Current Status of Elderly Drivers and Concurrent Statistics in the United States of America

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Submission date: December 6th, 2004
Word count: 3,340
ABSTRACT

Grandmothers, grandfathers, great aunts and uncles, even mothers and fathers; everyone can relate to these titles because they are people in everyone’s family. They are the elderly family members which should be respected for their wisdom and trusted for their experiences; however, most of the time the elderly generation of today are put into institutions, ignored, and robbed of most of their civil liberties. It is no wonder that the elderly hold on to their driver licenses so dearly; it is the one thing that gives them the sense of importance, freedom, and independence.

Traffic engineering’s five objectives are speed, comfort, convenience, economy, and environmental compatibility. Thousands of studies are done each year to achieve the optimum of each of these objectives. Studies have been made on speed, perception reaction time, crash rates, fatality rates, as well as human characteristics that are unique to each individual. Although there are various subject areas that are studied and tested in transportation, the results can mostly be separated by age groups.

The age group that has especially been targeted is that of the elderly (65+ years of age). They have been targeted by the traffic authorities for the objectives of comfort and convenience, especially in the states with high percentages of elderly population. Due to the altered physical and mental capabilities (such as vision, hearing, health, and judgment/reaction time) of the older population, traffic officials in certain areas of the United States have changed certain parameters in road design to accommodate (i.e. or to increase the comfort and convenience for) the needs of the elderly in all facets of transportation; whether it be as a pedestrian, a passenger, or a driver. The parameters that have been implemented have also been studied since implementation. Those studies reflect on how different cities and states have used or not used the parameters and their effectiveness on traffic. Still there is a great diversity among states regarding how elderly drivers are considered and accommodated. Greater emphasis on implementation of programs to aid elderly drivers and on consistency among state requirements for elderly drivers is needed.

Keywords

Elderly Drivers, Safety

BACKGROUND

According to USA today, there are about 19.9 million drivers in the USA that are age 70 or older. This figure increased 32% from 1991 to 2001 and is expected to continue as millions of baby boomers reach retirement age in the next decade (1). This finding indicates urgency in addressing older drivers. Driving is a privilege and not a right. Drivers must be competent and capable of safely operating a motor vehicle. However, as age increases so do health and mental problems that significantly affect a driver's ability. A high profile accident in July 16, 2003, involving an 86 year-old driver who careened into a crowd killing 10 people has brought the issue to national attention. The cause of the crash was unintentional acceleration due to the driver pressing on the accelerator instead of the brake (2). Statistics from the Insurance Institute for Highway Safety indicate that drivers 85 and older are about as likely to be involved in a fatal crash as those ages 16 to 19 but drive fewer miles (3).

Recently movement has begun to ensure that elderly drivers meet minimum standards for vision, health, and judgment/reaction time. Twenty-one states and the District of Columbia have
special provisions for older drivers (Table 1). Florida and Wisconsin have taken measures to improve the driving environment to compensate for diminished physical and mental capacities among their elderly population.

THE PROBLEM

Research has shown that getting drivers to renew their license in person can reduce deaths among people over 85 by nearly a fifth. However, eye tests, road tests, and more frequent license renewals fail to show similar results (4). Therefore, there is significance in requiring people to renew their license in person. Most of the states that currently have some special provisions for older drivers also do not allow renewal of driver's license by mail.

Studies show that most seniors rely on personal automobile as their primary means of transportation. Some seniors do not suffer the same maladies as others in their age group and in fact may have better vision and judgment than some younger drivers. Older drivers tend to restrict their own driving when they feel that their abilities are insufficient for adverse driving conditions. Therefore, care must be taken to be fair and reasonable when considering how to cope with a growing older population.

