Safe Mobility for a Maturing Society: **Challenges and Opportunities**

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Executive Summary

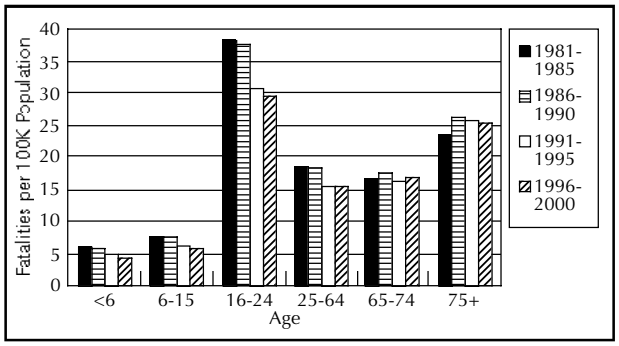
The United States faces a unique challenge in transportation, driven by its growing senior population. Health and medical advances make it possible for people to live longer, and the baby boomers are moving toward their retirement years. Today, 35 million Americans are age 65 or older – about 13 percent of the population. By 2030, this number will double, to 70 million people. One in five Americans will be 65 or older.

To date the nation has taken small steps to begin addressing the significant transportation needs of its changing population. Without continued and additional attention to these needs we could experience an increase in the number of older people killed in crashes and leave some stranded in their suburban or rural homes.

Without improvement in highways, vehicles, and user programs, the nation will face difficulty in providing safe transportation for its older population. According to data from the Fatality Analysis Reporting System (FARS) shown in Figure ES-1, the nation's safety efforts over the last two decades have resulted in significant reductions in fatality rates from highway crashes for all age groups under age 65. The rates for older persons, however, have declined far more modestly, despite substantial reductions over the last 5 years. Continued safety improvements for our older drivers and pedestrians need to be implemented to counter the potential for a major increase in older driver fatalities by 2030, as the elderly population doubles and drives far more miles than the present older generation.

Figure ES-1

Fatality rates per 100,000 for selected Groups



Older Americans, like their younger counterparts, depend on the automobile for the bulk of their travel. For most, it is the private automobile that provides them with independence, enables them to get to essential services, and satisfies their need for social contact – it is pivotal to their quality of life. Most older adults continue to live in the same homes or locales where they lived when they retired, close to family and friends, leading active lives, aging in place in familiar surroundings. When physical or mental limitations make it difficult to drive safely, most older adults gradually and responsibly withdraw from driving. At that point, many find themselves isolated from the activities that had filled their lives, especially if they live in suburban or rural areas where walking is difficult and non-driving transportation options scarce. Such isolation can seriously undermine the quality of life for older people and accelerate declines in health.

To provide safe mobility in the future, managers of our transportation system must lead the nation on many fronts: safer roadways, safer automobiles, better alternative transportation services, and improved competency of older drivers. Creative new partnerships are needed between stakeholders, including government at all levels, older persons themselves, their caregivers, social service agencies, automakers, insurance companies, commercial carriers, and local businesses. All of these groups need to anticipate the coming era and become an integral part of the response.

Based on a series of regional forums, focus groups, conferences, and stakeholder roundtables held over the last several years, the following vision of our future transportation system evolved:

A transportation system that offers safe mobility to all people and allows older persons to remain independent and to age in place. Investments in highway and pedestrian infrastructure and public transportation services support independence. Medical and social service communities, transportation managers, motor vehicle administrators, and caregivers work together to extend safe driving and to offer other convenient and affordable transportation options when driving and walking must be curtailed. Public and private organizations form new partnerships to enable all citizens to enjoy ***safe mobility for life****.*

Fulfillment of this vision will require a concerted effort by our political leaders and the community of professionals who have an interest in the continued independence of older adults. The nation's transportation infrastructure and vehicle fleet are massive and will require many years to change.

To achieve this vision over the next 10 to 15 years progress is needed in the following areas:

Safer, easier-to-use roadways and walkways

New roadway designs that better accommodate the needs and limitations of older drivers and pedestrians, including land use that minimizes auto dependence and facilitates aging in place.

Safer, easier-to-use automobiles

More effective protection systems for fragile older occupants; better understanding of the interaction between older drivers and vehicle systems that utilize new technologies to meet the needs and limitations of older drivers and occupants.

Improved systems for assessing competency of older drivers and pedestrians

Better understanding of the characteristics that cause older drivers to be at increased risk; more effective procedures for identifying, assessing, training, rehabilitating, and regulating functionally limited drivers; better understanding of how to enable people with functional disabilities to walk safely.

Better, easier-to-use public transportation services

Public transportation systems that facilitate wider use by older people, including one-call-does-it-all mobility managers; evaluation and promulgation of best practices; elimination of programmatic barriers to coordinated delivery of transportation services; and intercity travel that is more elder friendly.

Ta rgeted state and local action plans

Formation of state and local action plans that will provide safe transportation for an aging populace.

Better public information

A comprehensive campaign to educate older people and their caregivers on how to identify unsafe older drivers; information for health and social service groups to equip them to address and extend the safe transportation needs of older people.

Basic and social policy research

Research on the effect that loss of mobility can have on the quality of life of older people, on potential, related health-care costs, and on ways to reduce the transportation problems of older people through technological and other solutions.

No single organization alone can assume the responsibility of meeting the safety needs of our maturing society.

Responsibility must be shared, for success requires the actions and resources of many diverse interests: federal agencies, Congress, states, counties, municipalities, health and social service professions, and the private sector.

Table ES-1 lists specific strategies in each of the seven action areas. Implementation of these strategies will not only improve safety for older adults, it will improve safety for all road users.

Support for the implementation of the strategies presented in this report may be available from existing federal aid programs. These potential improvements must compete with every other class of highway or transit improvement and safety research. Careful evaluation of these strategies and their potential contribution to provide safe mobility for older Americans must be undertaken.

Table ES-1

Safe Mobility for a Maturing Society: Challenges and Opportunities

Strategies

1. Safer, Easier-to-Use Roadways and Walkways

Promote the use of guidelines and recommendations from FHWA *Highway Design Handbook for Older Drivers and Pedestrians* through continued training of traffic engineers and highway department personnel and by ensuring this guidance is incorporated into standard design manuals.
Promote the most effective guidelines for the accommodation of pedestrians.
Identify and promote effective land use approaches for accommodating older people's transportation needs, and develop a clearinghouse of best practices for planners and community developers.

2. Safer, Easier-to-Use Automobiles

Evaluate approaches to improve protection of older occupants in crashes.
Consider the need for new standards for exterior vehicle designs that are less injurious to pedestrians.
Evaluate older driver interactions with vehicle systems that affect the occurrence of crashes.
Continue work on specialized vehicle systems to extend the driving capabilities of persons with disabilities.

3. Improve Systems for Assessing Competency of Older Drivers and Pedestrians

Continue to identify the characteristics of older drivers who are at higher risk of crashing and those who self regulate.
Develop and evaluate procedures to identify referral, testing, rehabilitation, and regulation programs to improve older driver safety.
Develop and evaluate procedures to enable people with functional disabilities to drive, walk, and use transportation options safely.
Provide materials to enable professional organizations to conduct in-service training on effective program guidelines.

4. Better, Easier-to-Use Public Transportation Services

Develop and evaluate public transportation best practices for older adults.
Develop comprehensive, one-call-does-it-all mobility managers to coordinate local providers and their services.
Conduct demonstration programs of innovative transit and supplemental transportation systems for underserved and rural areas.
Strengthen the DOT/DHHS Interagency Coordinating Council to identify and remove programmatic barriers to the coordinated delivery of services for older adults.
Improve the ease of use of both transit and intercity transportation for older adults.

5. Targeted State and Local Safe Mobility Action Plans

Encourage formation of state and local consortia to address transportation needs of elderly people.
Encourage state and local communities to develop and implement action plans.

6. Better Public Information

Educate older people and their caregivers on how to identify unsafe older drivers and extend safe driving, walking, and use of transit.
Train transportation, health, and social service personnel to enable safe mobility and well being of elderly people.

7. Basic and Social Policy Research

Determine the relationships between mobility and aging-related physical, cognitive, and functional limitations.
Establish the relationship between lost mobility, aging in place, and societal costs for older people.
Determine technology's role in improving mobility and safety for functionally limited people as drivers, walkers, and public transportation users.

I. Transportation for a Maturing Society

Background

The United States will soon face a burgeoning population of people aged 65 and older. As the older population increases – expanded by the baby boomers, who will begin turning 65 in 2011 – there will be new demands and requirements on the nation's transportation system. The specialized needs of this older population present formidable problems. Enabling their continued safety and mobility will require newly tailored programs, new approaches, new forms of collaboration, and new investments. Some of these changes are underway, such as improvements to the highways. Many may take years to get into place.

Life expectancy has increased by 28 years since 1900. During the twentieth century, the number of people 65 years of age and older in the United States increased elevenfold as compared with only a threefold increase for younger people. Those age 65 and older represent an ever increasing proportion of the overall population – from 1 in 8 today (35 million) to 1 in 5 in 2030 (70 million). Further, the number of people age 85 and older will quadruple in the next 50 years.

