful at the local level.



*Flashing beacon at the intersection of U.S. 95 and U.S. 6 in Esmeralda County.*

- Take 3 percent of the highway funds in a given year and use them for safety purposes.
- Seek legislation that provides for 100 percent obligation of safety set-aside funds.
- Implement best practices by providing incentives to states and local governments.
- Tie funding to accountability and demonstration of results. Federal safety funds would be tied to performance standards.
- Provide funding for safety evaluation training for engineers and technicians.
- Develop a clearinghouse for intersection safety.
- Seek legislation that provides dedicated funding for automated crash reporting.



*Trees and shrubs hiding signs on East Washington Avenue in Las Vegas.*

### **Other recommendations**

A systems approach is essential to intersection safety. This includes setting up permanent partnerships among law enforcement, education and road engineering organizations and professionals.

More research is required, especially in driver information countermeasures, costs and benefits of intersection safety steps and intersection collision avoidance technology.

Better training to help professionals design safer intersections is a major need. The Federal Highway Administration is providing training for road safety audit reviews to all state departments of transportation. Online courses, such as those from the Institute of Traffic Engineers, can be used as well.



For additional information, contact the Nevada T<sup>2</sup> Center at the address shown below.

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***StreetWise***

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