Diminishing mental capacity is a concern with older drivers. For instance, drivers who begin suffering from Alzheimer's disease and other dementias may not recognize that their reflexes and driving abilities have declined or may get lost. As driving and assessment skills decline, the risk of serious loss or injury increases. Caregivers must assume the responsibility for monitoring and regulating the driving of the elderly especially those with dementia. Early warning signs of driving problems (5):

- Incorrect signaling.
- Trouble navigating turns.
- Moving into a wrong lane.
- Confusion at exits.
- Parking inappropriately.
- Hitting curbs.
- Driving at inappropriate speeds.
- Delayed responses to unexpected situations.
- Not anticipating dangerous situations.
- Increased agitation or irritation when driving.
- Scrapes or dents on car, garage or mailbox.
- Getting lost in familiar places.
- Near misses.
- Ticketed moving violations or warnings.
- Car accident.
- Confusing brake and gas pedals.
- Stopping in traffic for no apparent reason

Taking away the car keys or a driver’s license or selling or disabling the car should be a last resort. To an elderly family member, such actions seem abrupt, extreme, disrespectful and punitive. And some elderly may ignore, undo or maneuver around those strategies by driving without a license, enabling the disabled car, or buying a new car to replace the one that was sold.
Healthcare professionals may know how to arrange for an independent driving evaluation. These assessments may be available through rehabilitation programs and some state motor vehicle departments. Driving tests are not uniform, and the evaluations vary depending on the extent of the tests and the evaluators’ familiarity with cognitive impairments and other conditions that affect driving. Nevertheless, such tests may provide families additional input and support.

**THE SOLUTIONS**

There is a growing population of elderly persons and a growing list of obstacles and deficiencies that affect their driving skills. In 2002, there were 19.9 million licensed drivers of age 70 and above, which make up 10% of all licensed driver (6). By 2030, The Insurance Institute for Highway Safety says that people age 65 and older are expected to represent 25 percent of the driving population and 25 percent of fatal crash involvements (6). Due to these increasing numbers it is only logical that our transportation system be changed to accommodate this rising age bracket. As stated above, some states have adopted re-testing of driver abilities for renewal of licenses as one way of solving the large crash rates, injuries, or fatalities attributed to elderly drivers and pedestrians (Table 2 & Figure 1 & 2); however, there are many other researched, published, and implemented methods that can be used in addition to re-testing abilities. These methods involve the alterations to street/roadway geometry, sign design, sign and marking frequency and placement, lighting, and pedestrian timings and signs.

**Geometry**

The alterations that would be made to roadway geometry would be for the improvement of safety by reducing conflicts of movements and increasing vision or sight distance. The following list provides some of the recommended geometry given by the FHWA Old Driver Handbook (7):

- An intersection should meet at a 90° angle unless right-of-way is restricted; then, it meets at a 75° angle.
- A receiving lane must be at least 12 ft wide with a minimum of a 4 ft wide shoulder.
- When using a division of directions or channelization of lanes a raised median or curb should be used.
- Opposing left-turn lanes should be offset from each other so a vehicle in the lane will have unrestricted sight distance for opposing oncoming traffic (Figure 3).

**Signs and Markings**

As for the frequency, and placement of signs and markings, the direction that most engineers and traffic professional tend to follow concerning elderly drivers is redundancy. The philosophy is the more signs and bright markings there are the better. The placement of signs should be at each major intersection, entrance, and exit to any urban road, highway, or freeway as well as before each of these points as an advanced marker to give the driver time to react. The category of signs includes street and roadways names along with all other essential information on the upcoming intersection or access point. Markings, such as lane assignment and alignment,
should also be at each intersection as well as in advanced signs (Figure 4). The design requirements for signs and markings are as follows (7):

- Use of 8 inch lettering for overhead street name signs
- Preferable internally lighted signs
- Advanced Street signs are designed according to posted speed limit (Table 3)
- Stop, Yield, and Warning signs have 20/70 visual acuity and measure 48 X 48 inches
- 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 mid-block and intersection street-name signs (Figure 5)
- An increase of 2 inches in width of lane and edge line markings
- A spacing of 40 feet between reflective pavement markers which double the quantity
- The delineation of raised and end of curbs

**Lighting**

In the case of lighting, the improvements are straightforward and uncomplicated. Essentially the rule of thumb is to add lighting anywhere and everywhere it is needed if it can be afforded. Some of the locations that should be addressed initially are areas in which wrong-way movements have a great potential for occurring (recognized by previous crash experiences or engineering judgment), where night time pedestrians are high, and where shifting lane alignment, turn-only lane assignment, or a pavement-width transition forces a path-following adjustment at or near an intersection (7).

