DESIGNING ROADWAYS TO SAFELY ACCOMMODATE THE INCREASINGLY MOBILE OLDER DRIVER:

A PLAN TO ALLOW OLDER AMERICANS TO MAINTAIN THEIR INDEPENDENCE

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PREPARED BY:

THE ROAD INFORMATION PROGRAM
1726 M STREET, N.W., SUITE 401
WASHINGTON, D.C. 20036
202-466-6706 (voice)
202-785-4722 (fax)
www.tripnet.org

Executive Summary

With the graying of the Baby Boom generation, the number of older drivers on the road and the amount of driving they do continues to increase. However, along with this increase in the number of older drivers and their level of driving has come a sharp increase in the number of fatalities involving older drivers. Traffic safety improvements designed to make it easier for older drivers to navigate traffic are becoming increasingly important, as the largest generation in American history ages and seeks to maintain a level of mobility that matches their active lifestyles. Roadway improvements can help make driving safer for older Americans, as well as for the population at large.

Older drivers are defined in this study as persons aged 70 or older, based on the age when most people start to experience some diminished physical capabilities associated with driving, such as vision, hearing, reaction times and flexibility. National Highway Traffic Safety Administration (NHTSA) data shows that traffic fatality rates begin to increase among drivers aged 70 and above.

The major findings of this report are:

Statistics show that the number of older drivers being killed in motor vehicle crashes is increasing

- The number of Americans aged 70 and older killed in traffic crashes increased by 27 percent between 1991 and 2001 – from 2,494 fatalities to 3,164. By comparison, the number of overall motor vehicle fatalities increased only 2 percent during the same time.

- Florida led the nation in the number of older drivers killed in traffic accidents in 2001, with 268 older drivers killed.

- In 2001, crashes involving at least one older driver caused 5,113 fatalities nation-wide. This is up from 4,261 persons killed in crashes involving an older driver in 1991 – a 20 percent increase.

Recent trends indicate that older Americans are more mobile than ever.

- Form 1991 to 2001, the number of licensed drivers age 70 and older increased 32 percent, from 14.5 million to 19.1 million. Approximately 10 percent of all drivers are 70 and older, compared to 8.6 percent a decade ago.

- The number of older Americans who continue to drive is increasing. In 2001, 75 percent of Americans 70 and older still drove – an increase from 73 percent in 1995.

- The 2001 National Household Travel Survey (NHTS) found that the average American aged 70 or older spends approximately 37 minutes daily driving a

private vehicle. This level of driving is a 28 percent increase since 1995, when the average person aged 70 or above drove an average of approximately 29 minutes daily.

- The average person aged 70 or above drives 15.3 miles per day according to the 2001 NHTS – a 20 percent increase from 1995 when the average older person in the U.S. drove an average of 12.7 miles daily.

The increase in older drivers killed in traffic accidents is occurring as older Americans form a greater portion of the overall population.

- The older segment of the population (those 65 and older) grew nearly twice as fast as the total population between 1990 to 2000, according to the Census Bureau.

- The number of older Americans will only increase, as baby boomers will start to turn 65 in 2011. Estimates show that one in five people will be aged 65 or older by 2020.

- The latest Census Bureau data also shows that Florida, West Virginia, Pennsylvania, Iowa and North Dakota have the highest proportion of their populations aged 65 or older.

Certain driving situations are especially challenging or hazardous to elderly drivers.

- As people age, their eyesight, reaction time, cognitive ability and muscle dexterity may deteriorate, often making the tasks associated with driving more difficult.

- According to the National Highway Traffic Safety Administration (NHTSA), 50 percent of all older driver fatalities in 2001 occurred at intersections, while only 23 percent of younger driver fatalities (those 69 and under) occur at intersections.

- Left hand turns are also more problematic for older drivers, as they must make speed, distance, and gap judgments in a limited amount of time in order to enter or cross the through roadway.

