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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP SYNTHESIS 51

Impacts of Aging Travelers on Airports

A Synthesis of Airport Practice

CONSULTANTS
Philip Mein
Andrew Kirchhoff
and
Patrick Fangen
Corgan Associates, Inc.
Dallas, Texas

TRANSPORTATION RESEARCH BOARD

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www.TRB.org

AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

The need for ACRP was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. It is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. The ACRP provides a forum where airport operators can cooperatively address common operational problems.

The ACRP was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. The primary participants in the ACRP are (1) an independent governing board, the ACRP Oversight Committee (AOC), appointed by the Secretary of the U.S. Department of Transportation with representation from airport operating agencies, other stakeholders, and relevant industry organizations such as the Airports Council International-North America (ACI-NA), the American Association of Airport Executives (AAAE), the National Association of State Aviation Officials (NASAO), Airlines for America (A4A), and the Airport Consultants Council (ACC) as vital links to the airport community; (2) the TRB as program manager and secretariat for the governing board; and (3) the FAA as program sponsor. In October 2005, the FAA executed a contract with the National Academies formally initiating the program.

The ACRP benefits from the cooperation and participation of airport professionals, air carriers, shippers, state and local government officials, equipment and service suppliers, other airport users, and research organizations. Each of these participants has different interests and responsibilities, and each is an integral part of this cooperative research effort.

Research problem statements for the ACRP are solicited periodically but may be submitted to the TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.

Once selected, each ACRP project is assigned to an expert panel, appointed by the TRB. Panels include experienced practitioners and research specialists; heavy emphasis is placed on including airport professionals, the intended users of the research products. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, ACRP project panels serve voluntarily without compensation.

Primary emphasis is placed on disseminating ACRP results to the intended end-users of the research: airport operating agencies, service providers, and suppliers. The ACRP produces a series of research reports for use by airport operators, local agencies, the FAA, and other interested parties, and industry associations may arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by airport-industry practitioners.

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Cover figure: Elderly travelers. *Source*: Corgan.

FOREWORD

Airport administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the airport industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire airport community, the Airport Cooperative Research Program authorized the Transportation Research Board to undertake a continuing project. This project, ACRP Project 11-03, "Synthesis of Information Related to Airport Practices," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an ACRP report series, *Synthesis of Airport Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Gail R. Staba
Senior Program Officer
Transportation
Research Board

This report presents information from the literature and interviews that airport operators are generally aware of the needs of the elderly who make up a significant portion of their customer base, and how they are trying to accommodate them. Challenges of wayfinding, fatigue, technology and equipment, and needed amenities are described, and practices that airports are enacting to accommodate and improve the airport experience of aging travelers are provided. However, often airport operators' efforts are hampered by the lack of a well-coordinated policy, the constraints presented by existing buildings, and the costs of implementation both in terms of capital investment and increased staffing. The report will be of special interest to airport operators, airlines, and related stakeholders in understanding the aging demographic, defining issues, and implementing effective practices to accommodate aging travelers.

Philip Mein, Andrew Kirchhoff, and Patrick Fangen, Corgan Associates Inc., Dallas, Texas, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

IMPACTS OF AGING TRAVELERS ON AIRPORTS

SUMMARY   The number of aging and elderly travelers is increasing, challenging airports and airlines to respond to the physical and psychological needs of this important demographic. According to the Administration on Aging, the number of persons over 65 years of age is projected to increase from 40 million in 2010 to 70 million—from 13% to 19% of the population—by 2030. Although healthier in some respects than earlier generations, this age group is subject to such chronic illnesses as cardiovascular disease, Alzheimer's, diabetes, osteoporosis, and obesity, any of which can affect a person's ability to navigate an airport. The normal effects of aging, including muscular/skeletal problems, respiratory conditions, and deteriorating sight and hearing, also play a role. Contributing psychological issues include anxiety and lack of ability to adapt to change.

The stress affecting anyone undertaking a major journey can be felt more acutely by an older person because of the factors mentioned above. This study identified the following as the most prevalent issues the elderly face:

Wayfinding:

- Unfamiliarity with a complex airport environment
- Unclear or confusing informational and directional signage
- Difficulty understanding the meaning and terminology of directional signs.

Fatigue:

- Standing or waiting in line, at check-in, passenger security screening, bag claim, or curbside
- Long walking distances in the terminal, parking garage, and surface lots
- Handling heavy bags at curbside, check-in, and bag claim.

Technology and equipment:

- Understanding and using self-service devices
- Negotiating the security checkpoint process
- Using escalators and moving walkways.

Amenities:

- Difficulty in using toilet facilities
- Using congested retail and food service concessions.

A broad understanding of the current impact of aging travelers on airports, and what is being done to accommodate them, was established through an Internet review of relevant literature and a two-part survey of knowledgeable airport representatives in the United States and Canada. Fifteen of 18 airports selected for interviews responded to questions (an 83% response rate), each providing important contributions to the study process.

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The interviews indicated that there was certainly an industry awareness of the special needs of elderly passengers. In all cases, close attention was being paid to compliance with the Americans with Disabilities Act (ADA). Besides that, the following efforts were identified:

Wayfinding:

- Master plans commissioned to clarify signage
- Signage inventories carried out, and the removal of redundant signs
- Installation of simpler, clearer, brighter public service signs
- Staffed information kiosks supplemented by touch screens
- Visual two-way paging systems
- Airport-specific smart phone wayfinding applications.

Fatigue:

- Seating provided in check-in lobbies, concourse areas, bag claim areas, and curbside
- Availability of wheelchairs
- Motorized carts organized into "transit systems" for the elderly and disabled
- Parking shuttles providing service to the passenger's car
- Shuttle buses with low decks to align with sidewalk curbs
- Lounges for passengers to await ground transportation
- Remote and off-site bag check
- Baggage pick-up and delivery services.

Technology and equipment:

- Customer service personnel assisting at self-service devices
- Video displays explaining the security screening process
- TSA Cares and TSA Notification Card programs
- More elevators, ramps, and sloped floors as alternatives to escalators
- Audible caution alerts at escalators and moving walkways.

Amenities:

- Wider toilet stalls
- Volunteer help stations
- Greater provision of family toilets, which are often used by the elderly
- Concession contracts requiring the same accessibility standards as the public spaces
- Availability of porters in bag claim, etc.

A number of interventions that would clearly benefit the elderly were not yet commonly employed, most likely owing to the cost of implementing them, particularly in existing buildings. These included:

- Flat-plate claim devices, from which it is easier to retrieve bags
- Large capacity flow-through elevators as an alternative to escalators
- Check-in bag wells level with the floor to eliminate the need to lift bags
- Universal design toilets, where there is no differentiation between able-bodied and handicap accessible facilities.

In summary, the literature review and interviews indicate that airport operators are generally aware of the needs of over-65 travelers, who make up a significant portion of their customer base, and are trying to accommodate them. However, often their efforts are hampered by the lack of a well-coordinated policy, the constraints presented by existing buildings, and the costs of implementation both in terms of capital investment and increased staffing. If these issues are not addressed by airport authorities and airlines, it can be expected that there will be a negative impact on airport operations. As pointed out by one of the interviewees, successful implementation of elderly-accessible facilities will require determination and strong advocacy.

CHAPTER ONE

REPORT METHODOLOGY

In preparing this report, the researchers undertook (1) an Internet review of relevant literature dealing with air travel by aging passengers; and (2) a survey of key airport personnel at a broad cross-section of airports, who are familiar with the issues facing elderly travelers and the measures being taken at their respective airports to accommodate them.

LITERATURE REVIEW

The literature review entailed an in-depth Internet search of the most relevant research and data on topics relating to aging travelers, specifically:

- The demographic context
- Common physical and behavioral characteristics
- Challenges typically faced by aging travelers
- Current airport practices for accommodating aging travelers.