**Pedestrians**

Although 75% percent of the elderly that possess a driver’s license are actively driving, there are seniors that do use public transit systems and sometimes walk to their destination if the distance is minimal. Due to this percentage of non-drivers some alterations or improvements to pedestrian design and control devices must be taken into account especially in areas of large elderly populations. In this case the following features or facets of pedestrian design are recommended (7):

- A walking speed of 2.8 ft/s is recommended for design of timings
- If a right-turn lane channelization is present a separate pedestrian refuge island should be provided
- A recommended placard explaining pedestrian control signal operations should be posted (Figure 6)
- A TURNING TRAFFIC MUST YIELD TO PEDESTRIANS is recommended wherever engineering judgment indicates a clear potential for right-turning vehicles to come into conflict with pedestrians who are using the crosswalk for permitted crossing movements (Figure 7)
PROGRAM IMPLEMENTATION

The issue of elderly driving and license testing is a delicate matter and the subject of much debate. Addressing solutions and implementing particular programs have caused much controversy and spurred anti-civil liberties sentiment. When weighing the issue, the safety of the drivers (old and young alike) holds a greater precedence over the matter in question. In response, many states have taken measures to improve the safety of our streets by implementing programs that will aid in reducing the number of accidents caused by elderly drivers.

As discussed in the previous section, the measures to improve the driving conditions for older drivers are numerous, ranging from education programs, roadway improvements, physical/sensory tests (including vision tests), and the use of public transportation services. Such measures are not employed by all states across the country. Typically, you will find these programs in those states having a large population of elderly citizens – such as in Florida where the elderly population is quite significant.

Of the states that do utilize special programs, each state implements their own set of rules and guidelines as they deem appropriate. The following section will discuss specific programs being used in different states and their results in improving overall traffic safety.

Implementation of Education Programs

The American Association of Retired Persons (AARP) is probably one of the leading organizations on the rights of older citizens. Being concerned with the privileges and independence that come with possessing a license, they have developed the first and largest driver refresher course in the nation (8). The AARP Driver Safety Program was created in 1969 for drivers over the age of 50 as a means to educate them on being able to assess their current driving capabilities and to recognize signs of waning sensory abilities. In addition, the program helps in insurance savings for those who pass the test:

- “Insurance savings by people who complete our course were valued at least $45.5 million in 2002 (based on at least a $25 per graduate savings for 30 years in insurance discount mandated states).”

The program allows for the older driving populace to be informed of their personal responsibilities, and in understanding and accepting the fact that they will eventually have to give up their driving privileges.

Implementation of Roadway Improvements

Making the roads senior-friendly is yet another means of improving overall road safety. As was discussed in the previous section, simple things such as larger sign lettering, improved lighting placement, ergonomic geometry of roads, and safer pedestrian walkways all aid in making the road a safer place for older drivers.
Implementation of Physical Exams

Physical examination of an elderly driver’s sensory capabilities can help determine if their response time and mental cognition is satisfactory and allow them to address any deficiencies where practicable. Functional tests can include road sign tests (testing both memory and analytical skills); auditory tests; health tests (including motor skills and bodily mobility); and visual tests.

Most common of the physical exams are the visual ones. It is important that sight be held in high regards when it comes to driving. Not only is it important to be able to see road signs and traffic obstacles, but also to have sufficient peripheral vision to keep tabs of your own moving vehicle. Such medical conditions as cataracts and glaucoma can also be potential dangers to elderly drivers.

The American Optometric Association’s (AOA) Motorist Vision Policy of 2000 promotes that optometrists and ophthalmologists perform comprehensive eye examination of high-risk groups for driver’s licenses and re-licensing (9). According to the AOA, these individuals are “at risk for functionally impaired vision” and the category includes the following: those seeking their initial license; those involved in traffic crashes or moving violations; and those older than 60 years of age.