- Small or complex signage may be misunderstood or not seen quickly enough to alert older motorists about upcoming exits, obstacles, or changes in traffic patterns.

Based primarily on its analysis of the Federal Highway Administration (FHWA) report, "Older Driver Highway Design Handbook," The Road Information Program (TRIP) recommends the following comprehensive set of safety improvements for improving older driver safety:

Signage and lighting:

- clearer and less complex signage that is easier to follow
- larger lettering on signs and larger pavement markings
- better street lighting, particularly at intersections
- higher-performing retroreflective material in signs and pavement markings for better nighttime visibility

Intersections:

- bright, luminous lane markings and directional signals
- overhead indicators for turning lanes
- overhead street-name signs
- adding or widening left-turn lanes

Streets and Highways:

- wider lanes and shoulders to reduce the consequences of driving mistakes
- longer merge and exit lanes
- rumble strips to warn motorists when they are running off roads
- curves that are not as sharp
- Improvements to pedestrian features at intersections
- Improved intersection design
- Improved standards for acceptable stopping and reaction sight distances

The Florida Department of Transportation (DOT) is a leader among state transportation departments in implementing a variety of roadway safety improvements designed to improve the safety of older drivers.

- The initial stage of the Florida DOT's Elder Roadway User Program focused on improving guidance along roadways, providing more legible signs and providing increased warning of upcoming traffic and roadway improvements.

- The Florida elder driver program is now pursuing more long-term roadway safety improvements through new standards for design, construction and re-construction of state highways and streets. These improvements include improved intersection design, improved design for stop, yield and other warning signs, better advanced signing for freeway interchanges and improved standards for acceptable stopping and reaction sight distances.

- The Florida DOT is now working with local governments to implement similar programs on locally-maintained streets and highways.

Introduction

With the graying of the Baby Boom generation, the number of older drivers on the road and their level of mobility continue to increase. However, along with this increase in the number of older drivers and their level of mobility has come a sharp increase in the number of fatalities involving older drivers. Traffic safety improvements designed to make it easier for older drivers to navigate traffic are becoming increasingly important, as the largest generation in American history grapples with the effects of aging while trying to maintain a level of mobility that matches their active lifestyle. Roadway improvements can help make driving safer for older Americans, as well as for the population at large.

Older drivers are defined in this study as persons aged 70 or older, based on the age when most people start to experience some diminished physical capabilities associated with driving, such as vision, hearing, reaction times and flexibility. National Highway Traffic Safety Administration (NHTSA) data has found that traffic fatality rates begin to increase among drivers aged 70 and above.[1]

Growing Numbers of Older Americans

The increase in the number of older drivers killed in traffic accidents is occurring as older Americans form a greater portion of the overall population, as well as a greater percentage of licensed drivers. According to the Federal Highway Administration

(FHWA), 10 percent of all licensed drivers in 2001 were age 70 or older, as compared to 8 percent in 1990.[2]

According to the Census Bureau, the older segment of the population (those 65 and older) grew nearly twice as fast as the total population between 1990 to 2000. It is estimated that by the year 2020, individuals over the age of 65 will represent 20 percent of the population.[3]

The Census Bureau reports that there were an estimated 35 million people aged 65 or older in the U.S in 2000, comprising about 13 percent of the total population. The number of older Americans will only increase, as baby boomers will start to turn 65 in 2011. In fact, the size of the older generation is projected to double over the next 30 years, growing to 70 million by 2030, according to the Census Bureau.[4]

In addition, Americans aged 85 and older are the fastest growing part of the population. In 2000, about 2 percent of the population was age 85 or older; by 2050, this group will account for about 5 percent of the population, the Census Bureau reports.[5]

The latest Census Bureau data shows that Florida, West Virginia, Pennsylvania, Iowa and North Dakota lead the nation in the proportion of their populations aged 65 or older.[6]

Chart 1. Percent of State Population over 65

1. Florida	18%
2. Pennsylvania	16%
3. West Virginia	15%
4. Iowa	15%
5. North Dakota	15%

Mobility Trends Among Older Drivers

Older Americans are now living longer and healthier lives, and they want to be able to take their active lives on the road. Recent trends indicate that older Americans are more mobile than ever.