AIRPORT PERSONNEL INTERVIEWS

The two-step survey of airport personnel began with an online questionnaire and was followed by telephone interviews. The questionnaire was distributed to knowledgeable airport staff at 29 large and medium hub airports across the United States, as well as some smaller airports with a high percentage of elderly passengers. The questionnaire included the following three questions:

1. Does your airport make any special provisions for elderly travelers?
2. If yes, briefly list some of those special provisions.
3. Would you be interested in participating in a 15- to 20-minute telephone interview regarding the impact of elderly travelers on airports?

Some brief biographical information was also requested. A sample copy of the questionnaire is included in Appendix A. Twenty-two (22) questionnaires, which were designed to identify people whom it would be most beneficial to interview, were completed and returned; and based upon their responses to questions 2 and 3, 18 airports were selected to take part in a follow-up interview; one declined to participate and two did not respond. The 15 resulting interviews were conducted by the principal investigator using a list of standard follow-up questions, a copy of which is included in Appendix B. Interviewees were also invited to address any additional topics they felt were relevant.

REPORT ORGANIZATION

The report contains seven main chapters. The first describes the report methodology. The second is devoted to the definition and characteristics of the aging traveler. The remaining five chapters trace the progress of passengers from the starting point of their journey to the airport, on to the departure gate and back again, documenting the challenges they face and the assistance that may be available to them in each of the following steps:

- From home or office to the airport terminal
- From the terminal entrance through the security checkpoint
- From the security checkpoint to the gate and from gate to gate
- From the arrival gate to the terminal exit
- From the terminal exit to leaving the airport.

There is a matrix at the end of chapters one through seven that summarizes the key issues facing the elderly addressed in that chapter; and the strategies currently being employed to address them as discussed in the preceding chapter text. In addition, there are symbols shown indicating the main obstacles standing in the way of implementing the various strategies as follows:

Capital Cost to Implement

Operational Costs/Staff Required

Existing Buildings Constraints/Disruption

No Obstacles to Implementation.

The issues addressed in this summary apply to all airports, but are especially relevant to larger hub facilities. The findings from the literature review are integrated within the text of each chapter; however, many of the findings were derived from the first-hand experiences of airport staff described during the interviews. In talking to each individual, it was agreed that the observations made would not be attributed directly to him/her or the particular airport. Many statements were common to several airports, in which case it is so noted. A list of participating airports is included in Appendix C.

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THE AGING TRAVELER

As noted previously, it has been well documented that the proportion, as well as the actual number, of older persons in the United States is increasing at a faster rate than in the general population. The Administration on Aging estimates the number of people over 65 years of age will increase from approximately 40 million in 2010 to 70 million by the year 2030, and from 13% to 19% of the population. It is interesting to note that according to the European Commission Economic and Financial Affairs Department's Aging Report, the percentage of elderly persons in the European population is already higher than that in the United States, with levels above 16%, which may account for the apparently greater focus on elderly issues in European airport terminal design.

Figure 7 from the U.S. Census Bureau Age and Sex Composition Report—2010 illustrates the growth in the percentage of persons over 65 from 9% in 1960 to 13% in 2010 (see Figure 1). Significantly, the number of those between 45 and 65 years of age—the future elderly, so to speak—has increased from 20.3% to 26.4% over the same period. The U.S. Travel Association notes that mature travelers, those born before 1946, account for 21% of all leisure travelers, making four trips a year on average; and 14% of all business passengers, making approximately eight trips a year. It is also expected that the proportion of older travelers choosing to fly will increase as a result of increased affluence and education levels.

CHARACTERISTICS OF THE OLDER TRAVELER

The main explanations for the increase in the number of air travelers over aged 65 are that the post-war "baby boomer" generation is reaching retirement age, and that people are generally living longer. This may suggest that elderly persons are healthier than in the past, and in some respects they are. However, according to the paper, "The Normal Aging Process" (*Leading Age Wisconsin*), there is an increase in the prevalence of a number of chronic diseases among the elderly, such as diabetes, arthritis, and hypertension. It is these ailments, even in their early stages, that are most likely to impact an older traveler's ability to navigate an airport terminal.

A general deterioration in some physical and mental functions can be expected with advancing years. Mobility and stamina can be impaired by a variety of muscular/skeletal problems and respiratory conditions, and eyesight and hearing generally decline. Elderly persons tend to be less flexible than they were in their youth and can often be in denial about not having the same capabilities they had formerly. The psychological effects of aging cannot be overlooked either: According to the article, "Psychosocial Changes with Aging" (Pearson Higher Education n.d.), the elderly are more risk-averse and anxiety-prone, which can result in difficulty with decision making, particularly under the pressure of an unfamiliar environment.

It is important to recognize there is no such thing as a typical elderly person. Just because a person may be limited in one particular respect does not mean he/she is not fully capable in others. There are also different "generations" of elderly people (see Figure 2). For example, many of the "younger" seniors are more capable of dealing with technology than their older predecessors. The same article quoted in the previous paragraph notes that although some brain functions in areas such as math do decline with age, others, including vocabulary skills, may actually improve. Symptoms of aging and early onset limitations may hinder travelers in their 50s, while those who are still traveling in their upper 80s and beyond may be less affected.
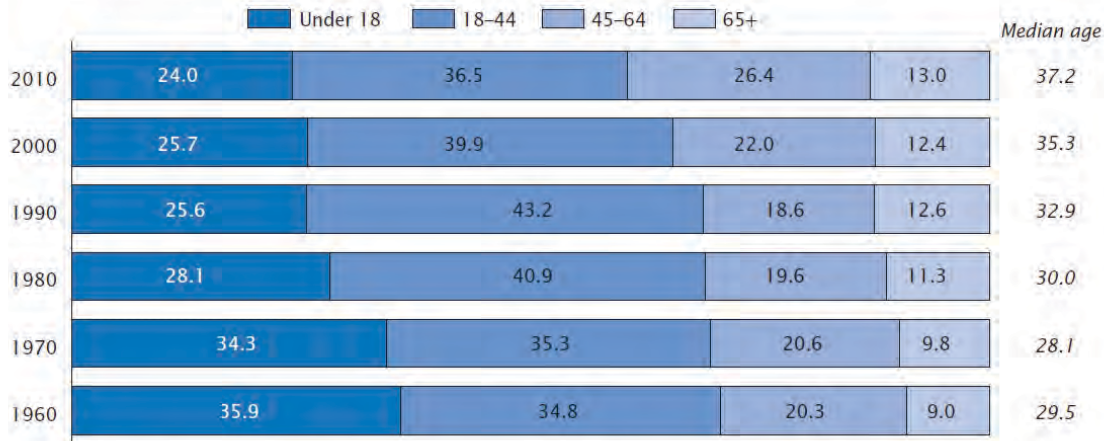
AMERICANS WITH DISABILITIES ACT AND THE AIR CARRIER ACCESS ACT

The Americans with Disabilities Act (ADA) defines a disabled person as one with a physical or mental impairment that substantially limits one or more major life activities. Although not necessarily fitting this description, the majority of elderly persons may benefit from some of the stipulations of ADA, such as more ample toilet stalls, automatic doors, and pedestrian routes without staircases. On the other hand, many older travelers do have physical or mental limitations that, although not classifying them as disabled, may cause difficulties in navigating an airport terminal.

The Air Carrier Access Act essentially prohibits discrimination on the basis of disability in airport terminals, parking garages, and ground transportation. This basically requires enabling a disabled passenger to use the airport facilities without hindrance and ensuring that any assistance that may be

Age Distribution and Median Age: 1960 to 2010

(In percent. For information on confidentiality protection, nonsampling error, and definitions, see
www.census.gov/prod/cen2010/doc/sf1.pdf)

	Under 18	18–44	45–64	65+	Median age
2010	24.0	36.5	26.4	13.0	37.2
2000	25.7	39.9	22.0	12.4	35.3
1990	25.6	43.2	18.6	12.6	32.9
1980	28.1	40.9	19.6	11.3	30.0
1970	34.3	35.3	20.6	9.8	28.1
1960	35.9	34.8	20.3	9.0	29.5

Sources: U.S. Census Bureau, *2010 Census Summary File 1, Census 2000 Summary File 1, 1990 Census Summary File 2C,
1980 Census Summary File 2C, 1970 Census of Population,* Vol. 1, *Characteristics of the Population,* Chapter B, Table 50, and
1960 Census of Population, Vol. 1, *Characteristics of the Population,* Chapter C, Table 156.