This unprecedented social achievement is not a blessing without costs. As age increases, older people develop physical, sensory, and cognitive limitations that often restrict their ability to drive, walk, or use public transportation. Illnesses, medications, and impairments make it difficult for them to use the transportation they need. Without mobility, people may decrease their involvement in outside activities, and their health and well being may suffer.[1] While some services exist to help people get to essential activities like medical appointments and grocery shopping, many older individuals have difficulty getting to social or recreational activities that are an equally important part of their lives.[2]

The report presented here provides a vision of safe transportation for the future. It has been based on a national dialogue concerning the transportation needs of an aging population. Led by the U.S. Department of Transportation (DOT) and begun in 1999, the process included regional forums, workshops, professional society meetings, and international conferences. These exchanges solicited the broadest possible range of perspectives from those practicing in the field – transportation professionals, medical and social service providers, public officials and agencies, and interest groups that deal with elderly people on a day-to-day basis. Concurrent with the regional forums, a series of focus group discussions was held with older people and their lay caregivers (usually adult children) to obtain their views on elderly driving, difficulties associated with driving cessation, and use of other transportation options. National telephone surveys of the general population and of elderly individuals and their professional and lay caregivers also contributed to this report.[3] Finally, extensive in-house analyses of the latest data aided in refining the issues.

Discussions of ideas and innovations led to a comprehensive set of strategies and helped to identify the activities needed to aid older people to be safe drivers, pedestrians, and users of other transportation options. These strategies were presented at the Transportation Research Board's (TRB) international conference, *Transportation in an Aging Society: A Decade of Experience*, and in several workshops since.[4] Information obtained from these sources was also reviewed in the context of industrialized countries through a related effort of the Organization for Economic Cooperation and Development.[5] Strategies on key research and implementation issues have been revised to reflect the results of these meetings and reviews by many other professionals in the field.

[1] Riter, Straight, & Evans. (2002).
[2] Kerschner & Aizenberg. (1999).
[3] Eberhard & Murtha. (in press).
[4] Transportation Research Board. (in press). *Transportation in An Aging Society: A Decade of Experience* (TRB Conference Proceedings 27). Washington, D.C.: Transportation Research Board.
[5] Organization for Economic Cooperation and Development. (2001).

Today, older adults constitute about 13 percent of the population but represent 16 percent of all traffic deaths. As pedestrians, drivers, or passengers, older adults experience over 6,600 fatalities a year.[6]

While traffic fatalities for younger Americans have decreased significantly over the last 20 years, those for older adults have not. Figure ES-1 (page v) shows the fatality rates for six age groups during four periods that span 1981 to 2000. It is evident from the graph that the number of fatalities per 100,000 people has declined far more sharply for those 64 and younger than for those above 65.[7] Thus, while our safety programs have been markedly effective for younger persons, there has been less of a reduction in fatalities for those 65 and older.

The picture from the immediate past is more reassuring, however. After peaking in 1997, a significant downward trend in older adult fatalities has become discernable over the last five years, dropping from 7326 per 100,000 people in 1997 to 6719 in 2001. This reduction is seen for both the 65- to 74-year old age group, and for those over 75. The National Highway Traffic Safety Administration (NHTSA), the National Institute on Aging (NIA), and the safety community are now trying to identify the basis for these reductions, which is currently unknown.

Despite these reductions, the fatalities among older road users represent, and will continue to represent, a significant traffic safety problem, and one which will get worse as the older adult population grows. This level of fatalities should be generally unacceptable, particularly to those who manage the transportation system. But implementing solutions to improve safety will take many years, as safer roads, safer vehicles, safer pedestrian facilities, better driver programs, and other improvements are made. This report attempts to lay out strategies for evaluation that encompass a 10- to 15-year perspective.

Older Drivers as a Public Health and Safety Issue

From a public health point of view, this report needs to address two key issues: (1) Do older drivers pose a significant risk to other motorists and pedestrians, and (2) To what extent are older motor vehicle occupants at increased risk of injury or death if they are in a crash?

Risk To Others

Contrary to popular belief, the older driver segment of the population is not a significant risk to others. With passing age, older persons often find driving more difficult as a result of vision problems, cognitive limitations, side effects of medications, slower reaction times, muscular difficulties, diseases, and other conditions. Most older people are aware of their limitations and responsibly discontinue or reduce their driving in difficult circumstances. They have the lowest rate of alcohol involvement, and the highest level of seat-belt use. They have fewer crashes per licensed driver than any other age group, contrary to the impression sometimes held by the public.[8] Evans found that renewing the license of a 70-year old male driver for another year poses, on average, 40 percent less threat to other road users than renewing the license of a 40-year old male driver.[9]

Figure 1 shows the total number of fatalities to vehicle occupants and to pedestrians by age of driver. It may be seen that fatalities caused by the age groups over 65 are lower than for drivers of any other age group shown.

[6] National Highway Traffic Safety Administration. (2001b).
[7] Over the 20 years, the average rates declined 23% for the 16-24 year old group, and 17% for those 25 to 64. The rate remained flat for those 65 to 74, and rose 7% for those 75 and older.
[8] Eberhard & Murtha. (in press).
[9] Evans. (2000).

Figure 1

Motor Vehicle Fatalities by Age of Driver

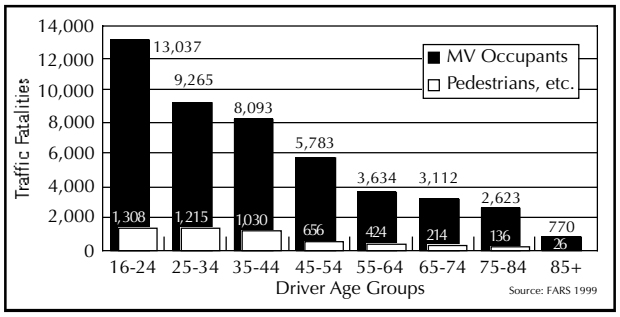
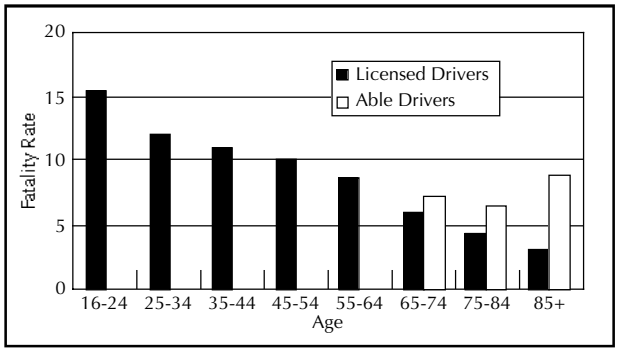


Figure 2 shows the number of occupant fatalities in vehicles other than that of the driver, for the year 2000. The data are shown as a rate per 100,000 licensed drivers of different age groups. As in Figure 1, older drivers are much less likely to cause fatalities to occupants of other vehicles than drivers of any other age group shown.

Figure 2

Other Vehicle Occupant Fatality Rate per 100,000 Drivers by Age of Driver



Source: Highway Safety Facts, 2000, Federal Highway Administration and FARS 2001, National Highway Traffic Safety Administration, U.S Department of Transportation, University of Michigan HRS/AHEAD

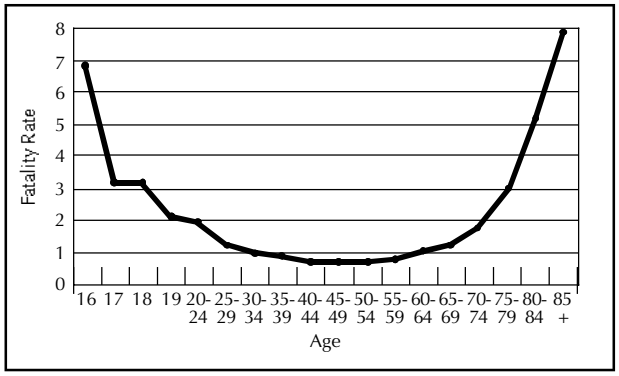
The point can be raised that older people have often retired from driving, but continue to hold their licenses. To resolve this, data from the University of Michigan Health and Retirement Study (HRS) survey were reviewed to determine the proportion of people over 65 who viewed themselves as still able to drive.[10] The rightmost bars in Figure 2 labeled *able drivers* show modified fatality rates based on applying those proportions to the numbers of drivers holding licenses for each age group. There are no comparable data for those younger than 65. It can be seen from the figure that the fatality rates per 100,000 able drivers for those aged 65 to 84 are lower than the rates per 100,000 licensed drivers of any other age group. The rate for those over 85 is comparable to drivers age 55 to 64, and lower than any other age group. Together, Figures 1 and 2 demonstrate that older drivers pose less of a public health risk to other road users than younger age groups.

Risk To Themselves

Figure 3 illustrates the fatality rate for drivers of different ages, as a rate per 100 million miles driven. The U-shaped curve indicates that the fatality rate of older drivers begins to increase after age 60. Recent analysis by the Insurance Institute for Highway Safety (IIHS) and Johns Hopkins University indicates that most of the increased fatalities for older people can be attributed to their increased fragility.[11]

Figure 3

Driver Fatality Rate per 100 Million VMT, 1996



Source: Crash Data and Rates for Age-Sex Groups of Drivers, 1996 (NHTSA Research Note)

[10] University of Michigan. (2000). The question asked was, "Are you able to drive?"

[11] Li, Braver, & Chen. (2001).