Whether driving to work, taking a vacation, visiting the doctor or buying groceries, vehicle travel by older Americans is now at an all time high. The recently released National Household Travel Survey (NHTS) found that the average miles driven by people 70 and older has reached 15.3 miles daily – a 21 percent increase from 1995, when the average person aged 70 or older drove an average of 12.7 miles daily.[7] The 2001 NHTS also found that the average older American spends approximately 37 minutes daily driving a vehicle – a 28 percent increase from 1995, when the average person aged 70 or above drove an average of approximately 29 minutes daily.[8]

Recent trends also show that more Americans continue to drive as they age. From 1991 to 2001, the number of licensed drivers age 70 and older increased 32 percent, from 14.5 million to 19.1 million. Approximately 10 percent of all drivers are 70 and older, compared to 8.6 percent a decade ago. According to the 2001 National Household Travel Survey, 75 percent of Americans 70 and older reported that they still drove, while only 73 percent of those 70 and older reported still driving in 1995.[9]

The purpose of travel also changes as we age. According to the 2001 NHTS, older drivers make a greater proportion of shopping trips, more family and personal errands, and more trips for social and recreational activities than younger adults.[10]

Older Americans, like their younger counterparts, overwhelmingly use private vehicles as their transportation mode of choice. According to the 2001 NHTS, 87 percent of trips by older Americans took place in a private vehicle.[11]

Challenges to Older Drivers

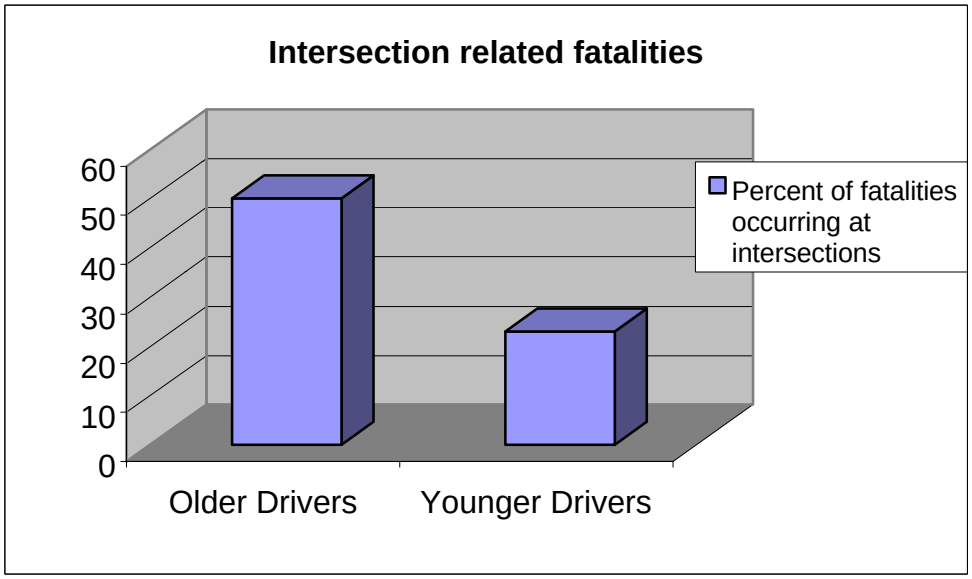
As people age, their eyesight, reaction time, cognitive ability and muscle dexterity may deteriorate, making the tasks associated with driving more difficult. While many older individuals want to maintain the freedom and mobility afforded to them by driving, certain situations are especially challenging or hazardous to older drivers.