In the state of Maine, vision tests are administered according to one’s age: once for a driver’s first license renewal after their 40th birthday; at every second renewal until they are 60 years old; and at every renewal for drivers older than 60 years of age. In the state of Oregon, drivers over the age of 50 must undergo vision screenings every eight years. Utah drivers, age 65 and over, are also required to have vision tests at every renewal (10).

Just last year, the state of Florida, by legislation of Gov. Jeb Bush, passed the law that drivers over 80 years of age would be required to take vision tests to renew their licenses (11). According to the old law, drivers could go as much as 18 years without having taken a vision test. The decision was even supported by the AARP who agreed that legislators should study ways to help those who fail the vision test find alternative transportation means.

Implementation of Transportation Services

Allowing older individuals to retain their sense of independence is a main concern. With this in mind, many states have provided for public transportation services for those individuals who have lost the privilege of having a license (in many cases after having failed visual exams).

Wisconsin provides transportation services for senior citizens through the government’s Department of Health and Family Services (12). The program allows for the elderly to get around and perform their daily living activities such as running errands to the banks, grocery stores, meeting medical appointments and participating in other social activities.

Flagler County, in the state of Florida, provides a bus service for the elderly and disabled citizens. The service is funded through federal, state, and local resources (13).

RESULTS OF PROGRAM IMPLEMENTATION

In-depth analysis of the beneficial effects of the previously discussed programs is insufficient and oftentimes inadequate. Since most states are in the process of conducting studies on the specific problems themselves, little is known regarding the quantitative results from the
research. Furthermore, results such as those of driver education are slightly subjective. The AARP reports the total number of individuals who have taken their driving safety program. It does not tell much regarding the lasting impressions its program made on the drivers. However, they note the following:

- “Four out of five of our graduates tell us they change driving behavior as a result of taking our course.”

The statement above does little to help understand the full impact of the safety program upon older-aged drivers. The use of public transportation services to aid in mobilizing the elderly further helps to reduce the number of accidents in the street, although conclusive results have not been established, as tests have not been conducted. At-risk drivers on a bus (and not in their own car) pose no threat to the driving community.

Study of the influence of vision tests on the driving ability of seniors was conducted earlier this year and published in the Journal of the American Medical Association (14). The data looked at fatal crashes in the United States from 1990 to 2000: totaling in 74,428 deaths among drivers aged 65 and over; and 231,288 deaths among drivers between 25-64 years old. In 2000, they found that in 45 of the 48 states which require drivers to renew their licenses in person there was a 17% decrease in the fatality rate.

Conclusion

The number of elderly drivers is expected to greatly increase in the coming years. Most states already have some form of special consideration for problems associated with elderly drivers whether it is in special design parameters for roadway design or traffic signage or requirements for license renewal. Solutions consist of re-testing for license renewal in person, better geometric design of streets and highways, better signage and markings, enhanced lighting at intersections, and more consideration for older pedestrians. Research has shown that these measures are very effective in reducing the fatality rate among elderly drivers. Therefore, state legislatures and transportation departments need to review their transportation programs and laws, and, if needed, implement measures similar to those in place in other states, such as Florida and Wisconsin, to protect and aid elderly drivers and the driving public. Given the mobility needs of the American society and the imperceptible state boundaries along roadways, consistency should be the goal among states in designing highways and legislating requirements for drivers’ licenses to address the special circumstances of elderly drivers. Also, traffic engineers should become familiar with the research and findings in consideration of elderly drivers and incorporate appropriate design parameters, such as those found in Florida’s Elder Roadway User Program. The problems associated with elderly drivers have long been recognized and researched; but implementation of programs to address these issues has been slow to develop. Greater emphasis is needed to prevent avoidable tragedies among our driving public. The safety benefits of implementing special features to protect the elderly driver would also accrue to drivers in all age brackets and may even offset the associated cost of implementation. Thus, implementation of a consistent elderly road user program among states could enable elderly drivers who want to maintain their independence to do so as long as possible while protecting themselves and the motoring public.
REFERENCES