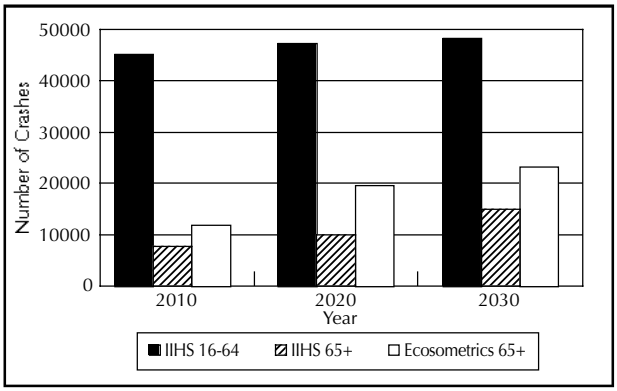
As drivers, passengers, and pedestrians, older people are far more fragile than younger ones. This fragility is exemplified by their fatality rate in crashes. For passenger vehicle crashes reported by the police, the rate of driver deaths begins to rise after age 60 and grows sharply as age increases. For those ages 75 to 79, the rate of driver deaths per crash is almost triple the rate for those ages 30 to 59. For ages 80 and above (our fastest growing age group), the rate is over four times that for drivers in the 30–59 age group

These fatality rates will present an ever more critical safety problem as the 65-and-older group continues to expand. The doubling of this population, in combination with the fact that more older people will be licensed drivers, will live further from social services, and will drive more miles than the present older generation means that their involvement in fatal crashes could increase substantially by 2030.

Some indication of the growth in overall fatalities for this age group may be gained by noting projections of the involvement of drivers in fatal crashes. In the year 2000 about 6200 drivers over 65 were involved in fatal crashes.[12] Two estimates of the projected number of fatal crashes for these drivers are provided in Figure 4. Ecosometrics, Inc. projects more than a tripling of today's number by 2030.[13] The Insurance Institute for Highway Safety estimate is about double today's number.[14] In contrast, IIHS provides an estimate of fatal crash involvement for the other segment of the driving population, those aged 16 to 64. These projections are relatively flat over the same time period.

Figure 4

Projected Involvemments in Fatal Crashes for Drivers Over 65 and Drivers 16 to 64



Source: Burkhardt, Berger Creedon, McGavock (1998). Lyman, Furguson, Williams, & Braver (2001).

According to these projections, without corrective action, the number of older persons killed in automobile crashes could increase two- to threefold by 2030.

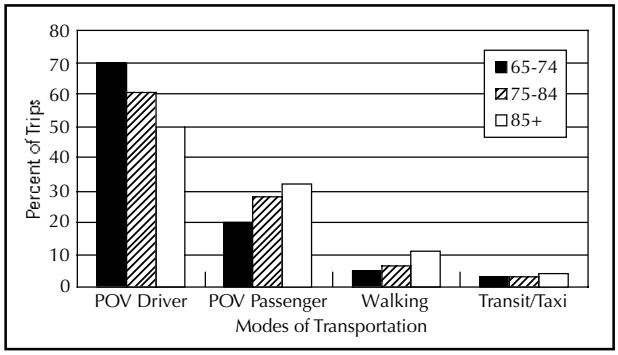
Mobility: An Essential Ingredient of an Aging Society

Older people enjoy a significantly better quality of life today than in the past.[15] They are more active and more involved, and they look forward to many more active years in retirement than earlier generations experienced. The use of various modes of transportation by three age-groupings of older adults is shown in Figure 5. The private vehicle is the dominant mode, with walking a distant second. Not only do most older people drive or ride in a private vehicle, they can be expected to continue doing so throughout the remainder of their lives as they seek to preserve this convenience in getting to friends, services, and activities and to enjoy self-sufficiency and independence.

[12] National Highway Traffic Safety Administration. (2001).
[13] Burkhardt, Berger, Creedon, & McGavock. (1998).
[14] Lyman, Furguson, Williams, & Braver. (2001).
[15] Hobbs & Damon. (1996).

Figure 5

Transporta tion Modes of Older Persons



Source: Bureau of Transportation Statistics 2003 National Household Travel Survey, U.S. Department of Transportation

Many people remember the feeling of freedom that came after they first got their driver's license – the rich array of destinations and activities that came into reach. Losing the ability to drive reverses that expansion of possibilities. The loss is intensified by years of habit and entrenched by location and activity decisions that were based on the ability to travel independently. Many middle-aged people observe this loss in their own parents, who are reluctant to stop driving or lose interest in their former activities once they are unable to drive themselves. Many older people who are considered unfit to drive refuse to quit in spite of efforts by their children or health providers to keep them from driving. The tenacity with which some older people cling to the wheel is evidence of the value they place on their mobility and independence.

Mobility is essential to personal health and social well being. Surveys indicate that many older people cherish their independence and are reluctant to call upon others for transportation.[16] But when people are unable to drive, they can find themselves isolated. If they do not have access to family members and neighbors to drive them, they may find it very difficult to get to shops, friends and family, health-care facilities, recreational spots, religious activities, or community events. When people are deprived of these normal forms of social interaction, health and mental well being deteriorate.[17]

Aging in Place

The value of familiar surroundings and maintaining contact with one's network of activities and friends, as well as reduced cost of living, has led to increased public support for programs that facilitate aging in place. Most people, in fact, do age in place and continue to live active and productive lives. For many who retire in familiar neighborhoods, automobile access is taken for granted. Few people plan for the time when they can no longer drive. Unless individuals plan far ahead for possible changes in transportation needs, they may find themselves literally stranded in their homes, inconveniently located with respect to public transportation services, and unfamiliar with or incapable of using other alternatives to the private car. They may find that they need special help carrying packages or getting to buses or taxis safely. The success of aging-in-place programs hinges on having the requisite transportation capabilities.

In the future, effects of reduced mobility may be mitigated by use of the personal computer, the Internet, and other advanced technologies. More and more older people are computer literate, and this percentage will increase as computers become more universal and as computer-literate persons grow older. As more older people are able to order food, medicine, and other goods via their computers, essential goods and services may become more available, but their social isolation may increase.

[16] Burkhardt, Berger, Creedon, & McGavock. (1998).
[17] Marottoli, Mendes de Leon, Glass, Williams, Cooney, Berkman, & Tinetti. (1997).

A NewVision: Safe Mobility for Life

From the concerns expressed by older people, their family members, caregivers, and a wide range of professionals familiar with these issues, the vision to which we aspire is as follows:

A transportation system that offers safe mobility to all people and allows older persons to remain independent and to age in place. Investments in highway and pedestrian infrastructure and public transportation services support independence. The medical and social service communities, transportation managers, motor vehicle administrators, and caregivers work together to extend safe driving and to offer other convenient and affordable transportation options when driving and walking must be curtailed. Public and private organizations form new partnerships to enable all citizens to enjoy safe mobility for life.

Fulfilling this vision will require dedicated leadership and long-term commitment. The result will be safer, more convenient transportation for all older people – transportation that will extend safe mobility further into the aging years.

Start Immediately

If the nation is to meet the challenge of safe mobility as its people age, it must be kept in mind that the transportation infrastructure and vehicle fleet are massive and require many years to change. Even changes that appear relatively simple in concept, such as enlarging the size of the letters and improving the visibility of traffic signs, take several decades to accomplish: appropriate new standards must be proposed and evaluated, results debated, new standards passed, and signs manufactured and installed. Because infrastructure improvement is an incremental process spread over several decades, it is important to begin preparing today for needs that will be widespread 20 or so years hence.

Create Broad Public Understanding

Public education programs are needed to dispel misconceptions about the safety risks and mobility needs of older adults. The crash data cited in Figure 2 indicate that as a group older drivers do not place an undue safety burden on the public. Further, mobility is an indispensable basic need of older persons. It is vital for aging in place and a healthy society. This requires a fundamental change in how the public, the media, the community, older people, and a wide range of professionals approach the issues.

Build Partnerships of Many Diverse Interests

Fundamental changes in perception are also needed if all citizens are to have safe mobility for life. The issue cannot be resolved if it is seen solely as a safety problem or solely as a transportation problem. Rather, it must be recognized as a public health and wellness problem that involves safety and mobility. Governments do many things that affect the mobility of older persons, as do vehicle manufacturers, community developers, health insurers, auto insurers, taxi operators, public transportation agencies, health-care providers, older individuals themselves, family members, and caregivers. Effective solutions to the transportation needs of older persons are complex and are often beyond the ability of any one of these groups to address by itself. In government, coordination will be required among agencies within large departments as well as across departmental jurisdictions. New levels of coordination and cooperation will be called for to successfully integrate these strategies into an environment of social, health, and transportation programs carried out by multiple organizations with unique missions.

Stay Customer Oriented

Older people, like everyone else, want mobility that is safe and convenient. The aging process varies widely from person to person, however, and differences in capabilities become greater as age increases. The specific features of safe mobility that are most important to individuals also vary widely. Improvements to serve people with visual impairments may be of no use to those suffering from dementia, and vice versa. Older people are key to understanding and developing solutions that will meet their needs, and their voices are essential in shaping effective policies. For example, older people and their caregivers can bring unique insights to local public transportation boards, zoning boards, highway commissions, and the like. Appointing them or their advocates to these bodies can help communities better address the needs of an aging society.

Experiment Aggressively

Consortia of local and state organizations are developing action plans to create local methods to ensure safe mobility. As their experience grows, they can provide model solutions on which others can build. Experimentation with a wide range of approaches will offer communities a variety of options to consider. In other venues, such as research on improved vehicle crashworthiness for frail occupants or the development of improved screening and rehabilitation programs, the federal government can target research and development on topics that have the highest potential to improve safety and mobility for older users.

Accelerate the Pace of Deployment

While the mobility of an older society may seem like a remote problem that is still decades away, 35 million persons in the United States are already age 65 or older. In anticipation of their growing numbers, the nation must accelerate the pace at which transportation improvements are made. The research community is now in the vanguard in recognizing this problem, and research will be a critical part of any solution strategy. Programmatic changes can be made in parallel with research as long as such strategies are evaluated to ensure their effectiveness as national investments are made. For example, the Federal Highway Administration (FHWA) published the *Highway Design Handbook for Older Drivers and Pedestrians*,[18] which lists thirty recommendations that can make roads safer for older road users. Federal and state grants for transportation system improvements could be structured to encourage upgrading facilities now, with full awareness that the efficacy of alternative treatments should be continually reassessed as experience accumulates.

Finance Realistically

Many of the strategies in this report are eligible for existing federal-aid programs. These potential improvements must compete with every other class of highway or transit improvement and safety research. Careful evaluation of these strategies and their potential contribution to provide safe mobility for older Americans must be undertaken.

[16] Federal Highway Administration. (2001c).

II. Safe Mobility for a Maturing Society: Challenges and Opportunities

Many federal agencies, state and local governments, and some private sector organizations have initiated programs to begin to prepare the nation's transportation system for older Americans. But these programs will not be sufficient to mitigate the high fatality level projected for the coming decades or the need to provide transportation options. There is no simple solution to these complex problems, nor is responsibility vested in a single organization. Responses to these needs must be undertaken by governmental agencies at all levels, by the private sector, and by the public, who have a shared responsibility. Coordinated action by many is required. The following provides a framework for managing safe transportation for our aging population in the first decades of the new century.

To provide safe mobility for older adults, progress is needed in the following categories:

1. Safer, easier-to-use roadways and walkways
2. Safer, easier-to-use automobiles
3. Improved systems to assess competency of older drivers
4. Better, easier-to-use transportation services
5. Targeted state/local safe mobility action plans
6. Better public information
7. Basic and social policy research

Major issues in each of these areas are discussed in the following seven sections. They represent strategies to be considered which encompass the next 10-15 years. Some of them are already under way, some can be initiated in the near future, some call for further development and evaluation, and some must await funding availability. The strategies are summarized in Table ES-1, at the end of the Executive Summary.

1. Safer, Easier-to-Use Roadways and Walkways

Older persons are highly auto-dependent. As shown in Figure 5 (see page 5), approximately 90 percent of all trips by those between the ages of 65 and 84 are now by auto. The automobile is likely to remain the dominant mode of travel among older persons. Because older persons are more easily injured and killed in crashes, roads need to be safer and easier for them to use. Pedestrian trips are the second most widely used mode and adequate and safe facilities must be provided for walking.

Improving Highways

Crash rates for older drivers are not evenly distributed across the various types of crashes. The sharpest increases with age involve intersection and crossing-path situations, where older drivers must make complex maneuvers and decisions as they interact with opposing traffic. These include turning crashes (right turns and especially left turns), particularly in urban areas, and lane changing crashes on two-lane rural freeways.[19] Older drivers are also disproportionately involved in crashes at stop signs, where the driver has stopped at the sign and then proceeds to pull out in front of another vehicle. This may be because older drivers have more difficulty perceiving and judging the dynamics of traffic movement and performing cognitive tasks within time constraints. Situations requiring peripheral vision may present the greatest risk to older drivers. Deterioration of vision, diminished cognition, increased perception-reaction time, and reduced muscular agility can affect an individual's ability to drive safely. Roadways can be designed, however, to help compensate for such changes.

[19] Cerreli. (1989).

Highway improvements and upgrades are a never-ending part of maintaining the transportation infrastructure. These projects may be initiated in response to adverse crash experience or as part of a totally new facility associated with development of previously empty land. When planners, decision makers, and highway engineers are developing and deciding on these projects, they can better accommodate the needs and limitations of older road users by utilizing existing guidelines and recommended designs. These are found in a series of FHWA handbooks, particularly the recently revised (2001) *Highway Design Handbook for Older Drivers and Pedestrians* and a new companion publication: *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians*.[20] These documents are collectively referred to as the FHWA handbooks. While applying these recommendations can extend the period during which driving is safe for older people, design improvements will also make the system safer for all road users.

Strategy 1.A.

Promote the use of guidelines and recommendations from the FHWA *Highway Design Handbook for Older Drivers and Pedestrians* through continued training of traffic engineers and highway department personnel and by ensuring that this guidance is incorporated into standard design manuals.

Upgrading the nation's highway infrastructure to include the long list of specific improvements identified in the FHWA handbooks is a massive challenge. Improvements include better nighttime visibility of signs and pavement markings, intersection design, lighting, and other safety enhancements. Innovative approaches made possible by new technologies are potential candidates for roadway improvements in addition to traditional features described in the FHWA handbooks. With many hundreds of millions of traffic signs across the nation, replacement will be an incremental process. New signs will be phased in over years, as physical deterioration requires and as financial resources allow. This process is slow, taking 10 to 20 years, not because of lack of concern, but because design standards involve consideration of many separate features and user attributes, and because any change affecting the entire highway infrastructure is a massive undertaking.

The nation needs to phase in these changes more rapidly in anticipation of an aging society. First, this requires increasing highway engineers' familiarity with and acceptance of the guidelines and recommendations in the FHWA handbooks. To that end, traffic and highway engineers should participate in training programs, such as those developed by FHWA, to ensure that they understand and can apply design standards to accommodate older people.

Second, these recommended designs need to be incorporated into the standard design manuals used by roadway designers, such as the *Manual on Uniform Traffic Control Devices*,[21] and *A Policy on Geometric Design of Highways and Streets* (The Green Book),[22] of the American Association of State Highway and Transportation Officials (AASHTO). Moving the design recommendations from the handbooks into the manuals demands priority attention from standard-setting bodies and transportation agencies because this is a time-consuming process. The various professional and government groups that are responsible for different aspects of highway design apply rigorous procedures to evaluate changes to standards, and it can take them many years to review and act on possible changes. While it is important to preserve the quality that they assure, the process can be accelerated if standard-setting groups are provided with analytic, evaluative, drafting, and communication assistance. Substantial progress has been made in getting these guidelines into the design manuals, and that work needs to continue.

[20] Federal Highway Administration. (2001c).
[21] Federal Highway Administration. (2000).
[22] American Association of State Highway Transportation Officials. (2001).

Improving Pedestrian Facilities

Following driving, walking is the second most frequent mode of transportation among older persons, as shown in Figure 5. Older adults account for 21 percent of total pedestrian fatalities, but only 13 percent of the total population. Walking is a key component of almost every trip taken. People walk between the different segments of most trips. The pedestrian death rate for those 75 and older is nearly double that of all other ages.[23]

Walking access is important for many local businesses. Land use policies that encourage walking can create concentrations of pedestrian traffic that lure additional business activity and can also reduce the amount of time people are on the road as drivers. Finally, walking contributes to improved health through physical exercise, and those who continue to walk into old age are more able to walk as a means of transportation.

In spite of possible physical limitations and safety concerns, older adults make a higher percentage of their trips by walking than do younger ones. As it becomes difficult for older persons to drive or use public transportation, walking also may become increasingly difficult due to declining functional ability. Overcoming design shortcomings or facility barriers may enable older people who have disabilities to walk to nearby services.

Strategy 1.B.

Promote the most effective guidelines for the accommodation of pedestrians.

Promising pedestrian facility improvements have been identified in the FHWA handbooks and in FHWA's *Designing Sidewalks and Trails for Access (Parts 1 and 2)*,[24] *Pedestrian Facilities Users Guide: Providing Safety and Mobility*,[25] and in its brochure, *A Walkable Community*.[26] Promoting and evaluating the pedestrian infrastructure is a responsibility shared by agencies at all levels of government, who must select among competing priorities for limited resources. Older persons and advocates working on their behalf can help their communities establish priorities for better pedestrian facilities and bring increased attention and coordination to pedestrian issues.

Better signaling, signing, speed management, and markings should be implemented to protect pedestrians. Pedestrian crosswalk signals need to be bright and clear to accommodate the reduced visual acuity common among the elderly. Pedestrian signal timing should be adjusted to reflect the often slower walking pace and slower "start up" time of older pedestrians. Greater use should be made of "smart" signals that detect when pedestrians are in the crosswalk and adjust the timing of the walk phase to give them time to cross safely. In addition, pedestrian refuge islands should be provided on wide, busy streets. In locations with high volumes of elderly pedestrians, additional roadway signing in advance of pedestrian crossings could be appropriate.

A range of other improvements would be helpful, including adding sidewalks, benches, and covered areas; widening sidewalks and maintaining them in good condition; providing additional curb cuts; and upgrading signing and markings to make walking a safer and more attractive alternative for older persons. Introducing traffic calming approaches can reduce speed and lessen the opportunity for serious conflict with vehicles. As above, there is a need for the guidelines and recommendations for pedestrian improvements in the FHWA handbooks to be incorporated into the standard design manuals. This work is underway and should continue.

Better Land Use

Some 50 years of suburbanization and choices of home sites dispersed across the community and beyond can leave those aging in place completely auto-dependent and

[23] National Highway Traffic Safety Administration. (2002).
[24] Federal Highway Administration. (1999 and 2001b).
[25] Federal Highway Administration. (2002).
[26] Federal Highway Administration. (2001a).

stranded when they can no longer drive. Nevertheless, today few older people adequately anticipate the transportation implications of old age when they are deciding where to live. Certainly, young people facing the possibility of having a family and making future career changes would not be expected to pay much attention to their mobility in old age as they choose a home or apartment. But even older persons and their adult children caregivers tend not to think far enough ahead about future transportation and mobility concerns when making housing decisions – such as moving out of the family house because it is too big and cumbersome to maintain, or relocating to a different climate or to an assisted living facility. The availability of activities and services within walking range and access to public transportation can become very important to older persons, yet most people make location decisions many years before they become dependent on these features.

Strategy 1.C.

Identify and promote effective land use approaches for accommodating older people's transportation needs and develop a clearinghouse of best practices for planners and community developers.

New land use approaches can result in patterns that facilitate neighborhood-based living, minimizing dependency on automobiles. Thoughtful future zoning and land use planning could lead to communities in which housing options are integrated with a variety of services needed by older adults (medical services, houses of worship, shopping, social centers, assisted living facilities, etc.). These communities could be served by access roadways where older drivers can safely interface with a network designed to allow older pedestrians, cyclists, users of motorized wheelchairs, scooters, and other unlicensed low-speed vehicles to proceed with a full sense of security.

Land use planners need to be informed about their role in accommodating the increasing numbers of older people who will reside in their communities in the near future. All who are concerned about safe mobility for the elderly – consumer advocates, health-care organizations, citizen groups, and local governments – can help draw attention to this planning need and encourage decision makers to anticipate it as they plan their development. A clearinghouse on innovative programs and best practices on land use planning and reengineering access patterns for the elderly needs to be established.

Land use policy is generally the purview of local officials, whose decisions must balance diverse social, economic, neighborhood, developmental, and individual rights issues. Metropolitan Planning Organizations (MPOs) and other agencies that plan public buildings, public transportation, pedestrian, and road facilities should adapt their work to reflect the changing needs of the increasingly older population. As plans are modified to address the needs of an aging population, local governments should include older persons or their caregivers on planning boards and other bodies responsible for planning, zoning, and programming street and pedestrian improvements.

Action Summary:

1. Safer, Easier-to-Use Roadways and Walkways

Recommended designs from the FHWA handbooks for making roadway use easier and safer for older drivers and pedestrians need to be promoted. Training of highway and traffic engineers on these guidelines and recommendations should be continued. Efforts to incorporate the FHWA guidelines and recommendations into standard design manuals should receive continuing priority. Projects that address the needs of older pedestrians, especially around sites heavily frequented by senior citizens, need to be promoted. Land use patterns that maximize the safe mobility of older adults need to be encouraged and recognized in state or local community and transportation improvement plans. A clearinghouse of best design standards and land use should be established, and planners and community developers should be informed of the most effective new community, highway, and pedestrian designs.

2. Safer, Easier-To-Use Automobiles

Improving Crash Protection

Older persons are less able than most persons to withstand and recover from the trauma of crashes, and they face a much higher likelihood that a crash will prove fatal. When they are involved in crashes, occupants over age 80 are more than four times as likely to die than those under 60.[27] This vulnerability leads to the following strategies.

Strategy 2.A.

Evaluate approaches to improve protection of older occupants in crashes.

As part of the continuing development of countermeasures that protect all occupants in crashes, strategies for the better protection of older occupants that take into account their increased fragility may be evaluated. Evaluation of the injury-saving potential of existing technologies and research into potential improvements could benefit the growing number of older persons buying cars. These investigations may examine the feasibility and practicability of crash dummy enhancements and/or revised injury tolerance criteria for existing dummies to replicate the features of older motorists. These might then be used to design and test improved air bag systems, inflatable belts, force-limiting safety belts, side air bags, knee bolsters, and other occupant protection systems to maximize protection for older users. Future revisions of the Federal Motor Vehicle Safety Standards should consider the needs of older occupants.

Strategy 2.B.

Consider the need for new standards for exterior vehicle designs that are less injurious to pedestrians.

Pedestrian fatalities are disproportionately high for older adults. The National Highway Traffic Safety Administration (NHTSA), through its participation in the International Harmonization Research Activities pedestrian working group, is a beneficiary of the test procedures and cost-benefit estimates being developed for pedestrian safety. Continued work through the U.N. WP 29, Working Party on Passive Safety (GRSP), would allow it to explore the feasibility of developing a Global Technical Regulation for pedestrian safety.

Improving Crash Avoidance

Crash statistics show that older drivers have a higher percentage of their fatal crashes in angle collisions than drivers of other ages.[28] More than half of their crashes are angle collisions, while among younger drivers the proportion is only a quarter. Industry has been working to develop crash avoidance systems that can reduce these angle collisions as well as other collision types.

Strategy 2.C.

Evaluate older driver interactions with vehicle systems that affect the occurrence of crashes.

To ensure new technologies such as navigation systems, brake assist systems, collision warning and avoidance systems are beneficial, careful evaluation with special emphasis on the demands placed on older drivers needs to be performed. Many older drivers' ability to focus attention and process information is impaired; therefore, the potential benefits of the new technologies must be established.[29]

Revisions to the crash avoidance Federal Motor Vehicle Safety Standards should consider the needs of older occupants. As an example, glare and nighttime vision issues regarding older drivers ought to be kept in mind in assessing and promulgating vehicle lighting standards. It should be recognized that technological advances in vehicles could result in problems as well as benefits. The success and practicality of all of these systems depends in large measure on designing them to help drivers with special needs without distracting or confusing them. Industry, government, and universities need to cooperate in research, development and evaluation of these designs.

[27] Li, Braver, & Chen. (2001).
[28] Hakimes-Blomquist. (in press).
[29] Caird. (in press).

Strategy 2.D.

Continue work on specialized vehicle systems to extend the driving capabilities of persons with disabilities.

Vehicle designs can be changed to compensate for the special needs of drivers with disabilities. Companies produce specialized vehicle controls to accommodate people with disabilities and make it possible for them to drive, such as brakes and accelerators designed for left foot operation for people with paralysis on the right side of the body.

Ongoing public and private work with disabled populations can further develop and evaluate advanced technologies to improve the ability of those with disabilities to drive. One area for investigation would be the potential for original equipment manufacturers (OEM) to accommodate the needs of people with disabilities by incorporating features into new vehicles rather than depending on items added at a later date. Steering and braking levels of effort could be easily adjustable in the vehicle's electronics rather than modified after the fact. While this would improve equipment reliability, it would be important to evaluate problems in the field to establish the costs and benefits of building in such specialized systems.

In the meantime, professionals involved in driver rehabilitation can continue to provide educational material to increase awareness of how available technology can help persons with specialized requirements continue to drive safely.

Action Summary:

2. Safer, Easier-to-Use Automobiles

Means to better protect frail older occupants and pedestrians need to be evaluated. Older driver interactions with vehicle systems that affect the occurrence of crashes and promote effective solutions need to be studied, to provide a basis for developing vehicles that are easier and safer for older people to drive. The continuing development of specialized vehicle systems can extend the driving capabilities for the physically challenged older population.

3. Assess and Improve Competency of Older Drivers and Pedestrians

Evidence to date indicates that older people prefer to drive in a private vehicle as late in life as possible and generally do so safely.[30] Additionally, there is evidence that some older people drive longer than they can walk or use transportation options.[31] To enable people to have safe mobility it is necessary to design programs that can enable older people to drive, walk, and use alternatives safely.

Identifying unsafe older drivers has been the focus of a number of studies.[32] These studies indicate that some older drivers who may be at higher risk of crashing may continue to hold licenses and drive.

Identifying Unsafe Drivers

Older drivers place less of a safety burden on the public because they drive less and reduce their exposure to higher-risk circumstances.[33] Some older drivers, however, particularly those with cognitive deficits and other diminished functional abilities, may not recognize their condition and may not properly reduce or cease driving.

Strategy 3.A.

Continue to identify the characteristics of older drivers who are at higher risk of crashing and those who correctly self regulate.

Research needs to be conducted to better identify the characteristics that cause older drivers to be at increased risk of crashing.[34] There is also a need to better understand the extent to which older people appropriately self-regulate, since less than 5 percent of older people lose their licenses due to action by state licensing authorities.[35] Based on these findings guidance to States on the particular needs to regulate and reexamine older drivers is warranted.

[30] Hakimes-Blomquist. (in press).
[31] Riter, Straight, & Evans. (2002).
[32] Staplin, Lococo, Stewart, & Decina. (1999).
[33] Hakimes-Blomquist. (in press).
[34] Transportation Research Board (Ed.). (in press).
[35] Kington, Reuben, Rogowski, & Lillard. (1994).

Identifying Appropriate Settings for Regulating Unsafe Older Drivers

Most people support programs that assess the overall driving population without regard for age.[36] Unfortunately, to test everyone on all the functional disabilities that could affect safe driving is impractical, particularly in a driver licensing setting because of costs and personnel considerations. Since functional disabilities associated with increased crashes are found more frequently in older people, age-based testing is often recommended. However, such testing should be advocated only if research determines that it can correctly identify unsafe drivers.

States need to know whether renewal testing should be based on age or on other ways of identifying potentially higher risk drivers such as crashes, moving violations, or reports by law enforcement, physicians, or family members. To date, none of these approaches has been very successful in effectively identifying those who cannot safely drive.[37] Traditional tests currently used in driver reexaminations have not been found to be predictive of crash involvement. Incidents of crashes and moving vehicle violations are generally low among the overall older population, and those who are most likely to observe the characteristics indicative of unsafe driving are often reluctant to report the need to reexamine.

Strategy 3.B.

Develop and evaluate procedures to identify referral, testing, rehabilitation, and regulation programs to improve older driver safety.

Surveys have indicated that neither professionals (physicians, other health and social service staff, or law enforcement personnel) nor family think they have sufficient information to adequately address the competency of older people to drive.[38] Development of better ways to insure that only safe drivers are on the road needs to continue. As a first step in this process it would be advantageous to evaluate the various programs being developed or recently developed. These include:

1. The American Medical Association (AMA) *Physicians Guide to Assessing and Counseling Older Drivers*,[39] needs to be made available to physicians or health care groups.
2. Promising programs need to be identified to assist lay caregivers or family members on how to deal with unsafe older drivers or bring them to the attention of the motor vehicle department. The recently developed *Model Driver Screening and Evaluation Program: Guidelines for Motor Vehicle Administrators*[40] would best be evaluated in one or more states to see which elements of these guidelines are effective in assessing the older driver.

Guidelines are also needed for traffic law enforcement, traffic court judges, social workers, and, possibly, religious groups that deal with issues facing older people and who can play a role in identifying those who may be unsafe drivers.

Strategy 3.C.

Develop and evaluate procedures to enable people with functional disabilities to drive, walk, or use transportation options safely.

Determination of which functional limitations are amenable to rehabilitation needs to continue. Research is needed to develop a broad base of experience with various diagnostic instruments and practices, develop norms and counseling procedures based on these norms, and develop ways to promote and pay for these programs. Though designed primarily as a means to rehabilitate or counsel older drivers, when remediation is not possible, test findings could help to get unsafe drivers off the road by providing valuable information to older people and caregivers regarding the need to stop driving and by helping to identify which mobility alternatives the aging driver is capable of using.

[36] Eberhand & Murtha. (in press).
[37] Staplin, Lococo, Stewart, & Decina. (1999).
[38] Sterns, Sterns, Aizenberg, & Anapole. (2001).
[39] Wang, Kosinski, Schwartzberg, & Shanklin. (July 2003).
[40] National Highway Traffic Safety Administration. (May 2003).

Available tools such as self-assessment materials to enable older people to correctly gauge their ability to drive safely need to be evaluated, to determine if the subpopulations with higher crash risks can correctly self regulate.

It is important to conduct an analysis of the potential of education and training to extend the safe driving and walking potential of older people. Attention should be given to how information can enable older people to make appropriate judgments about their driving ability.

Training programs that are available for older drivers need to be evaluated. Most are classroom-only programs, and their effectiveness has yet to be determined. Researchers should look into who takes these training courses and if they are the drivers who can best benefit from the information. The role that behind-the-wheel evaluation and training can have in enhancing the driving skills of older drivers with different functional disabilities needs to be determined. Similar activities that encourage safe walking also need investigation.

Strategy 3.D.

Provide materials to enable professional organizations to conduct in-service training on effective program guidelines.

As more appropriate systems and programs are identified, the *Safe Mobility for Older People Notebook* developed by NHTSA needs to be updated and widely distributed to state and local groups. Health, social service, and public service personnel who deal with these issues must then be trained and, if necessary, certified by the appropriate national organization. The approach used by the Association for Driver Rehabilitation Specialists (ADED) to certify driver rehabilitation specialists could serve as one example of such training. Attempts to help ensure that there are adequately trained personnel to enable older people to be correctly assessed, such as the current activity by the American Occupational Therapy Association (AOTA), should be encouraged.

Action Summary:

3. Assess and Improve Competency of Older Drivers and Pedestrians

Federal, State, and national organizations need to work together to develop cost-effective programs that enable older people to experience safe mobility longer in life. The organizations need to support evaluations of programs for identifying, assessing, training, rehabilitating, and regulating functionally limited drivers in State Departments of Motor Vehicles (DMV) and in medical and social service settings. They can determine the most cost-effective ways of identifying potentially higher risk drivers and the role that education and training have in enabling older people to drive or walk safely later in life. Personnel who deal with these issues need to be appropriately trained.

4. Better, Easier-to-Use Public Transportation Services

As Figure 5 shows, about 90 percent of all trips made by individuals between the ages of 65 and 84 are in private vehicles. For many of these trips, the older adult is not driving. The percentage of those who are passengers rises constantly with age, from 21 percent for those ages 65-69 years old, to 36 percent for those ages 80-84, to 40 percent for 85 and older. This indicates the significant role of the informal support system that provides the bulk of the transportation for older adults unable to drive themselves. For many older people, family, friends, and neighbors are the key to mobility. Nearby friends, available at all hours, can often provide transportation for an unplanned or last-minute trip. Many places of worship, senior centers, hired drivers, and voluntary organizations also provide transportation services, but most elderly people with special needs who are not in institutions are transported in family automobiles.

In future years, older people may be more transportation-disadvantaged because they will lack the help now provided by adult children. Relying on family as mobility providers may become less possible. Spouses and adult children, who have been the traditional caregivers, may be less able to take on transportation and care duties due to smaller family sizes, geographic separation, and a greater proportion of families where both husband and wife work.[41] As a result, public transportation will become increasingly important to the elderly community.

Public Transportation

The potential of public transportation is not being fully realized by older people, accounting for only about 3 percent of their trips. For some older people, this may be so because they are more able to drive than walk or use public transportation. Public transportation needs to be designed to better respond to the needs of America's growing elderly population. This is true for both conventional fixed-route public transportation and paratransit services (but not for the supplemental transportation systems, discussed below). Having a viable alternative to the automobile is important if older adults are to maintain true independence once driving becomes unsafe or they choose not to drive.

Strategy 4.A.

Develop and evaluate public transportation best practices for older adults.

Public transportation systems need to be made more elder-friendly – easier to use and more convenient to reach safely. They must offer better connectivity from where older persons live to where they need to go, and better pedestrian access to and from public transportation facilities. The physical and functional impairments that may limit or inhibit an older person's driving must be considered in the design and operation of public transportation. Impairments may affect the older individual's abilities to, for example, walk to the public transportation stop, wait for a vehicle outside in bad weather, climb aboard the vehicle, pay for the ride, stand in a vehicle while it is in motion, and recognize entry and departure points. Routes, schedules, and operating procedures must be simplified.

Paratransit services should be tailored more to the needs of older customers. These services address many of the barriers preventing the use of public transportation by older individuals. Most of these services provide door-to-door service from the passenger's home to their destination, eliminating the need to gain access to a bus stop.

There are limitations to the effectiveness of paratransit services, however. Many systems have a narrow geographic service area. Many offer limited hours of operation, and customers cannot use them for evening or weekend activities. Paratransit services also lack the flexibility in scheduling that many grew accustomed to when driving. Appointments may need to be scheduled 24 hours or more in advance, and the passenger must know in advance what time a return trip is needed. Advance scheduling can cause problems – for example, when a medical appointment runs very late. Further, many older adults do not meet the Americans With Disabilities Act (ADA) definitions of eligibility and do not have access to ADA paratransit. For those who do, paratransit services tend to be fractionalized and are not coordinated to address the full range of transportation needs of older, functionally limited Americans.

It is important public transportation operators become well acquainted with the special needs of their elderly customers to best take advantage of the growing market they represent. Marketing to this group of customers poses new challenges. Research should focus on their capabilities, functional limitations, and special customer needs so that public transportation providers are able to develop tailored training and marketing campaigns to attract older patrons.

[41] Hobbs & Damon. (1996).

Mobility Managers

Older adults may use a number of public and private modes to meet their travel requirements. Consequently, public transportation operators need to integrate their services into a network of diverse, ancillary providers of service in their region so they can become more responsive to customer needs.

Strategy 4.B.

Develop comprehensive, one-call-does-it-all mobility managers to coordinate local providers and their services.

Mobility managers may be put in place by a variety of organizations that serve the elderly, from public transportation operators, to Area Agencies on Aging, to faith-based or community-provided services. For public transportation operators, mobility managers will work through the network of services offered by different organizations, from providers of fixed-route bus and rail services to shared service on flexible routes with dynamic dispatching. They also may interface with taxis or other providers offering more individualized trips that accommodate special preferences or the functional limitations of the trip-maker. Mobility managers take more time to understand customer needs and functions, acting almost as a travel agent to connect the customer to appropriate services and service providers. They can coordinate the different programs, eliminate duplication of service, and provide continuity among services.

In the forums and focus groups conducted to develop this report,[42] a recurring suggestion was to have a single, user-friendly source of personalized information about transportation options. An older person could dial a one-call-does-it-all number, describe the specific trip he or she wanted to take, and get detailed help in arranging it. The mobility manager would counsel the elderly customer, family member, or caregiver on exactly how to accomplish all portions of the desired trip until the route becomes routine for the traveler. The mobility manager might also recommend alternative modes, list options, schedule pickups, provide contacts for service providers, arrange training to use the transportation services, or provide additional information.

The mobility manager's success in arranging the desired trip will depend in part on the information base they are using: how up to date, how comprehensive, and how well the transportation services are known to match the needs and abilities of the individual customer. For the mobility manager the database could be manual, with individual effort spent to stay up to date, or computerized using advanced information technology. Service could be provided in various languages and made accessible for those with disabilities. In some areas, mobility managers should eventually be able to provide guidance to users on how they could access the needed information in their own homes through an easy-to-use telephone service or the Internet, so users can make their own choices.

Rural Transportation for Older People

The isolation of older people in rural and outer suburban areas is particularly troublesome. Traffic fatalities for motor vehicle occupants age 65 and above are higher in rural areas (60%) than urban areas (40%).[43] Elderly people in rural areas face transportation challenges that are unique to the geographic and socioeconomic conditions of their communities. Often there are vast distances between destinations. Some rural communities are as far as 200 miles away from inpatient medical facilities or the nearest airport. Even though most elderly people travel by private vehicle as drivers or passengers, car ownership and use declines with age. Although transportation options become increasingly important with age, 38 percent of rural counties have no public transit service, and many have only negligible services (fewer than 25 trips per year for each household without a car).

[42] Kerschner & Aizenberg. (1996).
[43] National Highway Traffic Safety Administration. (2001a).

Left unresolved, these challenges will be exacerbated as the elderly population in rural areas increases. Rural retirement communities will see higher proportions of older persons, due not only to aging in place, but also to immigration of older people from metropolitan areas. By 2020, some states (including Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) will see up to a 100 percent increase of their elderly and oldest old (85 and over) populations.[44]

Adequate transportation also benefits rural communities that aim to attract retirees. Research shows that rural retirement destination communities (those with 15 percent or more net immigration of people age 60 and older) experience population gains, increased family incomes, greater economic diversification, and reduced unemployment rates.

State transportation planners should include solutions that address the need for safer rural roads and new or expanded transportation services for their older populations. It is necessary they work to get better information to communities so they can understand what is available to them. Without adequate transportation access, older people in rural areas will experience greater isolation and receive less health care. In economic terms, the medical costs of inadequate transportation will remain high if people enter institutions and nursing care facilities prematurely due to inability to drive or lack of transit services.

Strategy 4.C.

Conduct demonstration programs of innovative transit and supplemental transportation systems for underserved and rural areas.

It is important for communities around the country to experiment with different kinds of systems to provide alternative transportation for older adults. Some of the best such systems have grown out of creative partnerships among a variety of interests: elder advocates, governments, religious organizations, and care providers. For the most part, such partnerships rely on local leadership and meet a need that is recognized at the grassroots level. Opportunities and needs vary widely from one community to another, and what works in one area may or may not work in another. Nevertheless, many areas have been successful in building partnerships that combine services in innovative ways or that tap into unconventional sources of financial support. These transportation systems can encompass a variety of paratransit and shared-ride services, sometimes operated jointly by local public transportation agencies and social service organizations, sometimes taking advantage of volunteers. Such systems often provide a level of flexibility, convenience, and security that traditional public transportation service cannot match. It is important to determine which combinations of transportation arrangements work best in different settings.

Some attempts are being made to address this question. Through the Transit Cooperative Research Program, the Federal Transit Administration (FTA) supported a project by Westat, Inc., to identify best practices and assist public transportation providers to improve options for older adults.[45] The AAA Foundation for Traffic Safety (AAAFTS) and the Beverly Foundation have recently completed a study identifying best practices among supplemental or informal transportation programs (STPs) for elderly people.[46] They have identified over 300 STPs that provide senior-friendly service – most targeted at those 85 and older, the fastest growing segment of the population. Those 85 and older often have special needs because of cognitive, visual, and hearing impairments and difficulties walking and climbing inclines. Almost half of the STPs provide or can provide escort service. Local governments and public transportation operators should review and conduct demonstration projects of those best practices appropriate to their communities.

Experimentation will be needed to see which new approaches providing alternative transportation for older

[44] Burkhardt, Hedrick, & McGavock. (1997).
[45] Burkhardt, McGavock, Nelson, & Mitchel. (2002).
[46] Beverly Foundation. (2001).

adults could be adapted on a broader scale to address particular local conditions. It should be determined which requirements – particularly innovative use of volunteers, Intelligent Transportation Systems (ITS) applications, and public-private financing mechanisms – are most effective in different settings. They should continue identifying the advantages to be gained through using the latest technology to coordinate services at the local, regional, and multiagency levels for the purposes of job training, employment, medical service, nutrition trips, rehabilitation, and other life-sustaining functions. The value of ITS technologies should be established, including automated scheduling, dispatching, traveler information systems, and billing software, as well as automatic vehicle location systems to facilitate dynamic dispatching. The utility for mobility management in one-call-does-it-all applications can be proven over a variety of community settings.

Interagency Coordination

Many forms of specialized transportation service for older people are based on support from federal programs. Many acts govern the various services that are provided, including the Transportation Equity Act for the 21st Century (TEA-21), the Older Americans Act, the Americans With Disabilities Act, the Civil Rights Act, and the Clean Air Act. Federal agencies involved with these programs include DOT, Department of Health and Human Services (DHHS), Department of Veterans Affairs, Department of Education, Department of Agriculture, and the Joint Council on Human Resources. The distributions of funds for these specialized services are frequently fragmented, uncoordinated, and not universally available. Developing partnerships among providers, often combined with private-sector interests, allows for a reduction in inefficiencies, overlaps, and gaps, resulting in a better overall level of service for the elderly population. For example, dedicated paratransit and public transportation services serving individual medical institutions might be melded to save money and increase overall coverage. A coordinated information and reservation center could allow a single vehicle to pick up elderly and other eligible individuals and deliver them to nearby destinations, rather than having each institution send a separate vehicle to virtually the identical location. DOT and DHHS have been working on improving the coordination between their agencies through the DOT/DHHS Coordinating Council on Access and Mobility (Interagency Coordinating Council). The FTA and Administration on Aging (AoA) recently signed a memorandum of understanding that builds on the collaborative process between DHHS and DOT.

Strategy 4.D.

Strengthen the Interagency Coordinating Council to identify and remove programmatic barriers to the coordinated delivery of services for elderly people.

At the federal level, the Interagency Coordinating Council needs to review the barriers that prevent building cooperative systems and minimize the dissonance in the regulatory requirements for the use of federal funds. Information needs to be promulgated on the best systems among communities, which barriers are amenable to mitigation, and what performance measures it can use to demonstrate progress in coordinating services. This information could lead to improvements in the coordination of public transportation and specialized services offered by DOT, DHHS, and others. Better coordination will result in better overall service to elderly customers and lower overall costs.

Intercity Travel

Many older persons have the desire and the wherewithal to make intercity trips. But in many cases, intercity transportation presents barriers to older adult customers, particularly at airport, train, bus, and marine terminals, which are often difficult for older patrons to use. Older travelers report difficulty with long walks through airports with no place to sit down as well as problems finding gates, reaching storage bins, using lavatories that are hard to access, climbing

difficult stairways, getting assistance with luggage, negotiating awkward floor or platform heights, and the like.

Strategy 4.E.

Improve the ease of use of both transit and intercity transportation for older adults.

The reasons why older adults are so reluctant to use transit need to be identified and remedies developed to mitigate obstacles. A national dialogue is needed to identify barriers that the elderly face in using intercity passenger services and to assess the costs and benefits – including additional business – associated with removing these barriers. These findings would also help companies market to this growing set of customers. For example, electric passenger carts are usually available to provide rides to those who experience difficulty walking through air terminals, but many older persons who would use this service do not know how and where to request it. Additional customer information in this area could be helpful.

Action Summary:

4. Better, Easier-to-Use Public Transportation Services

Better-designed public transportation facilitating wider use by older people needs to be developed. Transit should be integrated with the services of other local providers through mobility managers who tie these services together for older users and mitigate the complexity that often deters them. Demonstration projects should be supported to test how new systems that provide alternative transportation for older adults can be adapted on a broader scale to suit particular local conditions and requirements in other communities. There is a need for the Interagency Coordinating Council to evaluate the presence of programmatic barriers to coordinating delivery of transportation services. The reasons why older adults are so reluctant to use transit need to be studied and remedies developed. Barriers that deter many older people from intercity travel need to be identified and ways to mitigate them determined.

5. Targeted State and Local Safe Mobility Action Plans

Transportation is but one of a number of issues associated with elderly needs (e.g., health care, retirement security) that compete for public resources and attention. This holds at the state and local level, as well as nationally. To give safe transportation the priority it warrants will require leadership, activism, and consensus building, both political and institutional.

To define safe mobility for their older populations, states and local communities must ensure that applicable areas covered in this report are addressed by community leaders, business executives, older people, care providers, concerned citizens, and researchers. The federal government can support, assist, and inform the process, but meeting the mobility needs of an aging society must first and foremost be a key priority of state and local leaders.

Strategy 5.A.

Encourage formation of state and local consortia to address the transportation needs of elderly people.

Some states – including Arizona, California, Florida, Iowa, Maryland, Michigan, and New York – have already developed task forces or consortia over the last 10 years to address the mobility of their aging population. These consortia or task forces provide a means to define what must be done and develop plans to proceed with implementation. Such task forces are a call to action to state offices (transportation, aging, motor vehicle, health, and housing), planning organizations, and community-based institutions to learn about transportation issues and develop a plan of action. In order to be fully effective, extensive cooperation is required among a broad array of groups with different perspectives: social service, medical, and transportation organizations, as well as the private sector. Solutions will typically lie outside the purview of any single organization. Only a full dialogue among interested groups can assure detailed knowledge of the many government mobility

programs available to draw upon and of the state of the art in research and development. This knowledge will provide the basis upon which consortia can consider potential policy changes and formulate new strategies for their long-range plans.

Strategy 5.B.
Encourage states and local communities to develop and implement safe mobility action plans.

States and local communities need to start immediately to determine what needs to be done to provide safe mobility for their aging population. They need to consider not only what they can do to make their infrastructure safer, but also other ways to make their drivers, walkers, and transportation users safer. Maryland, for example, has created a broad-based consortium to develop better techniques for identifying drivers at risk, assessing their capabilities, rehabilitating them when possible, educating them about their limitations and the resultant implications of each, and transitioning them to alternatives. Arizona, California, Florida, Iowa, Maryland, and Michigan have developed broad plans to address all the issues covered in this report.

Once consortia or task forces have been established and their plans developed, it is critical that there be an ongoing group to help ensure the continued development and implementation of the programs recommended in the plan. Furthermore, states should evaluate the effectiveness of the programs that are initiated (successes and failures) on some regular basis. Assistance should be provided to states establishing these groups, developing their plans, and sharing their programs with other localities.

Action Summary:

5. Targeted State and Local Safe Mobility Action Plans

There is a need for states and local communities to organize consortia to develop and put in place long-term plans for maintaining the safe mobility of their older citizens. The consortia should include representatives of key state and local groups with an ongoing interest in continued independence of the elderly population, as well as older people themselves. National organizations and federal agencies that have a role in this area need also be members. As states and local communities implement and evaluate their programs, it is important that the results be shared with other states and communities.

6. Better Public Information

The public, and the elderly in particular, need more current information on how older people can maintain safe mobility as late in life as possible. Transportation is frequently fundamental to independence, happiness, and health. Elderly individuals cherish an independent existence, and act safely and responsibly. A national social marketing program could provide information on corrective strategies that can enable older people to drive safely longer and on available resources that can enable them to have mobility. It can also serve an ill-informed general public by providing facts that counter often-held views that older drivers are unsafe.

Identifying the Unsafe Driver

Older persons themselves need better information on the issues they face and the resources available to assist them. For most older people, driving will remain their primary

means of transportation, and informational materials are needed to explain and encourage ways in which the safe driving years can be extended. The transition from driving to other forms of transportation is an extremely sensitive process. Loss of driving can be so debilitating that some social workers have established self-help groups to assist older people who have stopped driving.

Strategy 6.A.
Educate older people and their caregivers on how to identify unsafe older drivers and extend safe driving, walking, and use of transit.

A campaign to identify unsafe older drivers needs to be developed. It is important for the campaign to communicate to older people how they can evaluate their skills, improve their safe driving, and learn when to transition to other public transportation options. The campaign needs to also communicate with families of older drivers and the professional care-giving groups that interact with older people: doctors, extended caregiver networks, legislators, and law enforcement personnel and motor vehicle department personnel. Messages for each segment need to be consistent with that group's interests and responsibilities and focus on the overriding objective: ensuring safe mobility for life.

Programs are needed to help older adults and their caregivers plan effectively for lifelong mobility so that the need to reduce or cease driving can be anticipated. If mobility planning has taken place, a safe, effective, and satisfying transition from driving to the use of other options can occur. Since older people are reluctant to plan for stopping driving, social service agencies need to be in a position to enable those who do stop to readily use other transportation options. It is necessary to design and test information materials that emphasize the most satisfactory ways of making this change and advise older people and their families of the various transportation and life-style options available.

National campaigns exploring the broad impacts of aging on driving, how to extend the safe driving years, and the wisdom of thinking about alternatives even before they become necessary are needed. Providing media with an accurate description of older drivers could be an important element of a national campaign. How older persons – and their loved ones – deal with the transition from driving to other transportation options can be handled best at the local or regional level, where specific descriptions of various services, routes, and assistance available can be collected and publicized extensively. It is here where creative partnerships will be particularly advantageous to enable one-call-does-it-all and mobility manager services. National campaigns encouraging expanded public awareness of the relationship between advancing age and declining driver skills and the importance of preparing for possible cessation of driving are important.

The Professional Audience

In addition to providing information to older drivers, family members, and caregivers, it is essential to develop a system to share information among the professional, state, and local communities involved in these issues. Older people today (as evidenced by their comments at regional forums and focus groups) do not feel that their needs and concerns are understood by many of the professionals that they deal with on matters involving driving or mobility. A common suggestion was to train professionals – highway designers, medical providers, public transportation managers and drivers, police, taxi operators, driver licensing personnel, urban planners, or social service agency staff – to be sensitive to and informed about the safe mobility needs of senior citizens.

Strategy 6.B.
Train transportation, health and social service personnel to enable safe mobility and well being of elderly people.

Professional groups should be made aware of the need to ensure that their members are able to address safe mobility

for tomorrow's older people. Far more information and training is needed to equip the many more professionals who should be in service to address these matters as the senior population continues to grow. Training programs stressing how these professional specialties can assist older people in remaining safely mobile are needed.

It's important that medical research, engineering innovations, testing and evaluation protocols, and other data be readily available to academics and practitioners nationally and internationally. Existing or new web pages can be linked to assist in the general provision of information to both general and specialized publics (e.g., doctors, therapists) at both the national and local level. These web pages can serve as clearinghouses for government, private, and not-for-profit efforts to improve accessibility, mobility, and safety for older people. They should be linked to organizations providing information to older people on driving and transportation, such as AARP, AAAFTS, and the Association for Driver Rehabilitation Specialists (ADED) and others. These organizations can also be linked with toll-free numbers that provide immediate access to key information in a format understandable to older adults. State and local agencies that deal with aging constituents need to become knowledgeable about transportation issues.

Action Summary:

6. Better Public Information

A comprehensive campaign needs to be developed and implemented to educate older people and their caregivers on how to evaluate and extend their abilities to safely drive, walk, and use transit. Members of service and other professions involved in the well being of the aging population need to be trained on how they can assist the elderly in remaining mobile.

7. Basic and Social Research Needs

There are many proposals for ways to improve safe mobility for older persons, and additional research is needed to develop and evaluate them. In addition to the specific strategies presented in this report, there is a need for basic and social policy research. Worldwide experts have updated the requirements for new research and development in TRB's 2003 report, *Transportation for an Aging Society – Initiatives Drawn from a Decade of Experience*, cosponsored by DOT, the Centers for Disease Control and Prevention (CDC), and the National Institute on Aging (NIA).[47] A similar effort of the Organization for Economic Cooperation and Development provided the broader perspective of the industrial world in the report *Mobility Needs and Safety Problems of an Ageing Society*, published in November 2001.[48]

Strategy 7.A.
Determine the relationships between mobility and aging-related physical, cognitive, and functional limitations.

Additional research is needed to better understand the role mobility (or more specifically, lack of mobility) plays in key issues surrounding the aging process and its effect on successful aging. Better understanding is needed as to how co-morbid medical conditions affect driving and using other transportation options. For instance, the effects of early Alzheimer's dementia on driving capabilities need to be better understood. There is a need to determine at what stage in this disease, together with any other co-morbid conditions, a person may no longer drive safely or get around independently. As we learn more about the role of functional abilities on mobility, we should also determine the influence these abilities have on the ability to age in place. There is also a need to determine ways to reduce or eliminate functional limitations. With old age frequently comes more medications, and many older people are tak-

[47] Transportation Research Board. (in press).
[48] Organization for Economic Cooperation and Development. (2001).

ing multiple medications. Continued research on the positive and negative effects of short- and long-acting medications and multiple medications on driving capabilities is needed.

As more research confirms which physical and cognitive deficiencies impair driving performance, cost-effective ways to identify individuals with these deficiencies must continue to be developed. In addition, we need to develop more effective ways for doctors, health-care practitioners, social workers, rehabilitation specialists, law enforcement, judges, and others to identify and deal with potentially at-risk drivers.

One key consideration regarding mobility needs is to understand how the lack of mobility translates into social costs.

Strategy 7.B.

Establish the relationships between lost mobility, aging in place, and societal costs for older people.

Research needs to be conducted on the societal costs and benefits of increasing mobility to older persons. This research should provide a basis to evaluate the economic impacts of mobility and nonmobility on the individual, family, and community, and eventually provide estimates of the value to society of supporting life-long mobility. It could provide indications of whether and where additional private investment in mobility solutions might be stimulated from health, automobile, and life insurance companies, health-care providers, and others.

Future senior citizens will introduce new patterns of travel demand. Travel surveys need to track changes in the type, length, and frequency of trips made by older individuals in order to make new demand forecasts, inform public policymakers, and be responsive to changing needs of the older population. The key resource in developing these data is the Nationwide Household Travel Survey (NHTS). An over sampling of older persons is needed as NHTS tracks travel trends, and the survey could also include additional information on functional ability and transportation options to identify special groups needing tailored transportation. In addition to evaluating specific programs, a national survey could provide insights into changing issues faced by older drivers.

Strategy 7.C.

Determine technology's role in improving mobility and safety for functionally limited people as drivers, walkers, and public transportation users.

Increased application of technology and ITS holds great promise for helping functionally limited people overcome their limitations and take corrective actions. Research should be conducted to identify, design, and evaluate the additional systems needed by the anticipated larger population of older persons with functional limitations.

Action Summary:

7. Basic and Social Research Needs

Research is needed to increase our understanding of how loss of mobility affects older people. The impact of diminished mobility on the ability of the elderly population to age in place, on their quality of life, and on potential increases in the costs of health and nursing home care needs to be established. Research is also needed to better determine how the transportation problems of functionally limited people as drivers, walkers, and transit users can be reduced by technology and other solutions.

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Abbreviations

AAA – formerly American Automobile Association

AAAFTS – AAA Foundation for Traffic Safety

AAMVA – American Association of Motor Vehicle Administrators

AARP – formerly American Association of Retired Persons

AASHTO – American Association of State Highway and Transportation Officials

ADA – Americans With Disabilities Act

ADED – Association for Driver Rehabilitation Specialists

AMA – American Medical Association

AoA – Administration on Aging, DHHS

AOA – American Optometric Association

AOTA – American Occupational Therapy Association

CDC – Centers for Disease Control and Prevention, DHHS

DHHS – Department of Health and Human Services

DMV – Department of Motor Vehicles

DOT – U.S. Department of Transportation

DMV – Department of Motor Vehicles

DOT – U.S. Department of Transportation

FARS – Fatality Analysis Reporting System

FARS – Fatality Analysis Reporting System

FHWA – Federal Highway Administration

FTA – Federal Transit Administration

HRS – Health and Retirement Study

ITS – Intelligent Transportation Systems

MPO – Metropolitan Planning Organization

NHTS – Nationwide Household Travel Survey

NHTSA – National Highway Traffic Safety Administration

NIA – National Institute on Aging, NIH/DHHS

NIH – National Institutes of Health, DHHS

OST – Office of the Secretary, DOT

STPs – Supplemental Transportation Programs

TEA - 21 – Transportation Equity Act for the 21st Century

TRB – Transportation Research Board



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