# Older Drivers at Intersections

## The Problem

Driving within intersection environments requires complex speed-distance judgments under time constraints. This scenario for intersection operations can be more problematic for older drivers and pedestrians than for their younger counterparts. For the calendar period from 1997 to 2002, fatalities at intersections for drivers aged 65 and older ranged from 2,500 to 2,950 each year.

According to the National Highway Traffic Safety Administration, older drivers are more likely than drivers in their 30s, 40s, or 50s to be involved in traffic crashes, and they are more likely to be killed in traffic crashes. The number of Americans 65 years of age and older is expected to double between 2000 and 2030. Americans are living longer and driving longer. Together these trends suggest that the number of older drivers killed on U.S. streets and highways will grow. [1]

The AAA Foundation for Traffic Safety recently released a report entitled, "Older Driver Involvement in Injury Crashes in Texas: 1975 to 1999." This study evaluated 25 years of police-level crash data from nearly 4 million injury crashes in the state of Texas. Crashes were analyzed to determine the association between driver age and four factors: fragility—the likelihood of death among drivers involved in injury crashes; illness—the likelihood that drivers were ill or suffering from some other physical defect at the time of their crashes; perceptual lapses—the likelihood that drivers involved in crashes failed to yield the right-of-way or disregarded traffic signs or signals and left turns—the likelihood that left turns were involved in injury crashes. Readers are encouraged to review the entire research report which is available in PDF on the AAA Foundation Web site.

Three different age thresholds were used in defining the older population. Group I, persons are 65 years of age and older; Group 2, persons 75 and older; and Group 3, persons 85 and older. Drivers aged 55 to 64 constituted the comparison group in the analyses. When the analyses controlled for crash type (single-vehicle vs. multiple vehicle), population density (rural vs. urban), driver sex (male vs. female), light condition (daylight vs. darkness) and intersection relatedness, drivers in the three older age categories, compared with drivers aged 55–64, were found to be more likely to die in injury crashes:

- Drivers 65+ years of age were 1.78 times as likely to die;
- Drivers 75+ years of age were 2.59 times as likely to die; and
- Drivers 85+ years of age were 3.72 times as likely to die.

In addition, all three older person groups were more likely to (1) have been ill or suffering some other physical defect at the time of their crashes, (2) have suffered perceptual lapses that contributed to their crashes (such as failure to yield the right-of-way or disregarding signs or signals) and (3) have been involved in left-turn crashes.

U.S. Department of Transportation
Federal Highway Administration

Institute of Transportation Engineers

Figure 1 shows a comparison of total fatalities to intersection fatalities for the years 2000 through 2002 for three age groups: 64 and younger, ages 65 to 74 and for ages 75 and older. As shown, when considering total fatalities, the percentage of intersection fatalities involving older people in both the 65 to 74 and 75 and older age groups are clearly overrepresented.

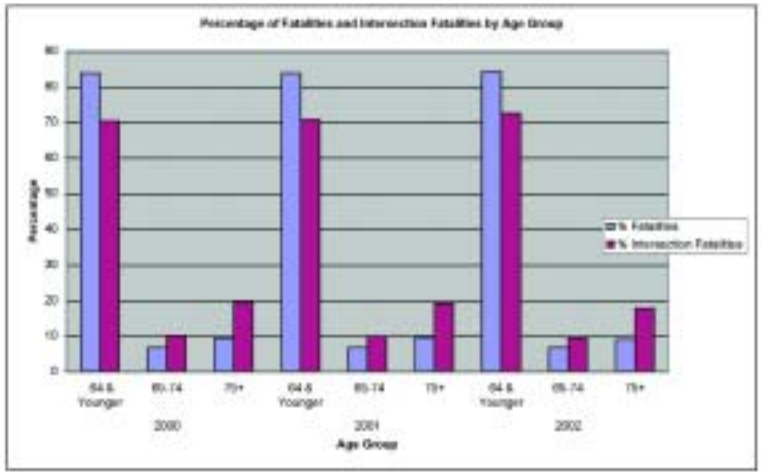


**Figure 1**

*Source: Fatal Analysis Reporting System (FARS). 2000, 2001, and 2002.*

## Project Planning Considerations

During the planning stage for each project involving new construction or reconstruction of an existing intersection, practitioners should seek answers to the following four questions:

- Is there a demonstrated crash problem with older drivers or pedestrians?
- Has any aspect of design or operations at the project location been associated with complaints to local or state officials from older road users or are you aware of a potential safety problem, either through personal observation or agency documentation, applying your own engineering judgment?
- Is this project located on a direct link to a travel origin or destination for which older people constitute a significant proportion of current users?
- Is the project located in an area experiencing an increase in the proportion of residents aged 65 and older?
- Is this project located on a direct link to a travel origin or destination for which older people constitute a significant proportion of current users?
- Is this project located in an area that will constitute a significant proportion of *future* older people, perhaps where there is a planned medical center or senior housing project nearby?

## Engineering Solutions To Make Intersections Safer for Older Drivers

The solutions to reduce older driver crashes incorporated into this briefing sheet have been extracted from the *FHWA Older Driver Design Handbook.* These solutions should benefit all road users, not just older people. It is acknowledged that intersection projects may have constraints, such as high construction costs, the need for additional right-of-way, local access management requirements, sight distance and other issues that may preclude the use of the suggested solutions. In all cases, professional engineering judgement must be used to validate the use or non-use of a particular solution set.