FIGURE 1 *U.S. Census Bureau Age and Sex Composition—2010.*

FIGURE 2 Elderly travelers (Corgan).

necessary, such as wheelchairs, is provided. The airlines have generally taken responsibility for the journey from check-in to the aircraft, from gate to gate for connecting passengers, and from the aircraft to bag claim or ground transportation. Increasingly, there are other situations where wheelchairs may be requested, such as from parking facilities into the terminal; and the airport often steps in to provide them.

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FROM HOME OR OFFICE TO THE AIRPORT TERMINAL

Once an older person has made the decision to travel by air, he or she must set about planning the journey, including making allowances for the extra time it will likely take to get to the airport and traversing the terminal to the gate. Travelers may also have recourse to one or more of the trip planning aids that can be found online, such as the FAA's "Preparing to Fly." There are also a number of commercial websites that offer advice on how to prepare for a journey by air. Nevertheless, air travel can be stressful, beginning with the journey from home or office to the airport and terminal entrance.

If the trip to the airport is by some form of public transit, there should be no wayfinding issue unless the train or bus does not drop off directly at the terminal front door, but rather at a remote location such as a ground transportation center (Figure 3). In this case, requiring a secondary method of transportation to the terminal can provide a challenge for the elderly in finding their way to the appropriate shuttle or moving walkway system. This may be exacerbated by the fact that they are probably still hauling the bags they intend to check. Most airports mitigate this problem by running shuttle buses with low decks that closely align with the curb, and having paid or volunteer staff to assist with directions.

HIGHWAY WAYFINDING

If the traveler is driving to the airport, there may be several wayfinding issues to deal with, including roadway signage design, sign spacing, and extraneous clutter. One respondent noted that signs are often erected in response to a specific issue but remain long after the issue is no longer relevant. That airport had instigated periodic signage inventories leading to the removal of redundant signs as appropriate. At another surveyed airport, the terminal roadway signage had been replaced by signs that had a design similar to the state highway signage en route to the airport, which was considered more comprehensible by the driver.

There are also multiple factors that increase the complexity of the journey, such as a series of arrivals or departures in a single journey, short-term or long-term parking, rental car return, etc. Airline signage can also be an issue, especially at large airports where a single airline may occupy more than one terminal with many gates in each, leading to the possibility of gate changes during the course of the journey to the airport.

PARKING CHALLENGES

Parking options at the airport can be especially confusing to older travelers. Because of the higher cost of close-in parking and the longer stays associated with leisure travel, aging passengers frequently use remote parking facilities. Often these facilities are large surface lots exposed to the weather, where there may be long waits for shuttle buses. These remote lots create the same problems of transferring to the terminal that the ground transportation centers do. Some remote parking and most close-in parking is in large multi-level parking structures, where it may be difficult to identify the most convenient area to park in order to minimize the walk distance to the appropriate terminal entrance. Even close-in lots can be hazardous in winter, when ice can lead to falls. One airport representative reported that the parking sections were identified by the gates and airlines to which they were closest.

For the technology-savvy traveler, there is a range of assistance available for finding a parking place. Gate information smart phone applications such as FlightTrack can help determine the most convenient parking location in relation to the aircraft departure gate; and there are smart phone applications that direct the driver to any available parking space ("Airport Apps Put You First in Line," *The New York Times*, 2010).

Most parking garages do not have baggage carts available within them because of their potential damage to cars. This requires passengers to transport their check-in and carry-on bags to the terminal unassisted. This issue has been ameliorated somewhat for the elderly by ADA requirements for ramps and automatic doors along travel paths. One airport had a passenger services website that allowed passengers to call and arrange for an agent to meet them at their parking space with a wheelchair to convey them to the check-in lobby.

DEALING WITH BAGS

Apart from wayfinding, the greatest challenge at the airport for aging travelers is dealing with their baggage. The ultimate solution to this problem is to have one's baggage picked up at home or other originating location. However, this raises several TSA security issues, primarily that the baggage may have

FIGURE 3 Remote terminal—Vienna (Corgan).

FIGURE 4 Garage bag check.

been tampered with. Also, there is no opportunity to have an airline employee positively identify the person checking the bag. Nevertheless, there are many off-site locations such as large hotels, resorts, convention centers, and cruise ship terminals certified by the TSA that deliver bags directly to the airport for screening and loading onto the aircraft ("On the Road with Harriet Baskas," *USA Today*, 2008). These services, as well as on-site locations, are generally provided by third-party vendors. The newer trend of shipping bags door-to-door is an alternative that could be a relief for elderly travelers.

In Europe, a number of airports have remote terminals, usually located in the city center or at major transportation nodes, where bags may be checked prior to riding a transit system to the airport (Figure 4). Because of regional demographic and infrastructural issues, including a lack of railway networks and generally dispersed population centers, this concept has not generally been adopted in the United States. The airports surveyed did indicate there is a trend toward on-airport bag check at parking garages and consolidated rental car facilities, etc., which is certainly a boon to the elderly. However, there are logistical and cost issues that have slowed the implementation of remote bag drop.

CURBSIDE CHECK

The most common method of checking a bag prior to entering the terminal is at curbside. This is generally convenient for the older traveler, and is available at all the larger airports surveyed. However, this does not eliminate all the issues for those who find it difficult to handle their bags. Generally, curbside agents will not lift bags from the trunks of cars, and curbside porters may only be interested in conveying bags from the car to the ticket counter. Also, elderly passengers who are dropped off at the curb while their traveling companion is parking the car or while waiting for a wheelchair can rarely find a place to sit, although waiting in what is often an unpleasant environment of vehicle exhaust fumes and traffic noise (see Table 1).

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TABLE 1
CHAPTER THREE SUMMARY

Issues	Obstacles	Strategies
Trip Anxiety	◢◣	- FAA's "Preparing to Fly"
	◢◣	- Commercial flight prep websites
Using Ground Transportation Within the Airport	◢◣	- Shuttle buses with curb-height decks
	$	- Shuttle boarding platforms
Following Roadway Signage	�	- Signage inventories to remove redundant signs
	◢◣	- Use of similar signs to surrounding highways
Using Large Parking Garages	◢◣	- Wheelchair service to the passenger's parking space
	◢◣	- Smart phone applications for locating parking spaces
	⚠ $	- Ramps at level changes on pedestrian routes
	$	- Automatic doors
	$	- Smart garage systems that enable empty space finding
Handling Heavy Baggage	♦person+	- Bag shipping
	$ ♦person+	- Check-in at off-site locations
	$ ♦person+	- Check-in at a remote terminal; e.g., downtown
	$ ♦person+	- Remote check-in on airport, long-term parking, or car rental
	$ ♦person+	- Garage check
	♦person+	- Curbside/valet check

ICON KEY

$ Capital Cost to Implement.

♦person+ Operational Costs/Staff Required.

⚠ Existing Buildings Constraints/Disruption.

◢◣ No Obstacles to Implementation.

CHAPTER FOUR

FROM THE TERMINAL ENTRANCE THROUGH THE SECURITY CHECKPOINT

The check-in area—usually an architecturally impressive space intended to instill a sense of awe and excitement at the prospect of taking a trip by air—traditionally represented the front door to an airport terminal. Nowadays, an older traveler entering such a space, with its visual information overload, large numbers of people, and loud ambient noise levels, may find it stressful and even disorienting (Figure 5). Some passengers will have already checked in, either at curbside or at a remote location such as a parking garage, and deposited their baggage prior to entering the building; but many will not have. For those aging travelers who need to obtain a boarding pass and check their baggage inside the terminal building, wayfinding can be a challenge.