Although older drivers are less likely to drive aggressively or too fast, diminished motor skills, vision, and reflexes can make driving more hazardous with age. Also, as

their overall fragility increases over time, older drivers become more vulnerable to injury and death in a collision.[12]

According to the Federal Highway Administration, the single greatest concern in accommodating older motorists is the ability of these persons to safely maneuver through intersections.[13] In 2001, 50 percent of all older driver fatalities occurred at intersections, while only 23 percent of younger driver fatalities (those 69 and under) occurred at intersections, making older drivers more than twice as likely to be killed while driving through an intersection than younger drivers.[14] Driving situations involving complex speed-distance judgments under time constraints, the typical scenario at intersections, can be more problematic for older drivers due to their slower reaction time for any complex motor-cognitive task.[15]

Chart 2. Percentage of 2001 fatal accidents occurring at Intersections for older and younger drivers



Left hand turns are also more problematic for older drivers, as they must make speed, distance, and gap judgments to enter or cross the through roadway. A study by the National Cooperative Highway Research Program shows that older drivers generally have problems selecting appropriate gaps in oncoming traffic and estimating the speed of oncoming vehicles with respect to left turns off a mainline highway. According to NHTSA, in two-vehicle fatal crashes involving an older driver and a younger driver, the older driver was turning left 6 times more often than the younger driver.[16]

Diminished vision and the inability to clearly see road signs and traffic signals can make driving more difficult and dangerous for older drivers. Small or complex signage may be misunderstood or not seen quickly enough to caution older motorists about upcoming exits, obstacles, or changes in traffic patterns. With the advancing age of much of the population, it becomes important to design road signs and traffic signals in a way that is easily visible and readily understood. These changes would benefit motorists of any age and increase overall traffic safety.

Faced with these challenges, many older drivers restrict their driving to certain roads and times of day. Many older drivers only drive on busy main roads during off-peak hours in order to avoid rush hour traffic. Nighttime driving can also be troublesome for elderly motorists, and as a result, may limit their driving to daylight hours. These self-limiting tactics can help elderly motorists to avoid potentially dangerous situations and reduce the chances of placing their safety and the safety of others at risk.

By making the roadway more visible with better illumination, larger lettering on signs, and more highly reflective materials in signs and pavement markings, nighttime driving can be made safer and more comfortable for drivers of all ages.

Older Drivers and Fatal Accidents

The growing mobility of older Americans is a significant traffic safety challenge. Statistics show that the number of older drivers being killed in motor vehicle accidents is increasing as they drive more.

The number of older drivers killed in traffic crashes increased by 27 percent in the last decade, from 2,494 fatalities in 1991 to 3,164 in 2001, according to federal data. By comparison, the number of overall motor vehicle fatalities increased only 2 percent during the same period of time, from 41,462 in 1991, to 42,116 in 2001.[17]

Florida led the nation in the number of older drivers killed in traffic accidents in 2001. Federal data show that 268 older drivers were killed in Florida in 2001. It was followed by Texas, California, Pennsylvania, and Michigan.[18] The full listing can be found in Appendix A.

Chart 3. States with the highest number of older drivers killed (2001)[19]

State	Older drivers killed
1. Florida	268
2. Texas	254
3. California	224
4. Pennsylvania	138
5. Michigan	123
6. New York	119
7. Georgia	116
8. North Carolina	112
9. Ohio	109
10. Illinois	101

In addition, new data compiled by the National Highway Traffic Safety Administration (NHSTA) shows that in 2001, crashes involving at least one older driver caused 5,113 fatalities nation-wide. This is up form 4,261 persons killed in crashes involving an older driver in 1991 – a 20 percent increase.[20] The full listing can be found in Appendix B.

Making Roads Safer for Older Americans

A number of federal reports have documented that the most difficult aspects for older drivers are issues related to intersections, merging and weaving and interpreting a variety of traffic signs and signals.