### Design

- Use a minimum receiving lane width of 12 ft. accompanied, wherever practical, by a minimum 4-ft. shoulder;
- Use positive offset of opposing left-turn lanes to increase the safety for older drivers who, as a group, do not position themselves within the intersection before initiating a left turn;
- In the design of new facilities or redesign of existing facilities where right-of-way is not restricted, all intersecting roadways should meet at a 90-degree angle. Where right-of-way restrictions are present, intersecting roadways should meet at an angle of no less than 75 degrees;
- Where roadways intersect at 90 degrees and are joined with a simple radius curve, provide a corner curb radius in the range of 25 ft. to 30 ft. to: **(a)** facilitate vehicle turning movements, **(b)** moderate the speed of turning vehicles, and **(c)** avoid unnecessary lengthening of pedestrian crossing distances; and
- For left- and right-turn lane treatments, provide raised channelization with sloping curbed medians.

### Signs

- Install larger (oversized) regulatory and warning signs;
- Use signs fabricated using high intensity retroreflective sheeting;
- Use redundant street-name signing for major intersections with an advance street-name sign placed upstream of the intersection at a midblock location;
- Increase sign lettering size for street names, directional signing and advance intersection signing;
- Install more overhead-lighted advance signing prior to major intersections. Include overhead lane-use control signs to help driv-

ers get into the proper lane in advance of the intersection;

- Use overhead-mounted street-name signs as a supplement to post-mounted street-name signs;
- When using advance intersection warning signs, accompany the signs with an advance street-name plaque;
- When different street names are used for different directions of travel on a crossroad, the names should be separated and accompanied by directional arrows on both advance midblock and intersection street-name signs;
- Where appropriate (e.g. dual-turn lanes or where a through lane becomes a turn-only lane) use lane-use control signs at intersections on a signal mast arm or span wire;
- Where appropriate, use the **LEFT TURN YIELD ON GREEN** ● with protected-permitted mode left-turn signal phases;
- Where practical, use a redundant upstream **LEFT TURN YIELD ON GREEN** ● sign at the start of the left-turn lane, in addition to using the same sign adjacent to the signal face, to remind left-turning drivers of the requirement to yield to oncoming traffic before turning on green.

## Pavement Markings

- Treat the median and island curb-sides and curb horizontal surfaces with retro-reflectorized markings and maintain them at a minimum luminance contrast level;
- Provide more visible and durable pavement markings;
- Use retroreflective raised pavement markings;
- Use wider pavement markings;
- Use transverse pavement striping or rumble strips upstream of stop-controlled intersections where there may be sight restrictions, high approach speeds, or a history of ran-stop-sign crashes. This treatment can also be used in rural areas where a stop sign is encountered after a long distance with no traffic control devices;
- Delineate median noses using retroreflective treatments to increase visibility and improve driver understanding; and
- Where appropriate (e.g. for exclusive left- or right-turn lanes) use lane-use arrow pavement markings at appropriate distances in advance of a signalized intersection.

## Traffic Signal Operations

- Where minimum sight-distances cannot be achieved or where a pattern of permitted left-turn crashes occurs, eliminate permitted left turns and use protected-only left-turn operations;
- Consider the use of a separate signal face to control turning phase versus through movements;
- Use a leading protected left-turn phase wherever protected left-turn signal operation is implemented as opposed to a lagging protected left-turn phase;
- Consider the use of a leading protected left-turn phase wherever protected-only left-turn signal operation is implemented as opposed to a lagging protected left-turn phase. Lagging left-turn operations, however, are more beneficial for reducing vehicular/older pedestrian conflicts since the pedestrian crossing is normally completed before the beginning of the lag-left green arrow display;
- Use of red left arrows instead of a circular red indication at left turn signals;
- To accommodate age differences in perception-reaction time, use the yellow change interval and all-red clearance interval formulae in the Institute of Transportation Engineers' publication entitled, *Traffic Engineering Handbook, Fifth Edition*; and
- Assume slower walking speeds for signal-clearance timing in the range of 3.5 feet per second if actual crossing times are not available. Time the clearance interval for a full crossing, or to a median, but not just to the middle of the farthest lane.

## Traffic Signal Hardware

- Install larger (12 in.) signal lenses;
- Consistently use backplates with traffic signals on all roads with operating speeds of 40 mph or higher. The use of backplates with signals on roads with operating speeds lower than 40 mph should be used where there may be special factors such as sun glare, a potential for wrong-way movements and high nighttime pedestrian volumes;
- Conduct regular cleaning of lamp lenses and replace lamps when output has degraded by 20 percent or more from peak performance for all fixed lighting installations at intersections;
- Install additional signal heads;
- Install more overhead traffic signals; and
- Consider using post-mounted signals (sometimes called "secondary," "low level" and "far-side left signal heads") to accommodate left-turn drivers waiting in the intersection to turn (permissive-only). Older drivers sometimes cannot easily view an overhead signal (which is usually to their right) at the same time they are looking for gaps in opposing traffic, especially if the overhead signals are strung on a diagonal span wire.

## Right-Turns-on-Red (RTOR)

- Where a RTOR is prohibited, use more than one **NO TURN ON RED** sign. A supplemental **NO TURN ON RED** sign should be placed on the overhead mast arm and at a location

on either the near or opposite side of the intersection where it will be most conspicuous; and

- At skewed intersections where the approach leg to the left intersects the driver's approach leg at an angle of less than 75 degrees, prohibit RTOR.

## Resources

FHWA. *Older Driver Highway Design Handbook.* January 1998. FHWA. Publication FHWA-RD-97-135. **http://ntl.bts.gov/DOCS/older/home/index.html**

Griffin, Lindsay F. III. *Older Driver Involvement in Injury Crashes in Texas: 1995-1999.* AAA Foundation for Traffic Safety, February 2004. **http://www.aaafoundation.org.pdf/OlderDriverInvolvementInInjuryCrashes.pdf**

*ITE Traffic Engineering Handbook, 5th Edition.* 1999.

MUTCD: **http://mutcd.fhwa.dot.gov.**