CHECK-IN AREA WAYFINDING

A survey respondent noted that while volunteer "ambassadors" in the terminal were often located beyond the security checkpoint, having a staffed information station immediately inside the front door would be helpful and reassuring to the elderly passenger. Another respondent indicated that a "You Are Here" map of the terminal would be helpful—provided it was oriented on the same two-dimensional axis as the terminal, and was not three-dimensional, which passengers, including the elderly, tend to find confusing. Generally, airline signage at the curbside was considered adequate for passengers to alight at the appropriate location.

Navigating the check-in process can be made more difficult by an excess of signs in the lobby, some of which are in airline jargon that may not be clear to a person who travels infrequently. At one of the terminals at London's Heathrow Airport, signs identifying check-in areas, bag drop, ticketing, etc., are replaced by three very large signs that simply read Step 1, Step 2, and Step 3. Step 1 refers to obtaining a boarding pass; if the individual already has a boarding pass, a sign below the main sign instructs them to proceed to Step 2, which is the bag drop. From there, passengers are instructed to either go to security or Step 3 for further assistance with check-in.

COPING WITH TECHNOLOGY

One obvious concern is how older travelers cope with the proliferation of technology, particularly self-service check-in devices (Figure 6). Survey respondents reported that the

airlines were generally doing a good job of assisting their customers using self-service devices. One airport reported that it had its own help stations near the self-service check-in areas. At a number of airports, the self-service devices have audio menus and instructions that can be accessed by headphones, which those who are hard of hearing often carry. The trend among airlines to have an agent approach the passenger with a handheld check-in device, enabling the identification and assistance of an elderly person who may be experiencing difficulties, was identified as a positive development.

FATIGUE

The issue of fatigue among older travelers caused by their having to stand in line in an overcrowded check-in area was raised by several of the airport representatives interviewed. Most had added seating to the lobby, so that elderly passengers could wait while their more able traveling companion checked them in, or while awaiting a wheelchair. One respondent suggested that elderly passengers could be given a number or an electronic device similar to those used by restaurants, so they could sit down until their turn came for checking in. Lifting bags into the bag well at the check-in counter poses another physical problem for the elderly traveler. This issue has been addressed in Europe by installing the index belt almost flush with the floor (Figure 7).

SECURITY SCREENING CHECKPOINT

Once check-in has been completed, aging travelers are faced with the challenges of the security screening checkpoint. A succinct list of these problems is contained in the paper "Accommodating Aging Population Needs in Airport Terminals" (Wolfe 2003). They include:

- Waiting in line and prolonged standing
- Removing personal items and items of clothing and depositing them in tubs
- Maneuvering baggage onto and off the screening conveyor belt
- Walking through the passenger screening devices.

The process of clearing the security checkpoint queue can be even more stressful than that of negotiating the check-in lobby (Figure 8). One airport is addressing the problem

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FIGURE 5 Crowded check-in hall.
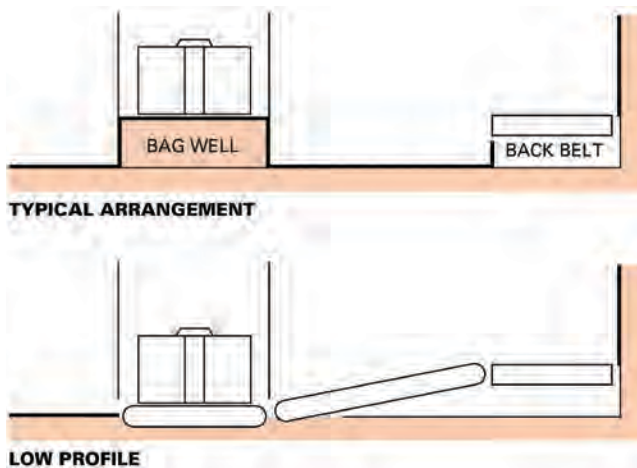

FIGURE 6 New check-in technology.

FIGURE 7 Flush bag well (*ACRP Report 10*).

by installing live action videos earlier in the queuing area that show clearly what is about to take place. Respondents generally acknowledged that the recomposing areas on the other side of the checkpoint are often too small, usually as a result of the constraints of adding checkpoints to buildings that were designed before the current screening requirements were instituted. One airport's recently designed terminal includes a large "recomposing lounge" where pas-

sengers can relax without having immediately to rush to their gates.

The TSA has made considerable efforts to accommodate those with disabilities and the elderly. Travelers who believe they will have difficulties at security can obtain a TSA Notification Card that assures assistance for the holder when passing through security. There is a program called TSA Cares, which operates a help line passengers can call to receive advice about getting through the security process. There is also a smart phone app called "My TSA" available at some airports that directs the traveler to the security checkpoint with the shortest line ("Airport Apps Put You First in Line," *New York Times* 2010). A review published on the TSA's website indicates that waits of 20 to 30 minutes are not uncommon at major hubs. Passengers over the age of 75 can also apply to use "Pre-Check" lanes at most airports, which exempt passengers from having to take off their shoes, belts, or light jackets. However, this might result in mixing elderly passengers with business travelers, which could cause some conflicts (see Table 2).

Most surveyed airports had special security check-in lanes for disabled or elderly passengers. Sometimes these lanes were opened on an ad hoc basis, and sometimes they were shared with a staff lane.

TABLE 2
CHAPTER FOUR SUMMARY

Issues:	Obstacles:	Strategies:
Wayfinding in the Check-in Lobby	$	- Volunteer information booths directly inside entry
	$	- Correctly oriented "You Are Here" maps
	⚠	- Signs in plain language, not airline/airport jargon
Dealing with Technology	⚠	- Airline staff with hand-held devices to assist the elderly
	⚠	- Volunteer staff located near self-service check-in devices
	⚠	- Self-service devices with audio menus
Fatigue Due to Standing/Queuing	⚠ $	- Provision of abundant seating in the check-in hall
	⚠	- Pager system to allow passengers to be seated while waiting
Handling Heavy Baggage	⚠ $	- European-style ticket counter bag wells at floor level
Negotiating the Security Checkpoint	$	- Screens showing live action film of the screening process
	⚠	- Dedicated lane for elderly and disabled
	⚠ $	- Enlarged "recomposing lounges"
	⚠	- TSA Notification card that assures special assistance
	⚠	- TSA Cares program help line to call for information
	⚠	- My TSA smart phone application

ICON KEY

$ Capital Cost to Implement.

👤+ Operational Costs/Staff Required.

⚠ Existing Buildings Constraints/Disruption.

⚠ No Obstacles to Implementation.

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FROM THE SECURITY CHECKPOINT TO THE GATE AND FROM GATE TO GATE

If the check-in process can be confusing to the aging traveler, the airside environment, with its abundance of potential destinations (gates, retail outlets, eating establishments, toilets, etc.) and resulting signage clutter and information overload, can be even more confounding. Much has been written about intuitive wayfinding in airport terminals, but directional and informational signs play a far greater role in helping passengers navigate their way through the typical terminal.

AIRSIDE WAYFINDING

Most of the airports surveyed agreed that signage clutter was a problem, and indicated that they were taking steps to deal with it. The primary approach was to establish a hierarchy of signs that could differentiate directional and informational notices from commercial and advertising displays (Figure 8). Wolfe presents the following useful list of criteria for terminal signage:

- Placement: Typically, directional signs should be placed where passengers can see them before they reach the concourse. They should also be placed near ticket counters or curbside check-in.
- Orientation: Maps need to be oriented with the axis of the environment. A different orientation of the map requires transposing directions on the part of the traveler, a difficult task, especially for seniors.
- Color: The choice of color is important, as seniors may have trouble discerning pastels and color intensity. Changes to the eye during aging may also make it difficult to distinguish certain color combinations.
- Text size: The size of the text should be large enough to allow for easy reading.
- Complexity: Wayfinding maps that try to display three-dimensional space are often too complicated to interpret. Furthermore, maps that attempt to convey too much information may be confusing.