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2. Accidents by Age of Drivers, 2003
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3. Left-Turn Lane Offset vs. Design Speed.
4. Sign Placement (Example Set for a One-Way Street).
5. Street Names Differ In Each Direction at a Crossroads Must Have This Design.
TABLE 1 State Driver License Renewal Laws Including Requirements for Older Drivers.
Source: Insurance Institute for Highway Safety
http://www.highwaysafety.org/safety_facts/state_laws/older_drivers.htm

<table>
<thead>
<tr>
<th>State</th>
<th>Length of Renewal Cycle</th>
<th>Accelerated Renewal</th>
<th>Other Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>4 yr.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Alaska</td>
<td>5 yr.</td>
<td>None</td>
<td>Mail renewal not available to people 69 and older and to people whose prior renewal was by mail.</td>
</tr>
<tr>
<td>Arizona</td>
<td>Until age 65(^1)</td>
<td>5 yr. for people 65 and older</td>
<td>People 70 and older may not renew by mail.</td>
</tr>
<tr>
<td>Arkansas</td>
<td>4 yr.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>California</td>
<td>5 yr.</td>
<td>None</td>
<td>At age 70, mail renewal is prohibited. No more than two sequential mail renewals are permitted, regardless of age.</td>
</tr>
<tr>
<td>Colorado</td>
<td>10 yr. (eff. 7/1/01)</td>
<td>5 yr. for people 61 and older (eff. 7/1/01)</td>
<td>Mail renewal not available to people 66 and older and to people whose prior renewal was electronic or by mail. Electronic renewal not available to people 60 and older and to people whose prior renewal was electronic or by mail.</td>
</tr>
<tr>
<td>Connecticut</td>
<td>4 yr. or 6 yr.</td>
<td>None that are safety related(^2)</td>
<td>None that are safety related(^2)</td>
</tr>
<tr>
<td>Delaware</td>
<td>5 yr.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>5 yr.</td>
<td>None</td>
<td>At age 70, or nearest renewal date thereafter, a vision test is required and a reaction test may be required. Applicant must provide a statement from a practicing physician certifying the applicant to be physically and mentally competent to drive. At 75 years, or nearest renewal date thereafter, and on each subsequent renewal date, the applicant may be required to also complete the written and road tests.</td>
</tr>
<tr>
<td>Florida</td>
<td>6 yr. With clean record; 4 yr. otherwise</td>
<td>None</td>
<td>Renewal applicants 80 and older must pass a vision test administered at any driver’s license office or if applying for an extension by mail must pass a vision test administered by a licensed physician or optometrist.(^3)</td>
</tr>
</tbody>
</table>

**Notes:**

1. \(^{1}\)Age 70 and older
2. \(^{2}\)Age 75 and older
3. \(^{3}\)Age 80 and older
<table>
<thead>
<tr>
<th>State</th>
<th>Length of Renewal Cycle</th>
<th>SPECIAL PROVISIONS FOR OLDER DRIVERS</th>
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<tbody>
<tr>
<td></td>
<td>Accelerated Renewal</td>
<td>Other Provisions</td>
</tr>
<tr>
<td>Illinois</td>
<td>4 yr.</td>
<td>2 yr. for drivers ages 81-86; 1 yr. for drivers 87 and older</td>
</tr>
<tr>
<td>Indiana</td>
<td>4 yr.</td>
<td>3 yr. for drivers 75 and older</td>
</tr>
<tr>
<td>Iowa</td>
<td>5 yr.</td>
<td>2 yr. for drivers 70 and older</td>
</tr>
<tr>
<td>Kansas</td>
<td>6 yr.</td>
<td>4 yr. for drivers 65 and older</td>
</tr>
<tr>
<td>Kentucky</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Louisiana</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Maine</td>
<td>6 yr.</td>
<td>4 yr. for drivers 65 and older</td>
</tr>
</tbody>
</table>