Traffic safety is an important issue for Americans of all ages, but especially for older drivers who are frequently less able to recover from injuries suffered in motor vehicle accidents compared to younger motorists. Highway repairs and improvements can help improve driving conditions and reduce the number of accidents and fatalities by providing a safer road system that helps reduce the potential for accidents resulting from driver error. Efficient and cost-effective public transportation systems can also benefit those who are no longer able to drive.

Based primarily on an analysis of the Federal Highway Administration (FHWA) report, "Older Driver Highway Design Handbook,"[21] The Road Information Program (TRIP) recommends the following comprehensive set of safety improvements for improving older driver safety:

<u>Signage and lighting</u>:

- clearer and less complex signage that is easier to follow
- larger lettering on signs
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Intersections:

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Streets and Highways:

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- Improvements to pedestrian features at intersections
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- Improved standards for acceptable stopping and reaction sight distances

Efforts Underway to Improve Older Driver Safety

The Florida Department of Transportation (DOT) is a leader among state transportation departments in implementing a variety of roadway safety improvements designed to improve the safety of older drivers.

The initial stage of the Florida DOT's Elder Roadway User Program, which was started in 1992, focused on improving guidance along roadways, providing more legible signs and providing increased warning of upcoming traffic and roadway improvements.

The Florida elder driver program is now pursuing more long-term roadway safety improvements through new standards for design, construction and re-construction of state highways and streets. These improvements include improved intersection design, improved design for stop, yield and other warning signs, better advanced signing for freeway interchanges and improved standards for acceptable stopping and reaction sight distances.

The Florida DOT is now working with local governments to implement similar programs on locally-maintained streets and highways.

Conclusion

While making safety improvements to roadways will specifically help older drivers, such improvements will also make driving safer for Americans of all ages. As more and more older Americans take to the road, safety improvements that could potentially reduce their fatality rate become increasingly crucial. Roads should be as forgiving as possible to help reduce traffic-related fatalities for motorists of all ages. With the aging of the population, it is time to upgrade America's roads in ways that help minimize problems associated with driving errors so that simple mistakes do not always result in accidents and fatalities.

[1] U.S. Department of Transportation: National Highway Traffic Safety Administration. Fatality Analysis Reporting System (FARS). www-fars.nhtsa.dot.gov

[2] U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2001. www.fhwa.dot.gov

[3] U.S. Bureau of the Census. www.census.gov

[4] Ibid.

[5] Ibid.

[6] Ibid.

[7] Federal Highway Administration and The Bureau of Transportation Statistics. National Household Travel Survey, 2001.

[8] Ibid.

[9] Ibid.

[10] Ibid.

[11] Ibid.

[12] *Exploring the High Driver Death Rates per Vehicle-Mile of Travel in Older Drivers: Fragility versus Excessive Crash Involvement*. Li, G., Braver, E., Chen, L. 2002 Transportation Research Board Annual Meeting CD-ROM.

[13] Federal Highway Administration. *Older Driver Highway Design Handbook.* Publication No. FHWA-RD-97-135. January 1998.

[14] U.S. Department of Transportation: National Highway Traffic Safety Administration. Fatality Analysis Reporting System (FARS). www-fars.nhtsa.dot.gov

[15] *Older Drivers' Perceptions of Problems at Unsignalized Intersections on Divided Highways.* Eck, R., and Winn, G. Transportation Research Board 2002 Annual Meeting CD-ROM.

[16]U.S. Department of Transportation: National Highway Traffic Safety Administration. Fatality Analysis Reporting System (FARS). www-fars.nhtsa.dot.gov

[17] Ibid.

[18]Ibid.

[19] Ibid.

[20]Ibid.

[21]Federal Highway Administration. *Older Driver Highway Design Handbook.* Publication No. FHWA-RD-97-135. January 1998.