There was a striking consistency of opinion from interviewees about the most effective design for public signs—ideally, that they would have a strong primary colored background with large, white, or yellow unadorned letters, and preferably back-lit (Figure 9). One airport had just replaced a terminal's original signage system, which had been designed in earth tones, because it could not compete visually with commercial messages. One airport, in the process of creating a new

signage master plan, indicated it was adding more symbols to its signs to improve readability.

The second most common method of wayfinding is using information points. It was reported in the survey that elderly travelers apparently preferred to seek directions at booths staffed by volunteer "ambassadors," many of whom were elderly themselves and were therefore considered to be approachable. However, as discussed earlier, there is a "new" generation of older travelers who are more conversant with technology, for whom touch-screen information kiosks may be preferable to engaging in conversation. The Pew Research Center's Internet & American Life Project (Smith 2013) indicates that 18% of seniors had smart phones in May 2013, compared with 13% in February 2012, a 38% increase.

Several interview respondents said free Wi-Fi in terminals was leading to an increasing use of smart phone applications for wayfinding. One app gives gate changes in real time. Another helps passengers find gate locations, concessions, and amenities at more than 100 airports in the United States, Canada, and London (*New York Times*).

One idea put forward for helping the elderly passengers gather information was to group together the sources, including staffed positions, touch screen terminals, a correctly orientated "You Are Here" map, and Flight Information Display Systems (FIDS), to make the information more accessible. Visual paging systems have also benefited aging travelers, and are typically located as part of an FIDS array, although more sophisticated systems with two-way communications may overtake that arrangement. It was reported that the elderly often found FIDS difficult to read because of the font size; and were confused by the scrolling of flight information by airline alliances that have multiple flight numbers for a single flight.

TRANSITIONING BETWEEN FLOORS

Frequently the path of travel through an airport terminal involves the passenger changing levels, most commonly by escalator, with elevators and stairs being secondary choices. All survey respondents noted that escalators presented problems for the elderly, and that accidents were not uncommon. (The Consumer Product Safety Commission estimates that more than 10,000 people are injured on escalators in public areas every year.) This was also a frequent opinion

FIGURE 8 Confusing signage.

found in the literature review, including in the International Civil Aviation Organization (ICAO) Planning Manual, which states that elevators or ramps are preferable to escalators. The installation of variable speed escalators, which are generally preferred for energy saving reasons, may benefit the elderly, but there is no definitive data on that aspect.

One airport representative reported that, in remodeling its existing terminals, the airport was removing all of the existing escalators and replacing them with high-capacity,

FIGURE 9 Clear signage (Corgan).

FIGURE 10 Large capacity elevators (Corgan).

flow-through elevators for reasons of safety, passenger convenience (especially for the elderly and families), and energy conservation Another respondent said that, in a recently completed terminal, escalators had been eliminated in favor of elevators, ramps, and 1:20 gradient sloped floors. At a smaller airport undergoing renovation, the relatively large number of elderly passengers was a factor in deciding on a single-level design.

In many European terminals, notably London's Heathrow Airport Terminal 5, the primary means of vertical circulation connecting the arrival and departure levels and the parking decks and ground transportation is by banks of as many as six large-capacity elevators, in effect, forming a vertical transit system (Figure 10). At one of the U.S. airports surveyed, the elevators had been reprogrammed to ensure that there was always one cab with its doors open on the primary level; lighting in the area had also been upgraded to increase visibility, especially for the elderly. Another airport had installed audible messages at escalators alerting passengers of the availability of nearby elevators. A suggestion for reducing accidents caused by older people missing their steps on escalators was to specify longer horizontal sections at the top and bottom.

LONG WALKING DISTANCES

Another frequently mentioned problem facing elderly travelers is the long walk distances often involved in getting to the gate and between gates. Planning standards generally recommend a maximum unassisted walk distance of 1,000 feet; however, distances far shorter than that can be tiring for an elderly traveler. The installation of moving walkways has been the common answer to this issue but, as with escalators, these moving belts can present problems getting on and off. Audible alerts before the end of the walks can be effective depending on the surrounding environment; but one respondent noted that in

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certain situations they may only add to the general cacophony. Walking fatigue may also increase the likelihood of tripping and falling, which can be a serious problem for older persons.

Reliance on mechanized means of easing travel for the elderly, whether horizontally (by means of moving walkways) or vertically (via elevators and escalators) raises issues of reliability. An out-of-commission moving walkway, for example, may not only translate into a very long walk but might also result in passengers missing their connections. Many airports group escalators and walkways in threes to minimize the risk of mechanical failure, with the added benefit that they can accommodate directional flows as appropriate (Figure 11). Elevators are generally grouped in twos, at least. In any event, operational issues of monitoring and rapid response are part of any decision to install mechanized movement systems.

Motorized carts are another common method of reducing the impact of walking, but their operation tends to be haphazard. One respondent's airport had formalized the service into a mini-transit system, with clearly identified stops and seating for waiting elderly or disabled passengers. Another airport had gone further by developing what it called a "compact transit system" of carts, with separate lanes in some locations for pedestrians, moving walkways, and carts. The availability of carts is particularly important for passengers making connections, although booking flights in segments should enable travelers to plan for adequate layovers between flights.
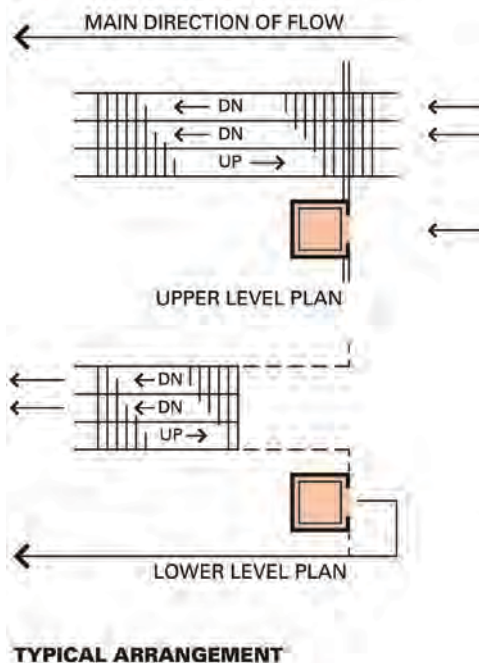

FIGURE 11 Elevators supplementing escalators (*ACRP Report 10*).

There is an apparent increase in the use of wheelchairs in airport terminals. This is partly owing to the increase in the number of elderly travelers. A 2013 study at Minneapolis International Airport, "Operations Accessibility Issues in Airports," ascertained that 90% of wheelchair users in airports did not use them in their daily lives. The same study recorded 15,000 wheelchair uses at the airport in a single month. This number is bound to increase substantially. Traditionally, wheelchair services have been provided by the airlines, but increasingly they are being provided or supplemented by airports eager to provide a high level of service to their customers.

An alternative to wheelchairs are motorized scooters, either provided by the airport or belonging to passengers. One interviewee reported that the increase in the number of scooters at their airport was causing congestion, particularly in the hold rooms. Also, the increased use of personal wheelchairs and scooters has made it virtually essential for elevators to be constructed near each gate to facilitate transfers from the concourse to the ramp. On the plus side, they do provide greater autonomy for the passengers, enabling them, for example, to shop or enjoy a restaurant on their way to the gate, possibly enhancing revenue; and also to dispense with the necessary assistance of a staff member.

At one airport, it had been noticed that elderly passengers were having difficulty pushing baggage carts across slight changes of floor level and thresholds; so airport management worked with the manufacturer to redesign the wheel system to overcome this problem. Problems with baggage carts still remain, however. Brakes are necessary to avoid runaway carts on ramps, but they can often be difficult to apply; they can also present a hazard at the end of a moving walkway, stopping the cart abruptly just as the passenger begins to walk.

Some airports reported they were reducing the impact of long walks by adding seating in "way stations" along longer concourses. It was noted that some elderly passengers tended to misjudge the distance to the gates, and refused the offer of a wheelchair at check-in only to realize, once through security, the length of the walk ahead of them. Unfortunately, airline-provided wheelchairs are not readily available at this point, resulting in the likelihood of a long wait for assistance.