**Special Provisions for Older Drivers**

<table>
<thead>
<tr>
<th>State</th>
<th>Length of Renewal Cycle</th>
<th>SPECIAL PROVISIONS FOR OLDER DRIVERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Michigan</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Minnesota</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Mississippi</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Missouri</td>
<td>6 yr.</td>
<td>3 yr. for drivers 70 and older and 21 and younger</td>
</tr>
<tr>
<td>Montana</td>
<td>8 yr., 4yr. if by mail, or on 75th birthday, whichever occurs first</td>
<td>4 yr. for drivers 75 and older</td>
</tr>
<tr>
<td>Nebraska</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Nevada</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>5 yr.</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State</th>
<th>Length of Renewal Cycle</th>
<th>SPECIAL PROVISIONS FOR OLDER DRIVERS</th>
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</thead>
<tbody>
<tr>
<td>New Jersey</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>New Mexico</td>
<td>4 or 8 yr. at driver's option</td>
<td>4 yrs. for drivers who would turn 75 in the last half of an 8-yr. renewal cycle</td>
</tr>
<tr>
<td>New York</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>North Carolina</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>North Dakota</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>State</td>
<td>Length of Renewal Cycle</td>
<td>Accelerated Renewal</td>
</tr>
<tr>
<td>------------------</td>
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</tr>
<tr>
<td>Ohio</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Oregon</td>
<td>8 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>5 yr.</td>
<td>2 yr. for drivers 70 and older</td>
</tr>
<tr>
<td>South Carolina</td>
<td>10 yr.^2</td>
<td>5 yr. for drivers 65 and older</td>
</tr>
<tr>
<td>South Dakota</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Tennessee</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Texas</td>
<td>6 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Utah</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Vermont</td>
<td>4 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Virginia</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Washington</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>West Virginia</td>
<td>5 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>8 yr.</td>
<td>None</td>
</tr>
<tr>
<td>Wyoming</td>
<td>4 yr.</td>
<td>None</td>
</tr>
</tbody>
</table>

\^1 In Arizona, the license is valid until age 65. Any person 65 years and older who is renewing by mail must submit a vision test verification form, provided by the department, or verification of an examination of the applicant’s eyesight. The vision test or examination must be conducted not more than 3 months before.

\^2 In Connecticut, people 65 and older may choose a 2-year or 6-year renewal cycle. A personal appearance at renewal generally is required. Upon a showing of hardship, people 65 and older may renew by mail.

\^3 In Florida, only two successive renewals may be made electronically or by mail, regardless of age.

\^4 Some states’ licensing laws specifically prohibit licensing administrators from treating people differently solely by virtue of advanced age. Maryland law specifies that age alone is not a grounds for reexamination of drivers; applicants for an initial license age 70 and older must provide proof of previous satisfactory operation of a vehicle or physician’s certificate of fitness. Massachusetts law prohibits discrimination by reason of age with regard to licensing. Minnesota and Nevada law specify that age alone is not a justification for reexamination. In Nevada, applicants for mail renewal age 70 and older must include a medical report.

\^5 License fee reduced for drivers 62-64 and are waived for drivers 65 and older in Oklahoma; fees are reduced for drivers 60 and older in Tennessee.

\^6 Beginning October 1, 2008 every licensee will be required to submit to a vision test every 5 years.
### TABLE 2 Accidents by Age of Drivers, 2003

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number of drivers</th>
<th>Percent of total</th>
<th>Drivers in fatal accidents</th>
<th>Percent of total</th>
<th>Drivers in all accidents</th>
<th>Percent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>9,503,000</td>
<td>4.8%</td>
<td>9,200</td>
<td>17.0%</td>
<td>4,410,000</td>
<td>22.1%</td>
</tr>
<tr>
<td>20-24</td>
<td>16,496,000</td>
<td>8.4%</td>
<td>9,900</td>
<td>18.3%</td>
<td>3,660,000</td>
<td>18.3%</td>
</tr>
<tr>
<td>25-34</td>
<td>34,021,000</td>
<td>17.3%</td>
<td>7,600</td>
<td>14.1%</td>
<td>3,580,000</td>
<td>17.9%</td>
</tr>
<tr>
<td>35-44</td>
<td>40,876,000</td>
<td>20.8%</td>
<td>9,100</td>
<td>16.9%</td>
<td>3,150,000</td>
<td>15.8%</td>
</tr>
<tr>
<td>45-54</td>
<td>40,740,000</td>
<td>20.7%</td>
<td>8,200</td>
<td>15.2%</td>
<td>2,490,000</td>
<td>12.5%</td>
</tr>
<tr>
<td>55-64</td>
<td>26,168,000</td>
<td>13.3%</td>
<td>4,300</td>
<td>8.0%</td>
<td>1,400,000</td>
<td>7.0%</td>
</tr>
<tr>
<td>65-74</td>
<td>16,165,000</td>
<td>8.2%</td>
<td>2,800</td>
<td>5.2%</td>
<td>730,000</td>
<td>3.6%</td>
</tr>
<tr>
<td>Over 74</td>
<td>12,731,000</td>
<td>6.5%</td>
<td>2,900</td>
<td>5.4%</td>
<td>580,000</td>
<td>2.9%</td>
</tr>
<tr>
<td>Total</td>
<td>196,700,000</td>
<td>100.0%</td>
<td>54,000</td>
<td>100.0%</td>
<td>20,000,000</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Note: Percent of total columns may not add due to rounding; driver columns do not add because drivers under the age 16 are not included.
TABLE 3 Design Requirements for Advanced Street Signs

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT (mph)</th>
<th>LETTER SIZE (inches) SERIES E Upper Case</th>
<th>LETTER SIZE (inches) SERIES E MODIFIED Upper Case</th>
<th>LETTER SIZE (inches) SERIES E MODIFIED Lower Case</th>
<th>MINIMUM DISTANCE ‘x’ (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 - 35</td>
<td>6</td>
<td>—</td>
<td>—</td>
<td>200</td>
</tr>
<tr>
<td>40 - 45</td>
<td>—</td>
<td>8</td>
<td>6</td>
<td>250</td>
</tr>
<tr>
<td>50 - 55</td>
<td>—</td>
<td>10.67&lt;sup&gt;1&lt;/sup&gt;</td>
<td>8&lt;sup&gt;1&lt;/sup&gt;</td>
<td>345</td>
</tr>
</tbody>
</table>

<sup>1</sup>The distance sign letter size may be reduced from 10.67/8-inch to 8/6-inch for roadways with speed limits posted from 50-55 mph.
FIGURE 1 Motor Vehicle Deaths Per 100,000 Persons By Age, 2003.
FIGURE 2 Relationships Between Injuries and Fatalities as a Function of Age and Road User Type.

Source: Older Driver Highway Design Handbook
FIGURE 3 Left-Turn Lane Offset vs. Design Speed.
Source: Older Driver Highway Design Handbook
http://www.tfhrc.gov/humanfac/01105/chp1rec.htm and
http://www.iowasms.org/pdfs/olderdriversforum/presentations/daveanderson_fdot_improvingmobilit
yforfloridaseniors.pdf

1 ft=0.305 m
1 mi/h=1.61 km/h
Recommended signing and delineation treatments for intersections with medians 9 m (30 ft) wide or wider.

**FIGURE 4 Sign Placement (Example Set For a One-Way Street).**

Source: Older Driver Highway Design Handbook

[http://www.tfhrc.gov/humanfac/01105/chp1rec.htm](http://www.tfhrc.gov/humanfac/01105/chp1rec.htm)
FIGURE 5 Street Names Differ In Each Direction at a Crossroads Must Have This Design.
Source: Older Driver Highway Design Handbook
http://www.tfhrc.gov/humanfac/01105/chp1rec.htm
FIGURE 6 Pedestrian Control Devices Explained.
Source: Older Driver Highway Design Handbook
http://www.tfhrc.gov/humanfac/01105/chp1rec.htm
FIGURE 7 Turning Traffic MUST Yield To Pedestrians Sign Placement.
Source: Older Driver Highway Design Handbook
http://www.tfhrc.gov/humanfac/01105/chp1rec.htm