Appendix A

Older Drivers Killed

	1991	2001
Alabama	75	86
Alaska	2	8
Arizona	36	56
Arkansas	38	44
California	197	224
Colorado	36	32
Connecticut	17	22
Delaware	6	11
Dist. of Columbia	0	2
Florida	158	268
Georgia	76	116
Hawaii	5	6
Idaho	17	18
Illinois	70	101
Indiana	73	77
Iowa	54	47
Kansas	38	49
Kentucky	43	60
Louisiana	37	67
Maine	23	18
Maryland	41	52
Massachusetts	44	38
Michigan	107	123
Minnesota	48	51
Mississippi	37	72
Missouri	83	90
Montana	15	12
Nebraska	18	20
Nevada	12	23
New Hampshire	16	13
New Jersey	69	74
New Mexico	18	24
New York	100	119
North Carolina	84	112
North Dakota	7	9
Ohio	92	109
Oklahoma	57	52
Oregon	30	49
Pennsylvania	111	138
Rhode Island	11	6
South Carolina	50	65
South Dakota	9	12
Tennessee	73	75
Texas	143	254
Utah	10	18
Vermont	8	9
Virginia	65	90
Washington	51	41
West Virginia	26	26
Wisconsin	53	60
Wyoming	5	16
U.S. Total	2,494	3,164

Source: National Highway Traffic Safety Administration

Appendix B

Number of Older Drivers Involved in Fatal Crashes

STATE	1991	2001
Alabama	110	113
Alaska	6	9
Arizona	80	93
Arkansas	52	67
California	340	338
Colorado	51	57
Connecticut	25	35
Delaware	8	17
Dist. of Columbia	5	2
Florida	283	456
Georgia	106	175
Hawaii	11	8
Idaho	25	33
Illinois	120	166
Indiana	104	125
Iowa	68	72
Kansas	60	69
Kentucky	62	86
Louisiana	59	92
Maine	38	33
Maryland	66	70
Massachusetts	61	58
Michigan	158	190
Minnesota	74	80
Mississippi	57	98
Missouri	103	125
Montana	16	19
Nebraska	25	28
Nevada	17	39
New Hampshire	20	24
New Jersey	111	113
New Mexico	33	34
New York	173	201
North Carolina	130	163
North Dakota	10	12
Ohio	145	165
Oklahoma	71	76
Oregon	46	72
Pennsylvania	178	216
Rhode Island	16	15
South Carolina	65	96
South Dakota	14	23
Tennessee	105	111
Texas	225	343
Utah	21	30
Vermont	9	16
Virginia	93	130
Washington	79	64
West Virginia	38	45
Wisconsin	84	86
Wyoming	9	20
U.S. Total	3,865	4,808

Source: National Highway Traffic Administration

Appendix C

Fatalities Where Older Driver Involved in Crash

STATE	1991	2001
Alabama	123	115
Alaska	5	10
Arizona	82	106
Arkansas	61	72
California	366	362
Colorado	62	60
Connecticut	25	35
Delaware	11	16
Dist. of Columbia	5	2
Florida	295	464
Georgia	119	192
Hawaii	18	8
Idaho	35	32
Illinois	133	174
Indiana	122	131
Iowa	74	74
Kansas	68	78
Kentucky	74	100
Louisiana	66	95
Maine	41	38
Maryland	76	75
Massachusetts	64	56
Michigan	174	190
Minnesota	79	83
Mississippi	60	104
Missouri	111	144
Montana	21	19
Nebraska	34	32
Nevada	19	40
New Hampshire	21	25
New Jersey	115	122
New Mexico	37	41
New York	183	214
North Carolina	151	179
North Dakota	10	14
Ohio	161	177
Oklahoma	83	83
Oregon	55	81
Pennsylvania	196	225
Rhode Island	17	15
South Carolina	71	100
South Dakota	14	25
Tennessee	106	120
Texas	234	370
Utah	29	32
Vermont	9	16
Virginia	109	136
Washington	86	71
West Virginia	42	44
Wisconsin	99	96
Wyoming	10	20
U.S. Total	4,261	5,113

Source: National HighwayTraffic Safety Administration (NHTSA)