The National Safety Council estimates that one in three adults over 65 falls in any given year, the primary causes being uneven floors, stairs, clutter, and poor lighting. Smooth, hard surfaces such as terrazzo are easier for older travelers to use if they are pushing a baggage cart, and are less likely to cause tripping than carpet. Lighting levels in many airports have been lowered for energy conservation reasons, but this can have a negative impact on the elderly, not just in avoiding accidents but in reading signage.

CONCESSIONS AND AMENITIES

Because of an abundance of merchandise, airport concessions can be challenging for the elderly to navigate. To ensure optimum accessibility, one airport revised its contracts with concessionaires to require them to meet the same, more stringent standards for corridor widths, etc., as the public areas of the terminal. Amenities offered at the surveyed airports that are especially relevant to the aging traveler included quiet rooms, some even containing a hospital-type bed; and on-site medical facilities. Wheelchair services were offered at all the airports.

Upon arriving at the gate, the elderly passenger needs a place to sit and relax. The evolution of hold room functionality and design taking place in the industry recognizes the differing requirements of passengers and would be beneficial overall. It was reported that some of the lounge-type seating being installed in hold rooms can be challenging for an elderly person to get in and out of easily. Most of the airports surveyed said they had set aside hold room seating for the disabled that also served the elderly, but that it was often taken up by regular passengers (Figure 12). Inadequate spac-

FIGURE 12 Crowded hold room.

ing between rows of seats was identified as a problem. The difficulty in hearing gate announcements was also mentioned several times, with the suggestion that boarding groups and other information be proffered visually as well as audibly (see Table 3).

TABLE 3
CHAPTER FIVE SUMMARY

Issues:	Obstacles:	Strategies:
Wayfinding	⚠	- Reducing signage clutter
	⚠	- Differentiating between public service and commercial signs
	⚠ $	- Large, unadorned, illuminated fonts for directional signs
	⚠	- Grouped information sources, FIDS, staffed position, touch screen, maps, etc.
	⚠	- Airport-specific wayfinding applications for smart phones
	⚠	- Use of symbols on signs
	$	- Two-way visual paging
Transitioning Between Floor Levels	⚠ $	- Providing more elevator alternatives to escalators
	⚠	- Programming elevators to be "open door"
	⚠ $	- Use of ramps and 1:20 gradient sloped floors
	⚠	- Increasing length of escalator flat sections
	$	- Adding audio alerts at top of escalators

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TABLE 3
(*continued*)

Issues:	Obstacles:	Strategies:
Long Walking Distances	$	- Moving walks with audible alerts at each end
	⚠	- Organization of motorized carts into a "transit system" for the elderly and disabled
	👤+	- Greater provision of wheelchairs
	⚠	- Use of scooters
	⚠	- Provision of seating "way stations" along concourses
	⚠	- Improved baggage cart design
Using Concessions and Amenities	⚠	- Requiring concessions to provide the same accessibility as public spaces
	⚠ $	- Providing quiet rooms
	👤+	- Providing on-site medical services
Hold Room Issues	⚠	- Designated seating for the elderly
	⚠	- Wider spacing between rows of seats
	$	- Visual as well as audio gate announcements
	⚠	- Elder-appropriate seating

ICON KEY

$ Capital Cost to Implement.

👤+ Operational Costs/Staff Required.

⚠ Existing Buildings Constraints/Disruption.

⚠ No Obstacles to Implementation.

TABLE 3

CHAPTER SIX

FROM THE ARRIVAL GATE TO THE TERMINAL EXIT

Of all the transitions experienced by the elderly traveler moving through an airport terminal, the emergence from the cramped quarters of an aircraft cabin into the open spaces of the terminal, where they are faced with swarms of people hurrying to their gates, the visual confusion of competing signage, and the distractions of concessions and advertising, can be the most unsettling. There are additional physical factors that can add to the disorientation: The jet bridge may be steep and uneven, and the change in lighting levels between the bridge and the concourse may be significant.

It was suggested that wider jet bridges would facilitate the use of wheelchairs without blocking egress for other passengers. However, while directional signs to bag claim or connecting gates are often not immediately visible from the deplaning doorway, none of the airport representatives interviewed was addressing this issue apart from general efforts to improve signage.

RESTROOM ISSUES

The journey from the gate to the bag claim area presents most of the same issues as traveling on the terminal airside to the departure gate: long walks, wayfinding difficulties, moving walkways, etc. On the way to baggage claim, the amenity most commonly used by deplaning passengers is the toilets. Most of the airports surveyed were aware of the problems faced by the elderly using toilet stalls. There appears to be a trend towards enlarging the stalls to make room on the floor for carry-on luggage, so that older travelers do not have to lift it onto a shelf. One respondent reported the airport was installing more "family" toilets, which it considers helpful to elderly passengers who may need assistance from a traveling companion. There was some interest in the concept of "universal design," which essentially makes all amenities such as sinks and water closets equally easy to use for everyone, similar to the standardized design for drinking fountains.

BAG CLAIM AREA ISSUES

Wayfinding in the bag claim hall is not nearly so difficult as in the check-in lobby and was not identified as a problem. However, there are other challenges for the elderly, the first being the likelihood of having to stand, sometimes for long periods, while waiting for baggage to arrive (Figure 13). Some airports have begun to provide seating, but often, because of space constraints, it is not close to the claim devices themselves. The next issue is the retrieval of luggage from the claim device. Sloped plate carousel claim units have a sill difficult to lift a bag over (Figure 14). Furthermore, it is virtually impossible for an elderly person to retrieve a double-stacked bag from below another. Flat plate devices are far more user-friendly, since bags can be slid off of them. While they are relatively uncommon at large U.S. airports, where sloped plate devices are generally preferred because of their greater capacity and suitability for remote feeding, at European airports, flat plate devices are more prevalent, whether direct or remotely fed (Figure 15).

Most of the airport representatives identified the availability of assistance in the bag claim hall as an issue, particularly with respect to how porters or skycaps are compensated. Several of the airports surveyed provided no personnel assistance in the bag claim hall at all. One airport persuaded the airlines to absorb most of the cost in their rates and charges, with the airport making a smaller contribution. At one airport that has a high percentage of wealthy clients, the skycaps were happy to work for tips only. It was reported that airline baggage handlers, who often work inside pulling bags off the claims devices to increase new bag capacity, sometimes assist older passengers. One respondent suggested the airlines could tag "elder bags" as they do heavy bags, so they could be pulled off the claim devices by handlers.

FACILITIES FOR ARRIVING PASSENGERS

After claiming their bags, passengers may have to wait for some time to be picked up, or for ground transportation to arrive. In the ACRP report *Innovations for Airport Terminal Facilities* (2008), it was proposed that, rather than having the passengers waiting outside in the elements, they could be accommodated in an "arrivals lounge" (Figure 16). There they could sit and relax and be informed of their ground transportation arrival status by a video display or by cellular phone. One of the airports surveyed reported that such an amenity had been included in a recently completed terminal and had already proved a benefit to elderly and disabled passengers (see Table 4).

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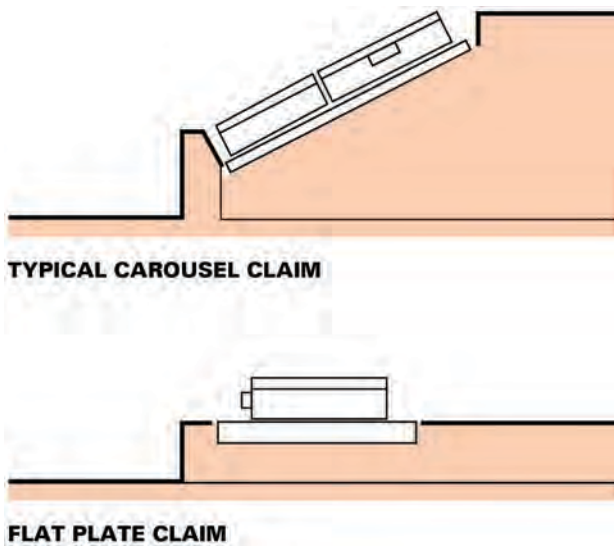FIGURE 13 Queuing congestion (Corgan).

FIGURE 14 Slope plate vs. flat plate baggage claim (*ACRP Report 10*).
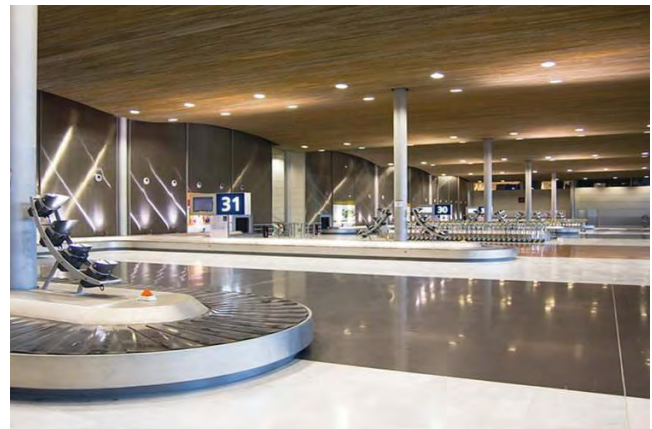
FIGURE 15 Flat plate claim device (Corgan).
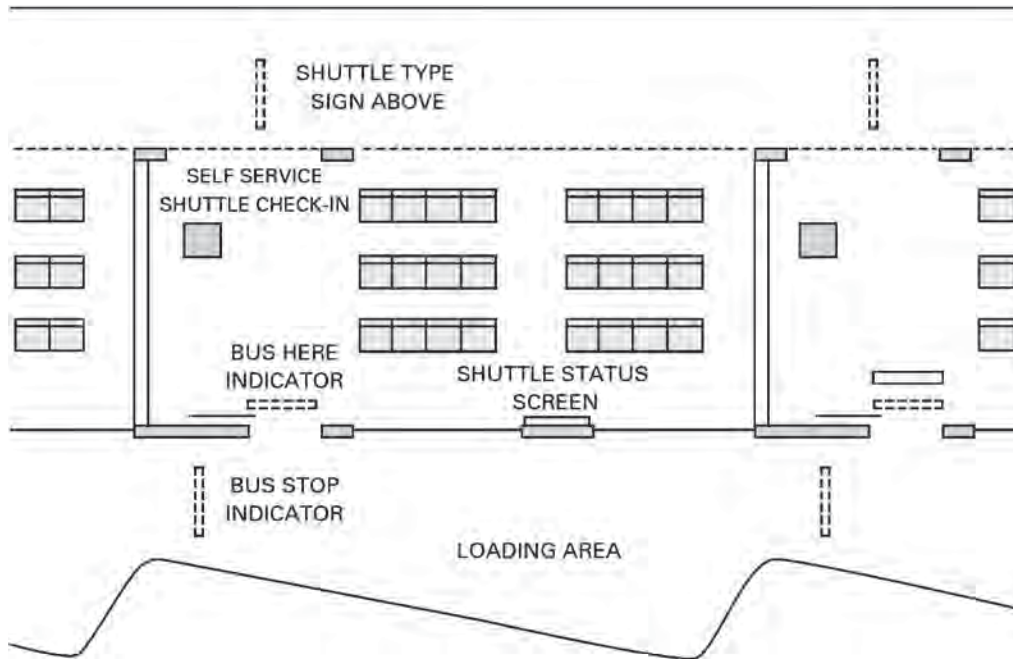
FIGURE 16 Arrivals lounge (*ACRP Report 10*).

TABLE 4
CHAPTER SIX SUMMARY

Issues:	Obstacles:	Strategies:
Toilet Provision	⚠ $	- Larger toilet stalls with floor space for bags
	⚠ $	- More family toilets for use by the elderly
	⚠ $	- Universal design with fixtures equally easy to use for all
Bag Claim Hall Fatigue	⚠	- Seating within close proximity of the claim device
	⚠ $	- Easy to use flat plate devices
	👤+	- Assistance from airline staff or "skycaps"
	👤+	- Tags identifying "elder bags" for assistance
Arrivals Amenities	⚠ $	- Provision of arrivals lounges in which to wait

ICON KEY

$ Capital Cost to Implement.

👤+ Operational Costs/Staff Required.

⚠ Existing Buildings Constraints/Disruption.

△ No Obstacles to Implementation.

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CHAPTER SEVEN

FROM THE TERMINAL EXIT TO LEAVING THE AIRPORT

Most of the problems faced by aging travelers when they leave the terminal building are similar to those they face when arriving at the terminal, including possible long walks to parking or ground transportation and wayfinding issues. One key difference is that passengers may have to wait for some time for transportation. Since a majority of airports do not have arrivals lounges, such as those described in the previous chapter, the waiting environment usually consists of a curbside or island that is covered but otherwise exposed to heat, cold, and likely low lighting levels. This situation can be aggravated by stress regarding the unknown arrival time for ground transport and possible concerns about personal safety. Several airports reported that they provided seating and enhanced lighting at the arrivals curb to address these issues.

ONGOING TRANSIT

Problems with shuttle buses for departing passengers, referred to in chapter three, can be even more critical for arriving passengers since they invariably have their checked baggage with them, making the boarding of shuttles even more difficult. It was also noted that the proliferation of shuttle services often made it difficult for travelers to find the correct curb or island and the appropriate shuttle stop. A trend that could certainly benefit elderly travelers is the delivery of a passenger's bag from the bag claim hall to their destination by a third party. One company will transport a bag up to 40 miles from the airport within four hours for less than $50. The service can be ordered on-line as late as the time of departure of the passenger's flight.

PARKING CHALLENGES

The last hurdle for many arriving passengers is the parking garage. Adding to the potential difficulty of locating their car is the concern for personal safety felt by many older people in large parking structures, especially at night. This has been mitigated at many airports by increased lighting levels and the installation of alarm stations in garages. One airport reported that one of its remote parking lots offers a shuttle service that takes passengers directly to their car, which not only reduces walk distances, but also eliminates passenger fears.

With the ever-increasing size of airport parking garages, the issue of locating a car has become a major problem, especially for the elderly. At Heathrow Airport's Terminal 5, the parking garage has a built-in car finding system. The ticket produced on entering includes the car license number. Upon leaving, the ticket is inserted into a machine and a map is displayed showing the level and zone, within a range of approximately 200 parking spaces, where the car is parked. (A similar system has been installed in a Santa Monica mall garage.) There are several smart phone GPS-based apps available, specifically designed for car-finding (see Table 5).

TABLE 5
CHAPTER SEVEN SUMMARY

Issues:	Obstacles:	Strategies:
Waiting at Curbside	⚠	- Provision of seating and adequate lighting
Parking Concerns	$	- Alarm systems and high lighting levels in parking garages
	🚹+	- Parking shuttles that deliver passengers to their cars
	$	- Smart garage car-finding systems
	⚠	- Smart phone apps for car-finding

ICON KEY

$ Capital Cost to Implement.

🚹+ Operational Costs/Staff Required.

⚠ Existing Buildings Constraints/Disruption.

⚠ No Obstacles to Implementation.

CHAPTER EIGHT

CONCLUSIONS

CONCLUSIONS

The study indicates there is a general awareness of the issues facing the increasing number of aging and elderly air travelers. This is supported by the documentation on the subject and by discussions with airport personnel. Efforts are being made to address these issues, albeit in a somewhat ad hoc fashion. There are, however, obstacles to be overcome, including the capital and operational costs of implementation, potential disruptions to ongoing operations, and the physical constraints of existing buildings. It appears clear that a concerted, integrated, and collaborative effort among airports, airlines, and other stakeholders will be required to satisfy the needs of the aging traveler without negatively impacting overall airport operations. Success will hinge on identifying a strong advocate for the elderly at each airport.

The following summarizes key issues and the efforts currently being made to address them:

- Wayfinding—difficulties in negotiating the complex environment presented by airport roadways, parking facilities, and terminal buildings

Solutions to wayfinding issues focus on efforts to improve public service signage as terminals are renovated or newly constructed; however, these efforts are often frustrated by pressure to generate revenue from commercial messages. Most airports have put a strong emphasis on volunteer helper programs, which they see as particularly beneficial to assisting older passengers through the airport.

- Fatigue—the physical effort involved in standing, waiting in line, lifting heavy bags, and walking long distances

The study indicates that relatively little is being done specifically to reduce the fatigue that aging and elderly passengers experience at an airport. Minor steps, such as acquiring shuttle buses with lower decks to facilitate boarding and having agents come out from behind the check-in counter with hand-held devices to assist elderly people, are positive developments. The increasing availability of remote bag check and bag delivery services relieves the elderly traveler of difficulties handling luggage. All the surveyed airports have been adding seating at check-in, along concourses, in the bag claim hall, and at curbside. Organized motorized cart service used as "compact transit" could also be helpful. Major improvements such as installation of flat plate claim devices, bag wells flush with the floor, and large flow-through elevators have not been generally adopted.

- Technology and equipment—coping with the increasing use of automation, self-service machines, TSA passenger screening process, and using escalators and moving walks

The study confirmed that there are different generations of "elderly" travelers, and that the youngest group is much more comfortable with technology than its predecessors. This should ease problems with self-service devices. The increasing use of smart phone apps for navigational purposes can be expected to assist future generations of tech-savvy older travelers. It is also anticipated that the TSA Pre Check program will be expanded, particularly for seniors, easing their way through security screening. Some newer terminals are reducing their reliance on escalators and the problems they represent by installing more elevators, ramps, and 1:20 sloping floors.

- Amenities—the challenges of using congested concessions area and constricted toilet facilities

The design of some amenities is still an issue for the elderly. There have been attempts to make retail and food service concessions, which are often very tightly arranged, more easily accessible. Toilet facility layout is still a major problem, though some airports are designing larger stalls and more "family" restrooms. The concept of universal design—making all amenities useable for everyone—has not yet taken hold.

OPPORTUNITIES FOR FURTHER RESEARCH

There are some opportunities for further research and creative thinking:

- Research on the development of overall goals and objectives for accommodating the aging and elderly traveler, perhaps as a precursor to creating policy guidelines for the industry

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- Investigating the concept of "elder tags" for checked baggage that would identify bags whose owners might need assistance in the bag claim hall
- Identifying the opportunities and challenges of "compact transit," whereby motorized carts are used not as an ad hoc back-up system for moving people but as a recognized and designated means of movement through the terminal for elderly and disabled passengers
- Further examination of smart phone applications available and being developed that would help the elderly in trip planning, wayfinding, and other travel issues

- A survey of aging and elderly travelers to identify the issues they faced along their journey so that the published issues can be validated and expanded
- Research on collaborative approaches between airports, airlines, and/or other stakeholders to better serve aging travelers and meet or exceed the requirements of the Air Carriers Access Act
- Research into the design of future accommodations for aging travelers at airports
- Research into the cost/benefits of catering to the needs of the aging traveler.

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APPENDIX A

Survey Questionnaire

Airport Cooperative Research Program

S13-07-01: Impacts of Aging Travelers on Airports

Corgan Survey Questionnaire

Dear Airport or Travel Facility Representative:

The Transportation Research Board is preparing a synthesis on the Impacts of Aging Travelers on Airports. This is being done for the Airport Cooperative Research Program (ACRP), an industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators. ACRP is administered by TRB and sponsored by the Federal Aviation Administration.

This study will identify how older travelers are different and how those differences affect their airport experience. It will also define the issues in planning, design, and operation of airports associated with aging travelers. Current practices employed by airports and other travel facilities to accommodate the aging population will be documented.

This survey questionnaire is being distributed to airport and travel industry personnel who have been identified as having a significant role in providing the services and amenities desired by aging travelers. If you are not the appropriate person at your airport to complete this survey, please forward it to the correct person.

Please complete and submit this survey questionnaire by June 14th, 2013. If you have any questions, please do not hesitate to contact our principal investigator, Phil Mein, at phil.mein@corgan.com.

Confidentiality: All answers provided by survey respondents will be treated as confidential and aggregated with other responses in the reporting.

Thank you very much for participating in this survey!

1. Does your airport/facility make any special provisions for elderly travelers?
2. If yes, briefly list some of those special provisions.
3. Would you be interested in participating in a 15- to 30-minute interview on the subject of the impact of aging travelers on airports or other travel-related facilities?

APPENDIX B

Airports Responding to Survey Questionnaires

The survey was sent to 29 airports; 22 airports responded.

List of Airports Surveyed
1. Canada Place Terminal
2. City of Phoenix Aviation Department
3. Dallas/Fort Worth International Airport
4. Des Moines International Airport
5. Fort Lauderdale–Hollywood International Airport (Broward County, Florida)
6. Greater Orlando Aviation Authority
7. Harrisburg (Pennsylvania) International Airport
8. Los Angeles World Airports
9. Massport Authority–Boston Logan International Airport
10. Minneapolis–St. Paul International Airport
11. Palm Beach (Florida) International Airport
12. Port Authority of New York & New Jersey
13. Port Everglades
14. Port of Bellingham
15. Rochester International Airport
16. Salt Lake City International Airport
17. San Antonio International Airport
18. San Diego International Airport
19. San Francisco International Airport
20. Seattle–Tacoma International Airport
21. The Calgary Airport Authority
22. Tucson Airport Authority

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APPENDIX C

Airports Where Staff Were Interviewed

There are 15 interviewees from 14 different airport organizations (Figure C1).

1. Los Angeles World Airports: 28,857,755 annual enplanements
2. Minneapolis–St. Paul International Airport: 15,512,487 annual enplanements
3. Port Authority of New York & New Jersey: 22,934,047 (JFK) annual enplanements
   12,001,501 (LGA) annual enplanements
   16,571,754 (EWR) annual enplanements
4. City of Phoenix Aviation Department: 18,901,171 annual enplanements
5. Dallas/Fort Worth International Airport: 27,100,656 annual enplanements
6. Greater Orlando Airport Authority: 17,071,491 annual enplanements
7. Massport Authority–Boston Logan International Airport: 13,561,814 annual enplanements
8. Palm Beach International Airport: 2,958,416 annual enplanements
9. Rochester International Airport: 1,263,965 annual enplanements
10. Salt Lake City International Airport: 9,910,493 annual enplanements
11. San Francisco International Airport: 19,359,003 annual enplanements
12. Seattle–Tacoma International Airport: 15,406,243 annual enplanements
13. The Calgary Airport Authority: 6,819,068 annual enplanements
14. Asheville Regional Airport: 371,226 annual enplanements

FIGURE C1 Location of interviewed airports (Corgan).

APPENDIX D

Interview Questionnaire

General questions about the impact of the elderly at your airport.

Specific questions about provisions for the elderly.

1. What are the difficulties you see facing the elderly in navigating through your airport?

   - Wayfinding, signage, FIDs, disorientation?
   - Dealing with technology, self-service devices etc.?
   - Walking distances, use of moving walks?
   - Making level transitions, escalator difficulties?
   - Difficulty standing for long periods, ticketing, security, bag claim etc.?
   - Managing luggage, curbside, check-in, bag claim, etc.?
   - Others?

2. Which of the following items are provided at your airport?

   - A person specifically responsible for ADA/elderly issues
   - A volunteer program for passenger assistance
   - Visual paging
   - Golf carts for conveying passengers
   - Flow through elevators
   - Seating at curbside, ticketing hall, bag claim hall
   - Designated seating for ADA/elderly in hold rooms
   - Flat plate claim devices
   - Others?

Abbreviations used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation