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Airport Access for Disabled and Elderly Persons

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AIRPORT ACCESS FOR DISABLED AND ELDERLY PERSONS

Workshop

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Hickling Corporation

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SUMMARY

The Transportation Research Board (TRB) Workshop on Airport Access for Disabled and Elderly Persons resulted from a Strategic Research and Policy Review conducted by the TRB Committee on Specialized Transportation in 1989. The review identified the use of airports and automobiles by people with disabilities as a high priority for transportation research and recommended targeted workshops as the means of highlighting issues, options, and research needs in each area.

This Circular reports the results of the Airport Access Workshop held in June 1990. The objectives of the workshop were threefold:

1. To highlight the question of airport access as a policy, research, and planning concern;
2. To summarize the state of airport access; and
3. To expose problems, planning approaches, and research needs.

STATE-OF-THE-ART REVIEW

The workshop commissioned five formal papers from specialists in the field, addressing the following subjects:

- The market for airport services among people with disabilities;
- The policy and regulatory framework for making airports accessible to people with disabilities;
- The state of airport design, technology, and operational logistics with regard to disabled persons; and
- International experience and practice in airport access for disabled and elderly people (two papers).

This Circular summarizes the workshop's findings. The full texts of the commissioned papers are presented in appendices.

GENERAL FRAMEWORK FOR ACCESSIBILITY PLANNING

The workshop outlined a framework within which airport management can address the accessibility problem in an organized and manageable fashion. The framework includes a taxonomy of airport functions that categorizes the airport into self-contained, homogeneous collections of facilities and services. The categorization is designed to permit planners to focus upon each functional category with a minimum need to consider facilities and services in other functional areas. The taxonomy includes eight planning areas:

- Airport-metro and interterminal movement;
- Intraterminal movement;
- Parking and landside access;
- Awareness training;
- Communications technology and signage;
- Terminal architecture and facilities;
- Airport/airline interfaces; and
- Regulation and planning process.

NEED FOR A COMMUNITY-BASED PLANNING PROCESS

The workshop identified the need for a community-based Airport Accessibility Planning Process. Under this approach, a Community Task Force drawn from all aspects of the disabled community would work with airport management in developing an on-going, multiyear Airport Accessibility Plan.

Together, the Airport Accessibility Planning Process, the Community Task Force, and the Airport Accessibility Plan provide the workshop's recommended administrative context within which airports can focus on each functional planning area.

NEED FOR UNIFORM NATIONAL ARCHITECTURAL AND DESIGN STANDARDS

The workshop supported a community-based, local planning approach for each airport. However, research commissioned for the workshop also found that the myriad of architectural and design standards with regard to disability cannot be used effectively at the local level unless they are forged into a comprehensive planning concept, which must also be applied uniformly to all airports. This indicates the need for national planning guidelines and standards for airport accessibility, guidelines upon which local planning efforts can draw.

Although the Uniform Federal Accessibility Standards (UFAS) address aspects of airport buildings and facilities, the state-of-the-art review did not uncover any architectural guidelines or standards published specifically for airports in the United States. The Airport Operators Council International has surveyed all U.S. airports and published information on how they provide

for people with disabilities. Comprehensive airport accessibility planning concepts and associated guidelines have not been prepared, however, leaving airports to develop plans without reference to a central, consistent conceptual framework.

As a step towards remedying the absence of a comprehensive planning framework, from both a technical and a community process standpoint, the workshop aimed to define the special planning issues and research needs associated specifically with airport design, operations, and logistics.

SPECIAL PLANNING ISSUES AND RESEARCH NEEDS

During the workshop, organized work teams of specialists addressed a range of questions in each of eight broad planning areas. Intensive five-hour sessions led to the identification of specific airport functions of special concern; identified the range of disabilities that are not well served by such functions today; specified the barriers disabled people face in their efforts to use them; attempted to define the level of service and operational performance to be expected of each airport function in serving specific categories of disability; looked at the range of technologies, designs, and operational solutions currently available; and identified areas in which further research is needed.

Special Planning Issues

An overriding issue for each of the work teams was to establish desirable performance objectives for airport functions in relation to disabilities that currently preclude the independent use (use without the help of another person) of airports. Specifically, the question is whether an airport service—such as vertical and horizontal people movers and information media—should facilitate independent use in cases where the necessary technology is either disproportionately expensive in relation to conventional (inaccessible) technology or simply not feasible. Work teams agreed that while independent use is always the ultimate goal, it is by no means clear where the line needs to be drawn in airport planning and for whom. Although the Americans with Disabilities Act permits alternatives to independent use in cases of "undue financial burden," research is needed to identify available solutions—techniques to adapt existing technologies to accommodate speech-, hearing-, and cognitively impaired people without relying on airport personnel or personal attendants.

Key Research Needs

As shown in Table 1, specific research requirements identified by the work teams may be classified into those needed to adapt existing design and technology and those where new designs are required to meet performance objectives. Key research and development needs include the following:

- Improved lighting for people with low vision and color blindness;
- Development of moving sidewalk adaptations to make them usable by those in wheelchairs;
- Modification of escalator technology to make them usable by those in wheelchairs;
- Improved signage (including audible signs) and self-navigation guidance systems (including radar and sonar) for visually impaired persons;
- Improved ticket lobby design concepts to accommodate wheelchair users;
- Development of logistics for nonlifting baggage check;
- Refinement and dissemination of a community-based airport accessibility planning process; and
- Development of an accessible revenue control system for parking lots, with accommodation of adapted vans and persons with limited reach.

RECOMMENDATIONS OF THE COMMITTEE ON SPECIALIZED TRANSPORTATION

Many issues emerged during the course of the workshop, all of which deserve special attention, but the Committee on Specialized Transportation has identified four areas in which research and development is critical:

1. Development and promulgation of a uniform architectural and design concept for airport accessibility;
2. Development of technically feasible performance standards for all airport functions;
3. Development and promulgation of a general framework for community-based airport accessibility planning, including both a technical framework and a community-involvement process;
4. Development of a research and development program aimed to enhance independent use of airports by people with disabilities.

The Committee recommends the formation of a joint Federal, State, and local task force under the auspices of the Transportation Research Board to develop organizational and funding concepts through which the recommendations above can be activated.

TABLE 1 RESEARCH AND DEVELOPMENT PRIORITIES IN AIRPORT ACCESSIBILITY

ARCHITECTURAL DESIGN	TECHNOLOGICAL DEVICES	PLANNING DEVICES	TRAINING
ADAPTING EXISTING DESIGN			
Machinery and equipment within the terminal adapted to use by those with disabilities	Sign legibility	Accessibility standards specific to airports	Accessibility training for all airport personnel
Transportation technologies that match distance and climate	Sign redundancy		
Tactile warning materials on chairs, moving sidewalks, etc.	Alternate communications media		
Tactile and audio elevator controls	Wheelchair-accessible escalators		
	Wheelchair-accessible people-mover		
	Wheelchair-accessible electric carts		
	Parking places for vans		
DEVELOPING NEW CONCEPTS			
Airport entry system	Accessible revenue control system	Community-based planning process	Strategic training plan developed through a national organization
Ticket counter for seated passengers	Wheelchair-accessible moving sidewalks	Airport access plan	
Baggage check-in and pickup facilities to allow independent use by disabled people	Self-navigation guidance system (radar, sonar)		Transferrable training materials
Accessible lounge/restroom with changing area and special equipment	Talking signs and directions		
	Field research into critical factors affecting legibility of information systems (distance, size, glare, comprehension, speech devices, alarms)		
	Alternatives to attended wheelchair procedures		

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Chapter 1
INTRODUCTION

Air transportation has become a fundamental and necessary part of modern social activity and business enterprise. Deregulation of the airline industry in 1978 sharply accelerated this emerging trend by making air travel financially available to a broader segment of U.S. society than ever before in the history of aviation. Unlike the period leading up to deregulation, civil aviation today serves virtually every socioeconomic group.

For one group, however, the cost of air transportation represents only one barrier to full participation: people with disabilities—whether physical, visual, speech, hearing, or cognitive in nature—must also overcome design- and logistics-related obstacles in order to travel by air. These barriers arise in the use of both airports and aircraft, and without deliberate steps to resolve them, people with disabilities will be unable to participate in a wide range of travel-related business, social, and other travel activities.

For the last 20 years, problems facing disabled people in the use of urban and rural public transit have received substantial attention from legislators, regulators, researchers, and operators. More recently, the use of aircraft by people with disabilities has occasioned similar notice. To date, however, the accessibility of airports to people with disabilities has received only sporadic attention. To be sure, advances in architectural design generally have been incorporated into airport facilities—standards for accessible restrooms provide an obvious example. But the airport is a unique and integrated functional system in its own right, with a set of distinct but overlapping and interrelated subsystems. Without focused attention, there is a risk that problems will go unrecognized, available solutions will be underutilized, and scope for innovation will be unexploited.

The Transportation Research Board (TRB) Committee on Specialized Transportation conducted a Strategic Research and Policy Review in 1989 that identified the use of airports and automobiles by people with disabilities as high priorities for transportation research. The review recommended targeted workshops as the means of highlighting issues, options, and research needs in each area. This Circular reports the results of the Workshop on Airport Access for Disabled and Elderly Persons, which was held in Phoenix, Arizona, in June 1990.

WORKSHOP OBJECTIVES

The objectives of the workshop were threefold:

1. To expand awareness and define issues and options for policy makers; the planning and research communities; the architectural, design, and logistics professions; and airport management;
2. To summarize the state of the art in accessibility design, logistics, and operations in airport access; and
3. To provide impetus for the development of an airport accessibility planning and design framework.

In providing information and summarizing issues and options, this Circular represents the principal means of achieving the first objective. In pursuit of the second objective, the workshop invited five specialists in the field of airport access to develop and present formal resource papers on the following subjects:

1. The market for airport services among people with disabilities;
2. The policy and regulatory framework for making airports accessible to people with disabilities;
3. The state of airport design, technology, and operational logistics with regard to disabled persons; and
4. International experience and practice in airport access for disabled and elderly people (two papers).

Accomplishing the third objective involved the use of a structured workshop format, in which participants formed knowledge-based work teams to address specific problems.

Work teams were formed to address the eight general planning areas developed in consultation with specialists over the three months prior to the workshop. The workshop was structured so each participant would take part in two work teams, each five hours in length. Participants were invited to take part on the basis of their knowledge and expertise in relation to each of the eight planning areas. In addition, workshop organizers invited 16 individuals to act as facilitators and recorders. These individuals were provided with a structured format of tasks as the basis for work team activities. The final

task required each work team to prepare a formal report for presentation to the workshop as a whole; these reports also form the basis of the findings reported in Chapter 4 of this Circular.

WORKSHOP STRUCTURE

Structuring of the workshop involved three stages:

- Presentation and discussion of commissioned resource papers;
- Conduct of work team activities; and
- Presentation of work team reports.

Sessions devoted to the presentation and discussion of resource papers were open to the general public, while work team activities and presentations were conducted by 55 invited specialists. A summary of activities and findings at the close of the workshop was again open to the general public.

To encourage a work-intensive, high-output environment, all sessions, meals, and accommodation were housed in a single, integrated facility. Special arrangements were made beforehand to ensure that facilities were accessible to people with disabilities.

Chapter 2 presents an overview of the state of the art, using the commissioned resource papers as the principal source material. Chapters 3 and 4 present the results of work team activities. The general framework is outlined in chapter 3 while chapter 4 presents the work team results in each of eight functional planning areas. The resource papers are published in full in Appendices A through E, while Appendix F provides the names of workshop participants and means of contacting them for additional information.

Chapter 2
OVERVIEW OF THE STATE-OF-THE-ART

An overview of airport accessibility must begin with an understanding of the people whose requirements are at issue. The policy and legislative context for addressing these requirements must follow, since market forces alone cannot be expected to redress all of the problems. Then comes an understanding of the technical solutions and research needed to make tangible progress. And finally, an overview must expose available standards and guidelines to steer the implementation of solutions and uncover areas where better guidance is needed. The following overview of these four subjects should be examined in conjunction with the full resource papers, presented in the appendices.

THE MARKET FOR ACCESSIBLE AIRPORT SERVICES

Definitions of disability vary depending upon function. For purposes of planning medical facilities and equipment, definitions are based upon disease and physical or mental condition. Insurance companies, on the other hand, require numbers that reflect degree of impairment. According to the Americans with Disabilities Act of 1990, up to 43 million U.S. citizens have one or more disabilities when defined according to one scheme or another. However, not all of those who are defined as disabled according to medical condition or degree of impairment face the same kind of obstacles in the use of public facilities; not all are functionally unable to use public facilities that meet today's design standards; and while some can use existing facilities, for others, the physical difficulty or mental stress of doing so inhibits travel.

Transportation research uses functionally based definitions to identify the disabled population for whom conventional transportation systems present obstacles to travel. A common definitional scheme is based upon the following functional taxonomy of disabilities that result in activity limitation:

- **Mobility-disabled persons** are limited in their ability to walk, move from room to room, carry an object for 10 meters, or stand for long periods;
- **Agility-disabled persons** are limited in their ability to bend, dress or undress, get in and out of bed, cut toenails, use fingers to grasp or handle objects, reach, or cut their food;
- **Visually disabled persons** are limited in their ability to read normal print or to see another person from 4 meters, even if wearing glasses;
- **Hearing-disabled persons** are limited in their ability to hear what is being said in conversation with another person, even when wearing a hearing aid;
- **Speech-disabled persons** are limited in their ability to speak and be understood; and
- **Cognitively disabled persons** are limited in their ability to express or understand information.

Research conducted in preparation for the workshop finds that an estimated 28.1 million Americans in 1986 experienced some form of limitation in activity due to the factors outlined above(*1*). Within this total, some 18 percent cannot travel over long distances specifically because of their physical or medical condition (many being confined to the home). The remainder, however, some 23 million people, represent potential users of air transportation and airport services.

Among those 23 million, the resource paper finds that disabled people for whom airports limit the benefits of air travel may be classified according to specific key tasks required in the use of airports:

- Moving around and between the departure and arrival terminals;
- Grasping money and tickets and carrying baggage;
- Viewing timetables and screens and hearing announcements and information;
- Understanding the operation of air transportation systems;
- Using terminal facilities, including ticket counters, baggage claims, restrooms, restaurants, shops, and other concessions; and
- Boarding, disembarking, and riding in vehicles and aircraft.

Statistical surveys examined in the resource paper indicate that in 1986 an estimated 1.4 million persons, 6 percent of the potential disabled market for air travel, indicate that air transportation is inhibited or impossible because of barriers in relation to the tasks outlined above.

It is important to note that the 1.4 million persons identified above represent people for whom airport-related barriers are serious enough to inhibit travel. For millions of additional disabled and elderly individuals, the use of airports remains arduous and burdensome,

leading to physical and mental strain and associated economic losses in productivity and leisure-related travel benefits that are disproportionate to those suffered by the public at large in the use of airports.

Overall, the research finds that 73 percent of all disabled people face mobility-related problems in using airports. However, people with speaking- and vision-related problems generally are more likely than other disabled groups to face barriers in the use of airport facilities. Among those with speaking-related airport problems, moving around the terminal building represents the most frequently cited problem, followed by hearing announcements and using signs and notices.

POLICY, LEGISLATIVE, AND REGULATORY FRAMEWORK

Research commissioned for the workshop finds that at least five major Federal statutes affect the accessibility of airports(*2*):

1. Americans with Disabilities Act (enacted in July 1990),
2. Section 504 of the Rehabilitation Act,
3. Architectural Barriers Act,
4. Air Carrier Access Act, and
5. FAA Exit Row Seating Rule.

Although existing and proposed regulations under Section 504 require airport terminals, when viewed as a whole, to be made fully accessible, the scope of the regulations are limited to facilities and services in receipt of Federal financial assistance. Unlike Section 504, however, the Americans with Disabilities Act (ADA) covers facilities that do not receive Federal financial assistance, as well as expanding the requirements placed upon entities that do receive such assistance. ADA thus brings concessionaires and contractors under obligation to make their facilities accessible to people with disabilities. Aisles in terminal area restaurants, gift shops, and book shops that are not wide enough to accommodate wheelchairs, for example, may need to adapt under ADA. ADA does not cover private airports.

At the time of writing, the U.S. Department of Transportation has published a Notice of Proposed Rulemaking that would impose accessibility standards for terminal transportation systems, including interterminal vans and buses, electric carts used for transportation within terminals, and moving sidewalks. Even though electric carts are often owned by individual airlines and thus do not fall under the authority of Section 504, the Supreme Court has taken the view that Federal regulations should "take modest affirmative action." The proposed rule would thus cover certain privately owned and operated airport facilities which are under the control of the air carrier, and thus covered by the Air Carrier Access Act.

ARCHITECTURE, DESIGN, AND LOGISTICS

Another resource paper examines issues in airport design and architecture from the user's perspective(*3*). Each airport user has his or her unique perspective, but they share certain common problems. Just as people who drive to the airport must be able to find a place to park, disabled people who require accessible parking must be able to find an accessible parking place.

The research categorizes facilities from the perspective of people with disabilities by "walking through" the airport from the ground side to the aircraft. At each stage, the resource paper asks key design questions that provide a practical guide to accessibility planning:

- **Parking.** Design questions cover the need for accessible walking routes to special luggage drop points;
- **Curb-Side Check-In.** Design questions cover the need for curb-side check-in for people using motorized wheelchairs and the special training needs of skycaps;
- **Entrances.** The principal questions here relate to accessibility standards and the need for automatic doors;
- **Ticket Lines and Check-In.** Design questions here relate to the adequacy of space for wheelchairs in corrals; the height of ticket counters in relation to the reach of wheelchair users; and the standards of assistance to the gate, both for disabled persons wishing assistance and for those wishing to make their way independently;
- **Routes to the Gate.** Key design questions relate to the need for accessible pathways; the provision of audible and visual cues in mobile lounges and people movers; personal assistance to the gate upon request; and the choices available to wheelchair users who want to use their wheelchairs to get to the gate;
- **Security.** Security can be a source of both disproportionate inconvenience and embarrassment to people with disabilities. Key design issues include sensitivity training of security staff and the need for wheelchair access without sounding alarm signals;

- **Restrooms and Drinking Fountains.** The common standard of one accessible restroom in a facility may apply to certain public facilities, but it fails to offer reasonable service in airports due to long walking and rolling distances. Design issues include adherence to stall width standards and the need for unisex toilet areas where individuals can receive assistance from a member of the opposite sex;
- **Concessions and Services.** The need for assistance to people who need help carrying trays, the accessibility of cash machines and car rental desks to wheelchair users, and the availability of volume controls on direct telephone lines to taxi companies are design issues in this area;
- **Signage and Communications.** This is one of the most crucial and complicated aspects of airport access for people with disabilities. The resource paper identifies 11 distinct design issues, including the need for pictograms and plain sans serif characters and for pay-phone TDDs;
- **Gate Access.** Although jetways make wheelchair access more readily accessible, designs often include steps or steep inclines midway down the boarding ramp. Design issues also include the need for adequate seating areas for those who may need assistance or who preboard the aircraft;
- **Access to Connecting Flights.** As the use of hub airport concepts grows and the need to change planes increases, the facilitation of flight connections for people with disabilities becomes critical. The need for electric carts to accommodate wheelchairs and three-wheel mobility aids and the ready availability of escort service when needed are included among the design issues exposed in the resource paper;
- **Arrival and Baggage Claim.** The reassembly of wheelchairs and transportation to the baggage claim area represent critical design issues in this area; and
- **Ground Transportation.** Do taxi companies or shuttle vans provide lift-equipped service? Do disabled persons need to make advance arrangements for lift-equipped service? If so, how do they find out about it? These are some of the key questions outlined by the research in this aspect of airport service.

The research concludes that while many solutions are now available, substantial research needs remain, including the call for interactive electronic information systems, computers that are controlled and used with audio activation, and electric service carts for people who cannot climb aboard conventional vehicles.

GUIDELINES AND STANDARDS

Research commissioned on behalf of the workshop also reveals that, throughout the world, literally hundreds of standards are used in planning and design that address the requirements of people with disabilities(*3*). Standards are intended to be relatively simple, straightforward, and cover the most common cases. General standards deal principally with elements, leaving the overall design and integration of individual elements to the architect or designer. Since airports are complex, with specialized facilities not specifically addressed in general standards (e.g., ANSI A117.1: Standard for Buildings and Facilities Providing Accessibility and Usability for Physically Handicapped Persons), the designer must be especially sensitive in applying provisions.

The research also argues that airport designs for accessibility must be applied consistently throughout a country, so that features and logistics will be the same or similar at all airports in a network. Two papers commissioned for the workshop indicate that, internationally, standards are now in place that help resolve the twin needs of (i) integrating individual standards into an integrated airport concept for accessibility and (ii) encouraging the application of the concept on a consistent basis among airports(*4*)(*5*).

International Civil Aviation Organization

The International Civil Aviation Organization (ICAO) of the United Nations has promulgated a standard stating that "contracting states shall take the necessary steps to ensure that facilities and services are adapted to the needs of elderly and disabled persons." The recommended practices cover transportation to and from the airport; setting down and picking up passengers; parking and links to the terminal; flight information for hearing- and vision-impaired persons; and movement between the terminal and the aircraft.

In its Airport Planning Manual, ICAO also provides specific guidance material on ground transportation for disabled persons; building design principles; the particular needs of sensory-impaired persons; the use of passengers' own wheelchairs, and training programs for personnel. ICAO has developed and published recommendations for design principles for walkways and floors, ramps, stairs, elevators, doors, and security gates, belts, and check tables, and for the provision and identification of a very wide range of additional facilities, including signs, warnings, guide maps, parking, telephones, and means of embarkation and disembarkation.

The ICAO resource paper also identifies a wide range of other international organizations that have published guidelines on airport accessibility(*4*). These include the World Tourism Organization; the Latin American Civil Aviation Commission; the International Commission on Technical Aids, Housing and Transportation; and the International Air Transport Association.

International Civil Airports Association

The International Civil Airports Association (ICAA) has developed and adopted very detailed design specifications and provisions, including clear illustrations. In a resource paper prepared for the workshop, the ICAA notes that while airports have tended to concentrate on measures to help wheelchair users, people with other types of disabilities are now making more use of air travel, especially those with visual and hearing impairments(*5*). Reflecting the findings reported above under market trends, this trend reflects the growing number of people, both young and old, with hearing- or vision-related problems.

ICAA guidelines also emphasize the importance of providing disabled airport users with advance information about conditions at each airport in their travel arrangements, including parking, moving about in the terminal (including arrangements for reaching connecting flights), and the kind of assistance that can be expected.

The United States

The state-of-the-art review did not uncover any architectural guidelines published specifically for airports in the United States. The Airport Operators Council International has distributed a questionnaire to all U.S. airports and published the responses as to their provision for people with disabilities. Comprehensive airport accessibility planning concepts and associated guidelines have not been prepared, however, leaving airports to develop plans without reference to a central, consistent framework.

NOTES

1. L. Suen, D. Lewis, M. Blum, and B. Guthrie, "Disabled and Elderly Persons as a Market for Airport Services," paper prepared for the Workshop on Airport Access for Disabled and Elderly Persons, Transportation Research Board, June 1990.
2. I. Mields, "Accessibility Requirements Affecting Recipients of Federal Aviation Administration Financial Assistance," paper prepared for the Workshop on Airport Access for Disabled and Elderly Persons, Transportation Research Board, June 1990.
3. J. Bostrom, R. Lusher, and R. Mace, "The Airport as an Accessible Facility: The User's View," paper prepared for the Workshop on Airport Access for Disabled and Elderly Persons, Transportation Research Board, June 1990.
4. P. Shaw, "The Role and Content of International Guidelines For Airport Accessibility (The International Civil Aviation Authority Experience)," paper prepared for the Workshop on Airport Access for Disabled and Elderly Persons, Transportation Research Board, June 1990.
5. R. Treibel, "The Role and Content of International Guidelines For Airport Accessibility (The International Civil Airports Association Experience)," paper prepared for the Workshop on Airport Access for Disabled and Elderly Persons, Transportation Research Board, June 1990.

Chapter 3
TOWARDS A GENERAL PLANNING FRAMEWORK

The state-of-the-art review reported in the previous chapter found that the myriad of architectural and design standards with regard to disability cannot be used effectively unless they are forged into a comprehensive airport accessibility planning framework. The research also indicates the need for a locally oriented community planning process, albeit one that can draw upon the consistent framework of guidelines and standards.

As a first step towards remedying the absence of a comprehensive planning framework, from both a technical and community process standpoint, the workshop aimed to define the nature and content of such a framework. This was accomplished in two steps. The first involved research in advance of the workshop to develop a taxonomy of airport functions as a technical framework for airport accessibility planning generally. The work teams for each of these airport functional planning areas would further shape, define, and validate the taxonomy.

Second, preparatory research explored a possible administrative framework for airport accessibility planning. Although preliminary, this administrative context for technical activities would test whether the overall framework is realistic and thus useful to airport managers. Again, the work teams would then help shape, define, and validate the process. This chapter presents the results of the preparatory research, while the following chapter reports the subsequent activities of the work teams.

GENERAL TECHNICAL FRAMEWORK: A TAXONOMY OF DISCRETE AIRPORT FUNCTIONS

To serve as a useful and convenient basis for planning in a large, complex, and interrelated environment such as an airport, a framework is needed that enables airport management to address the accessibility problem in an organized and manageable fashion. This requirement calls for a taxonomy of airport functions that, to the fullest extent possible, categorizes the airport into self-contained, homogeneous collections of facilities and services—homogeneous in the sense that they permit planning to focus on each functional category with a minimum need to consider facilities and services in other functional areas.

The following taxonomy of eight planning areas was developed prior to the workshop in consultation with field specialists (including those commissioned to prepare resource papers):

- Airport-metro and interterminal movement;
- Intraterminal movement;
- Parking and landside access;
- Awareness training;
- Communications technology, signage, and information;
- Terminal architecture and facilities;
- Airport/airline interfaces; and
- Regulation and planning process.

Work teams addressed the task of validating the taxonomy by defining the range of specific airport functions within each category. The absence of duplication or overlap among the specific functions identified by the work teams indicates that the taxonomy can be used as the basis for accessibility planning at airports generally. The taxonomy reported above, together with the elaboration of each planning area reported in chapter 5, represents the workshop's recommended basis for accessibility planning.

GENERAL ADMINISTRATIVE FRAMEWORK: AN ON-GOING PLANNING PROCESS

As shown in chapter 4, the work team on strategic planning for airport accessibility was asked to address the question of how best to organize accessibility planning efforts at the local level. This work team met towards the end of the workshop in order to benefit from any change and refinement to the basic taxonomy.

The planning work team recognized the need for a community-based Airport Accessibility Planning Process, centered upon the taxonomy broadly as outlined above (specific refinements are reported in the following chapter). Under this approach, a Community Task Force drawn from all aspects of the community would work with airport management in developing an on-going, multiyear Airport Accessibility Plan.

Together, the Airport Accessibility Planning Process, Community Task Force, and Airport Accessibility Plan provide the workshop's recommended administrative context within which airports can focus on each of the functional areas outlined above. Through the Task Force the process can establish planning priorities, schedules, and spending levels for each aspect of the taxonomy.

Of course, to serve as a useful basis for Airport Accessibility Plans, further elaboration of the taxonomy is required. Such elaboration was the fundamental job of the work teams. In particular, airport management and the Community Task Force require a listing of the specific airport functions to be addressed in each broad planning area; identification of the range of disabilities that are not well served by such functions today and the barriers that disabled people face; the level of service and operational performance to be expected of each airport function in serving specific categories of disability; and the range of technologies, designs, and operational solutions available. Areas in which research and development are needed to find solutions must also be identified. The findings of each work team are reported in the following chapter.

Chapter 4
TOWARDS A FRAMEWORK FOR INDIVIDUAL AIRPORT FUNCTIONS

The taxonomy of discrete planning areas presented in the previous chapter provided the broad framework within which the work teams conducted their activities. The principal aim of the work teams was to further shape and define the general framework and give substance to its individual components.

Work teams were established for each planning area. Each was assigned the following work requirements:

- Identify and categorize airport functions and facilities within the planning area;
- Identify and categorize disabilities for which the airport functions and facilities identified may fail to provide adequate service; and identify the specific problems associated with each function;
- Establish performance standards and objectives for each function in relation to the needs of people with disabilities. Performance standards and objectives (as distinct from engineering standards) do not necessarily relate to specific technologies, designs, or logistics but rather to the purposes that these engineering and design solutions are intended to serve;
- Identify design approaches and technologies available to help achieve performance objectives and identification of research and development needs; and
- Prepare a formal presentation of results to the workshop as a whole, using charts to display key findings.

The workshop aimed to define the nature and broad outline of a comprehensive planning framework. The actual "task order" provided to each work team is shown in Figure 1.

The task order was ambitious and conceptually challenging. The concept of "performance standards" (Task 3) is especially difficult; it requires the planner to specify the level of service and performance objectives for an airport function *before* establishing the appropriate technology or design solution. Simply stated, performance objectives become the basis for technology and design, not the reverse (as is often the case today). Although work teams were expected to have mixed levels of success in this area, it is a new and important concept in design and planning.

Work teams were encouraged to focus on areas of key importance rather than cover every possible aspect of each task area. Work teams were also encouraged to work through every task rather than seek completion in just some of the activity areas. In this way, the workshop would provide a complete, if necessarily partial, overview of the airport accessibility problem. As seen below, where results are partial, there is always enough detail to serve as an illustration for planning situations. This indeed was the workshop's principal purpose.

APPROACH TO THE PRESENTATION OF RESULTS

The results of the workshop are presented in each of the eight planning areas individually. The findings were drawn from principally two sources:

1. The formal material developed by each work team for presentation to the workshop as a whole;
2. Notes of each work team maintained by its designated recorder (see chapter 1 for explanation of the recorders' role).

In certain areas, additional information is drawn from communications with work team participants subsequent to the workshop and additional research conducted by the workshop organizers.

The results in each planning area are presented in a summary table and supporting text, categorized as follows:

- Airport functions and related facilities;
- Disabilities and problems of special concern;
- Performance objectives for airport functions and facilities; and
- Design, technology, and logistics.

Each section concludes with a discussion of research and development needs and a review of steps required to advance the state of airport accessibility. The discussion focuses on design, technology, and logistics. It also highlights the need for additional research into the appropriate performance objectives for specific airport functions and facilities. Further, it examines the need for additional information regarding the problems faced by people in specific categories of disability.

WORKSHOP ON AIRPORT ACCESS FOR DISABLED AND ELDERLY PERSONS
Transportation Research Board Committee on Specialized Transportation
Phoenix, Arizona
June 7-9, 1990

TASK-STRUCTURE FOR THE CONDUCT OF WORK TEAMS

These guidelines are intended to ensure a measure of consistency among the eight individual workshops.

WORKSHOP TASKS

Each workshop will complete five interrelated tasks. The completion of each task provides building blocks to be used in the subsequent tasks, as follows.

Task 1: Airport Functions

Airports serve many functions on behalf of passengers:

Task 1 CLASSIFY airport functions that relate to your Workshop subject and list the existing facilities, technologies and operations in place to serve them.

Task 2: Disabilities and Barriers

Airport functions are performed below-standard for persons with certain kinds of physical, mental and functional disabilities.

Task 2a LIST the physical, mental and functional disabilities of concern to your Workshop subject.

Task 2b IDENTIFY the problems and barriers facing persons in each category of disability identified in Task 2a. Problems and barriers should be identified for each airport function separately.

Task 3: Performance Standards for Airport Functions

Practical and policy-related factors come into play in establishing an appropriate standard of performance for each airport function. Perhaps the standard will need to vary for persons with different kinds of disability.

Task 3a IDENTIFY alternative standards of performance for each airport function;

Task 3b INDICATE where standards might need to vary in relation to different physical, mental or functional disabilities.

Task 4: Design, Technology and Research

Performance standards can be achieved through design principles and the application of logistics and technology. In some cases, research and development will be needed in order to identify design and technological solutions.

Task 4a IDENTIFY design principles and technologies available to achieve the stated performance standards for each airport function. Indicate where design and technology differs in relation to type of disability.

Task 4b Where there is no design principle or technology available, or where available approaches have shortcomings, IDENTIFY the research need.

Task 5: Develop a Presentation to the Group

Each Workshop will report the key findings of its deliberations to the Group as a whole.

Task 5 Using flip charts as a visual aid, prepare a presentation summarizing the salient results for each of the four tasks above.

FIGURE 1 Work team task structure.

CONDUCTING THE WORKSHOP

Each Workshop will be equipped with:

- Paper and pencils;
- Flip charts; and
- Background Technical Papers.

While an organized approach to each task is required, the lists, tables and other methods of keeping a record of Workshop deliberations is left to the discretion of the Facilitator and the Recorder, in consultation with Workshop participants.

A briefing for Workshop participants and a special briefing for Facilitators and Recorders will be conducted at the start of the meeting in order to answer questions, provide clarification and offer ideas about recording the deliberations of each task.

MAKING THE PRESENTATION

Presentations should be made by the Workshop Facilitator or Recorder. Presentations should be 15 minutes in length and should outline the results of each task in turn. One summary table or chart per task is encouraged, using flip charts and large lettering.

SUPPLEMENTARY GUIDELINES FOR WORKSHOP 8

Strategic Planning, Community Process, Guidelines and Regulation

Divide the time for this Workshop into two parts, as follows:

Part I: Strategic Planning and Community Process

Document a step-by-step airport management/community planning process for making airports accessible to disabled persons.

Part II: Guidelines and Regulation

Task 1: Airport Functions

a) Which airport functions should be governed by regulations?

b) Which airport functions should be governed by guidelines?

Task 2: Disabilities and Barriers

a) Which disabilities should be addressed by regulations?

b) Which disabilities should be addressed by guidelines?

Tasks 3 and 4: Performance Standards for Airport Functions and Design, Technology and Research

a) Should regulations govern the performance standard or the specific design and technology to be used?

b) Address (a) by airport function. This will help establish where regulation is necessary and where guidelines are sufficient.

FIGURE 1 ***(continued).***

AIRPORT-METRO AND INTERTERMINAL MOVEMENT

As shown in Table 2, airport functions in this planning area are found to include both transportation equipment and communications media. All major forms of disability need to be addressed in the planning process. Although adaptive or substitute technology is available in most functional areas, research and development is needed to redress problems for people with speech-, hearing-, and vision-related disabilities. The workshop team identified two overriding principles in its planning area: (1) interface with public transit operators, and (2) involvement of human factors engineers from the earliest planning stages.

Airport Functions and Related Facilities

The work team identified two broad functional requirements in this largely surface transportation-related planning area:

1. Facilitating travel between the airport and metropolitan origins and destinations; and
2. Facilitating travel between terminals and between terminals and parking lots.

According to the work team's findings, the airport's Accessibility Plan in this area should focus special attention on motorized forms of transportation (principally rental cars and transit), fixed guideway systems, pedestrian-moving technologies, and communications media.

Disabilities and Problems of Special Concern

The work team established five categories of disability for special consideration in this planning area, as follows:

1. Mobility impairments, including both nonambulatory and semiambulatory persons;
2. Visual impairments, including both blind and partially sighted persons;
3. Speech impairments, covering specific speech-related disabilities and those associated with hearing and related impairments;
4. Hearing impairments, including both deaf persons and those with low hearing; and
5. Cognitive impairments, which can include the entire range of developmental and mental disabilities.

Planning for accessibility in certain functional areas needs to address the entire range of disabilities. In addition to the vehicle design and level-change related problems of mobility-impaired persons, airport planning should address the requirements of speech- and hearing-impaired persons in the acquisition and use of information about airport facilities, vehicles, and schedules.

Table 2 indicates that the work team also identified special concerns to be addressed in relation to certain facilities and communications media. Moving sidewalks need to accommodate visually impaired persons for whom standard designs make entry and exit difficult or impossible. Information media that depend principally upon verbal communication need to be adapted to accommodate the requirements of people physically unable to speak.

Performance Objectives for Functions and Facilities

The establishment of performance objectives in this planning area has two principal components: (1) level of service, and (2) design and logistics.

Level of Service

Level of service in the context of this planning area relates to the degree of comparability between services available to the general public and those available and accessible to people with disabilities. In the case of transit between terminals, these objectives relate to the scheduled frequency of accessible vehicles in comparison with schedules generally. Ideally, the disabled passenger should wait no longer for service than any other airport user. In addition, comfort and safety are important considerations.

The work team identified the following areas for which performance objectives should be written:

- *Distance* includes internal versus external, climate technologies matched to specific distances, and need for seating;
- *Platform edges* performance objectives would address distinguishable materials on platform edges and reduction of gaps;
- *Information* objectives involve alternate media for people with visual, hearing, and reading disabilities;
- *Fares* should be simple and easy;
- *Space* objectives are maneuverability of entry and exit, door width, seating availability for those with physical or cognitive disabilities, and bus securement systems.

TABLE 2 AIRPORT-METRO AND INTERTERMINAL MOVEMENT

AIRPORT FUNCTIONS AND FACILITIES[a]	PERFORMANCE OBJECTIVES	SUBSTITUTE OR ADAPTIVE TECHNOLOGY AVAILABLE	HIGH R&D PRIORITY
Facilitate travel between the airport and metro destinations	Minimal delay		
	Physical convenience		
	Safety		
	Ease of baggage handling		
Rental car	Adaptive equipment	X	
	(Hand controls, lifts)	X	
	Check-in ease	X	
Transit	Enough space for luggage	X	
	Adequate securement	X	
	Appropriate operator training	X	X
	Roadway maintenance	X	
	Smooth ride	X	X
	Adequate supports for sitting and standing	X	
	Adequate sign illumination	X	X
	Frequent service	X	
	Understandable bus schedules	X	
Move passengers between terminals and parking lots	Minimal delay		
	Physical convenience		
	Adequate space and lighting		
	Smooth and safe entry and exit		
People-movers	Appropriate available seating	X	
	Safe platform edge	X	
	Adequate door width	X	
	Ease of entry or exit	X	
	Smooth trip	X	
	Slip-resistant floor cover	X	
	Adequate baggage space	X	X
Moving sidewalks	Slow entry	X	
	Adequate width	X	X
	No incline	X	
	Gradual speed change	X	
	Suitable for wheelchairs		X
Information and communication[b]	Alternative media backup		X
	Adequate lighting		X

[a] Affects a broad range of disability groups, especially mobility, visual, and cognitive.
[b] Particularly important for those with vision, hearing, and speech disability.

- *Acceleration/deceleration* performance standards address the need to minimize the stress of stops for people for whom this may cause pain or trauma;
- *Stanchions and grab-bars* performance standards involve an adequate number of bars that are reachable and that do not limit maneuverability;
- *Lighting* objectives are adequate and appropriate illumination and head signs on buses;
- *Baggage* performance objectives should include space on vehicles, curb space, and alternate means of check-in; and
- *Timing* objectives relate to dwell time, headway, and response time.

Design, Technology, and Logistics
The work team established design principles and technology for the following facilities and functions:

- Platform edge—
  - Detectable cuing material
  - Platform screen
- Information—
  - Digitized speech
  - LED readout
  - Printed material
- Fare—
  - Accessible collection
  - Convenient location
  - No charge
- Baggage handling—
  - Assistance on request
- Moving sidewalks—
  - Gradual speed change at each end
  - Minimum threshold at end
  - Adequate width for passage
  - No incline
- Buses—
  - Adequate wheelchair or mobility aid and baggage space (includes three-wheel motorized aids)
  - Adequate securement
  - Smooth, slip-resistant flooring to ease acceleration and deceleration trauma
  - Appropriate operator training
  - Road maintenance
- Rental cars—
  - Hand-controlled vehicles put in lease agreement.

Research and Development Needs

The work team identified the following areas in need of additional investigation:

- Matching technologies to distances and climate in transporting disabled people;
- Lighting improvements for people with visual disabilities, including color-blindness, and improvement of LED readouts; and
- Development of a moving sidewalk accessible to those in wheelchairs.

INTRATERMINAL MOVEMENT

As shown in Table 3, the work team identified a variety of facilities encountered by airport users with disabilities within terminals. Since terminals may be built on several levels, this movement may be vertical or horizontal. Vertical movement presents special problems to people with mobility and visual limitations. In addition to available adaptive and substitute technology, the team recommends research and development for lighting and surface textures.

Airport Functions and Related Facilities

The work team defined vertical movement in the airport to include use of the following structures:

- Elevators;
- Escalators;
- Stairs;
- Fixed ramps;
- Inclined moving ramps; and
- Chair lifts (attendant-assisted only).

Horizontal movement was defined to include use of the following structures:

- Moving sidewalks;
- Depot wheelchairs (attendant-assisted only);
- Battery-operated carts (attendant-assisted only); and
- Walkways.

TABLE 3 INTRATERMINAL MOVEMENT

AIRPORT FUNCTIONS AND FACILITIES[a]	PERFORMANCE OBJECTIVES	SUBSTITUTE OR ADAPTIVE TECHNOLOGY AVAILABLE	HIGH R&D PRIORITY
Facilitate movement within the airport	Ease and safety of entry and exit		
	Alternate communication methods		
	Adequate space and lighting		
Vertical movement			
Elevators	Operating speed standards	X	
	Tactile operating controls		X
	Tactile floor indicators		X
	Audio controls		X
	Adequate door closing time	X	
	Supports for standing and sitting	X	
	Ceiling lighting and controls		X
	Emergency communication		X
	Nonslip flooring		X
	Appropriate control height	X	
	Adequate door width	X	
	Adequate maneuvering space	X	
Escalators	Operating speed standards	X	
	Tactile floor indicators		X
	Supports for standing and sitting	X	
	Ceiling lighting and controls		X
	Nonslip flooring		X
	Tactile threshold area		X
	Ease of entry and exit	X	
	Stair edge contrast	X	
Stairs	Textural floor changes	X	
	Supports for standing	X	
	Ceiling lighting		X
	Nonslip flooring	X	X
	Standardized labels		
	Tactile threshold area	X	
	Ease of entry and exit	X	
	Stair edge contrast	X	
Fixed ramps	Hand rail	X	
	Ceiling lighting		X
	Nonslip flooring		X
	Adequate maneuvering space	X	
	Tactile threshold area		X
Inclined moving ramp	Operating speed standards	X	
	Textural floor changes		X
	Supports for standing	X	
	Ceiling lighting		X
	Nonslip flooring		X
	Tactile threshold area		X
	Ease of entry and exit	X	
	Stair edge contrast	X	
	Nondeflecting surface	X	
Horizontal movement			
Moving sidewalks	Intraterminal		X
Depot wheelchairs	Independent use		X
Battery-operated carts	Independent use		X
Walkways		X	

[a] Affects the blind, the elderly, wheelchair users, and those with mobility, agility, visual, hearing, speaking, and cognitive disability.

Disabilities and Problems of Special Concern

The workshop team found that people with temporary or permanent mobility limitations, vision limitations, including color-blindness; and hearing, speaking, and cognitive disabilities are faced with a number of barriers within the airport terminal, particularly regarding vertical movement.

Performance Objectives for Functions and Facilities

The work team compared the cost and feasibility of designs and technologies that would foster either (1) the independent use of airport facilities by people with disabilities or (2) their use with the assistance of another person. Performance objectives that facilitate movement within the terminal can be established in the following general areas:

- *Operating speed* is an important safety consideration on automatic devices such as elevators, escalators, and moving ramps. Performance standards should be written that address the timing of elevator doors, escalators, and moving ramps;
- Performance objectives need to be established for *controls, indicators, and floor textures* in elevators for airport users with visual disabilities;
- Performance objectives need to be written in regard to *communication methods* to inform visually and hearing disabled travelers of the location of services and schedule and gate changes;
- *Lighting quality* performance objectives should be written with consideration for airport users with low vision. Most visually disabled people have partial vision; many elderly people also have low vision;
- *Stair edges* performance objectives should be written to avoid falls for people with low vision;
- *Flooring surface* performance standards on moving conveyances should address the ability of people with a range of disabling conditions to maintain balance;
- *Information transmittal* performance standards should be established to ensure security and orientation of airport users with disabilities; and
- Performance objectives for timing *entry and exit* on escalators and moving ramps should be written to address the needs of people with balance and agility problems.

Design, Technology, and Logistics

As airports expand to meet increased capacity demands, travel within the airport terminal becomes more serious for travelers with disabilities. To accommodate passenger movement in larger airports, a number of technologies have been developed and implemented in recent years. Unfortunately, these technologies have rarely addressed the needs of passengers with disabilities. The work team found that most of the performance objectives it identified in this area can be met by employing currently available substitute or adaptive technology.

Research and Development Needs

To increase independent movement within the terminal for people with disabilities, the workshop team recommends research and development in the following areas:

- Self-navigation guidance systems;
- Modified escalator systems that permit wheelchairs and baggage carts;
- Alternatives to attended wheelchairs; and
- Intraterminal people movers.

In considering safety and accessibility issues, the work team emphasized technologies that enable an individual with a disability to move about the airport terminal without an attendant.

PARKING AND LANDSIDE ACCESS

As shown in Table 4, this planning area involves the functions associated with driving into the airport, using revenue-collection mechanisms, parking a vehicle, and moving from the parking area into the terminal. These functions are associated with barriers for many disability groups but especially for drivers who use wheelchairs.

The work team recommends two underlying policies:

1. To elevate the awareness level of all involved airport personnel; and
2. To approach compliance or equivalency when feasible.

Many adaptive and substitute technologies are available in the area of parking and landside access, but the work team found a need for additional research and development in relation to revenue control equipment

TABLE 4 PARKING AND LANDSIDE ACCESS

AIRPORT FUNCTIONS AND FACILITIES[a]	PERFORMANCE OBJECTIVES	SUBSTITUTE OR ADAPTIVE TECHNOLOGY AVAILABLE	HIGH R&D PRIORITY
Facilitate parking within the airport	Adequate parking space		
	Proximity to terminal		
	Adequate, uniform signage		
	Accessible revenue collection		
	Parking spaces to accommodate high-profile vans		X
	Parking spaces to accommodate vans with wheelchair lifts	X	
	Parking spaces in proximity to entries, bus stops, and elevators	X	
	Identification of reserved parking	X	
	Identification of accessible route to terminal	X	
	Ticket dispenser and payment booth positioned to accommodate wheelchair users		X
Facilitate access between parking place and terminal	Barrier-free route to terminal		
	Adequate, uniform signage		
	Readily available assistance		
	Level route between parking and terminal	X	
	Protection from inclement weather	X	
	Warning devices for visually impaired persons	X	
	Access to information	X	
	Assistance for all disability groups	X	

[a] Particularly affects the following disability groups: quadriplegic, paraplegic, temporarily nonambulatory, elderly, mobility, color-blind, mental, illiterate, hearing

and van design. The latter suggests adapting the vehicle rather than the parking garage dimensions to remedy an incompatibility between the two.

Airport Functions and Related Facilities

The work team identified two major functional areas: (1) parking in the airport, and (2) moving between the parking areas and the airport terminal. Parking needs include the following:

- Available space with adequate dimensions to accommodate the range of vehicles driven by persons with disabilities, including wheelchair users;
- Proximity to access into the terminal; and
- Signs that identify reserved parking areas.

The work team also identified the following needs for a route between the parking area and terminal:

- Protected from weather,
- Well marked,
- Without obstacles to wheelchairs or other mobility aids, and
- With textural warnings for people with visual disabilities.

Assistance, when required, should be available in an appropriate format for different disability groups and readily available at parking areas.

Disabilities and Problems of Special Concern

The work team established the following categories of disabilities of special concern in this planning area:

- Mobility disabilities;
- Age restrictions;
- Color blindness;
- Cognitive disabilities; and
- Hearing disabilities.

The team developed its objectives based on the premise that people using wheelchairs would be driving their own cars. Its considerations therefore centered upon mobility-related disabilities.

Performance Objectives for Functions and Facilities

The development of performance objectives in this planning area involves two distinct but related functions: (1) parking within the airport, and (2) moving between the parking area and the terminal. Performance objectives for parking should be written to address the following:

- Parking spaces for people who need wide spaces;
- Parking revenue collection method for drivers with disabilities;
- Distance from accessible parking areas to the terminal; and
- Proximity to entries, bus stops, elevators, etc. for disabled people, especially mobility-disabled.

For landside access, objectives include the following:

- Barrier-free routes from parking area to terminal for wheelchair users and vision-impaired people; and
- Methods to provide information and assistance to people with a variety of disabilities.

Design, Technology, and Logistics

The work team on parking and landside access identified a number of areas where adaptive technologies are needed. It identified surface textures to indicate environment changes and distribution of accessibility information as two of these for which the technology exists.

Research and Development Needs

In the research area the work team lists (1) revenue control equipment, and (2) van heights.

AWARENESS TRAINING

Training of airport personnel affects all of the other planning areas defined in the taxonomy. In fact, it is only through the adequacy of personnel in dealing with the special needs of disabled people that optimal use of adapted airport facilities is achieved.

Airlines have been aware of training needs regarding people with disabilities for some time, but airport personnel have remained largely untutored until just recently. Even now airport personnel training is the exception rather than common practice.

The work team identified two underlying conditions required to begin the training process: (1) understanding disability etiquette and (2) overcoming personal embarrassment and fear. While some training materials are available at this time, the team recommended improving and increasing the resources as shown in Table 5.

TABLE 5 AWARENESS TRAINING

AIRPORT FUNCTIONS AND FACILITIES[a]	PERFORMANCE OBJECTIVES	SUBSTITUTE OR ADAPTIVE TECHNOLOGY AVAILABLE	HIGH R&D PRIORITY
Discrete training areas	Awareness training Education Technical training Evaluation	N/A[b]	Development of training materials
Airport operations: maintenance, standards, physical plant			X
Security: security check, airport police, emergency personnel			X
Ground transportation: rental car, buses, taxis			X
Information services: central information center, public relations and marketing, multimedia technician			X
Parking services: employee, general public, long- and short-term			X
Airline operations: ticketing, baggage (skycap), intraterminal, boarding and gate			X
Retail sales: restaurants, shops, banks, ATM			X
Airport administration: employment, policy, long-term plan, design			X

[a] Particularly affects the following disability groups: mobility, sight/blind, cognitive, mentally ill, speech-impaired.
[b] Not applicable.

Airport Functions and Related Facilities

To enhance the effectiveness of airport personnel in serving people with disabilities, training is recommended in several broad functional areas:

- Airport operations and security;
- Ground transportation and parking;
- Retail sales; and
- Administration.

Disabilities and Problems of Special Concern

The work team cited seven disability groups for consideration in awareness training:

1. Mobility;
2. Sight/blind;
3. Hearing;
4. Deaf/blind;
5. Cognitive;
6. Mentally disabled; and
7. Speech-impaired.

Disabilities of special concern affect communication, particularly "invisible" impairments such as deafness and the inability to be understood.

Performance Objectives for Functions and Facilities

The workshop team established the following four performance objectives for programs that train airport personnel:

1. Awareness that individual disabilities impose particular limitations;
2. Education on disabling conditions to enable recognition and appropriate response in real situations;
3. Technical training to enable personnel to facilitate communication, wheelchair transfers, etc.; and
4. Evaluation.

Using these four objectives throughout, training should be tailored appropriately to each discrete airport functional area. This would be further task- and disability-specific. For example, in the restaurant (the functional area), to order a meal (specific task) a braille menu would be provided to a visually disabled customer (disability specific).

The work team recommends the following:

- Employee orientation program;
- Employee training program;
- Supervisory training;
- Medically oriented training for medical personnel;
- Service-specific training;
- Training that considers individual disabilities;
- Task-specific training;
- Practical application;
- Awareness of a variety of needs;
- Increased awareness of hidden disabilities; and
- Communication techniques.

In addition to training the general airport employees who relate directly with the public, the work team recommends training airport executives and administrators, as well as the personnel of air travel organizations such as AAAE and AOCI.

Design, Technology, and Logistics

The team recommends the following principles and technologies:

- Consultants to develop a training plan;
- Training models;
- Videos, books, etc.;
- Federal agencies; and
- Resource list of organizations.

COMMUNICATIONS, TECHNOLOGY, SIGNAGE, AND INFORMATION

Using the services and facilities in an airport involves a stream of communication and instruction, evidenced by the number of signs at virtually every turn. For people with disabilities that prevent them from reading and interpreting signs, the airport becomes a clutter of confusion that can cause disorientation and even panic.

People who are unable to hear spoken messages may miss vital information such as gate change announcements. While a good deal of technology exists in the communications area, standards have not been adopted, nor has existing technology been utilized fully in removing barriers for people with disabilities. The work team recommended that airports make use of existing guidelines in improving adaptive technology. As noted in Table 6, research is recommended in audio, visual, and tactile technology.

TABLE 6 COMMUNICATIONS, TECHNOLOGY, SIGNAGE, AND INFORMATION

AIRPORT FUNCTIONS AND FACILITIES[a]	PERFORMANCE OBJECTIVES	SUBSTITUTE OR ADAPTIVE TECHNOLOGY AVAILABLE	HIGH R&D PRIORITY
Signs	Provide tactile and auditory as well as visual signs		X
	Provide directions to accessible facilities	X	
	Present uniform, consistent information verbally and with pictograms	X	
	Maximize legibility of visual information		X
Wayfinding	Optimize visual information, locations, lighting, and floor texture	X	
Technological devices and vending machines	Provide redundancy in signs and instructions	X	
	Place machines in accessible and convenient locations	X	
	Ensure compatibility of technological product design		X
Interface with transportation	Provide redundant systems appropriate to the range of disabilities	X	
	Minimize auditory and visual clutter		X
	Provide universally understood information	X	
	Maximize independent usability or choice	X	

[a] Particularly affects the following disability groups: visual impairment, blind, hearing impairment, deaf/blind, wheelchair users; semiambulatory, reduced agility, cognitive, mentally ill, speech-impaired.

Airport Functions and Related Facilities

The work team defined four functional areas: signs, wayfinding, technological devices, and interface with transportation. The following facilities are relevant:

- Airport entrance;
- Airline choice;
- Parking;
- Rental car;
- Cargo/express package;
- Curbside check-in and pickup;
- Ticketing;
- Security;
- Gate location;
- Boarding;
- Baggage claim;
- Ground transportation;
- Public services; and
- Concessions.

Disabilities and Problems of Special Concern

Communication and information barriers vary with particular disability groups. For the majority of disabled people, restrictive architectural conditions, unintelligible visual signs, public address systems, and baggage clutter make airport use very difficult.

People with speech and hearing disabilities face particular disadvantages in airports that are poorly equipped with adaptive equipment. Speech-disabled people are unable to use a telephone or communicate with personnel. Hearing-disabled people also have difficulty using the phone and detecting and understanding verbal announcements. Research reported to the workshop (see Appendix A) finds that people with hearing disabilities have a higher incidence of airport-related problems than any other group.

People with cognitive disabilities are confused by inconsistent terminology and symbols. Distractions make understanding visual and auditory messages difficult for people with certain mental illnesses.

Performance Objectives for Functions and Facilities

As summarized in Table 6, performance objectives should be written with regard to signage, wayfinding, machinery, and interface with transportation.

- *Signage* should be redundant for people with visual and hearing disabilities. Signs should be uniform and consistent. Legibility of signs should be addressed with attention to size, contrast, and illumination.
- *Wayfinding* should be facilitated by establishing objectives for location, texture and finish, contrasting colors, ambient lighting, and lighting consistency.
- *Technological devices and vending machines* should have audio and visual instruction redundancy and be accessible, convenient, and available.
- *Interfacing with transportation* requires redundant systems adapted to different disability needs. Visual and auditory clutter should be minimized and information presented clearly.

The workshop team cited as an objective "Minimum dependence on others, maximum independent usability or choice."

The team described six discrete areas in which performance objectives need to be written and guidelines identified to meet these objectives:

1. Provide organization of architectural features and elements;
2. Utilize existing accepted research on legibility of visual and auditory information systems;
3. Provide amplification that is effective for the hearing impaired;
4. Provide levels for auditory signs and alarms 30 decibels above the average hearing acuity of the population using the facility;
5. Provide more written material describing the facility for all disabilities; and
6. Identify TDD locations more prominently.

Design, Technology, and Logistics

The team recommends using Architectural and Transportation Barriers Compliance Board (Access Board) and industry research to enhance the acuity of visual and auditory information for all airport users. In accomplishing this, the following are areas to consider:

- Distance/size,
- Contrast/color,
- Illumination, and
- Location.

Research and Development Needs

The team identified research needs regarding auditory and visual signs and information systems and self-navigation devices. It recommends the following:

- Investigation and testing of user-activated "talking" signs and directories;
- Self-navigation devices or systems (sonar and radar);
- Investigation/evaluation of the legibility of dynamic signs, including LEDs, light dot, and flip disk; and
- Field research on critical factors affecting legibility of information systems:
  - Distance/size,
  - Case,
  - Glare,
  - Comprehension issues,
  - Speech devices, and
  - Alarms.

TERMINAL ARCHITECTURE AND FACILITIES

As summarized in Table 7, this planning area involves the airport terminal facilities. The work team examined each of the terminal structures and facilities individually and identified the possible barriers that airport users with disabilities may encounter from their entry into the airport to the time they board a plane. The team recommended research and development in the design of entry doors, ticket counters, and restrooms.

Airport Function and Related Facilities

The workshop team identified four functional areas within the terminal:

1. Facilitation of ticket transactions;
2. Facilitation of baggage handling;
3. Passage through public circulation areas; and
4. Use of restrooms.

Disabilities and Problems of Special Concern

The workshop team cited the following disability groups for consideration:

- Mobility disabilities, including wheelchair users;
- Visual disabilities, including blindness;
- Hearing disabilities;
- Speaking disabilities;
- Age-related disabilities; and
- Cognitive disabilities.

Performance Objectives for Functions and Facilities

Performance objectives to be considered in the Airports Accessibility Plan need to address the following areas:

- *Entrance door* performance objectives should address the movement of those with age-related, mobility, visual, and cognitive disabilities;
- *Ticket lobby* performance objectives are in relation to customer transactions, working height for seated wheelchair users, and queuing space that accommodates mobility devices including wheelchairs;
- *Baggage claim* performance objectives should be written regarding checking in at the airport and retrieving luggage. Consideration should be given to the question of whether objectives are best met by independent or assisted use of conveyer belts and other claim devices. For persons with visual disabilities and mobility limitations especially, the question of safety is a consideration in this area; and
- *Emergency egress and alarms* performance objectives address the use of stairs, ramps, and exits and alarms.

Design, Technology, and Logistics Research and Development Needs

The workshop team combined the above categories and made recommendations regarding entrance doors, ticket lobbies, and restrooms:

- *Entrance doors*—
  - Develop a door system that avoids impact with person in close proximity;
  - Improve operational reliability;
  - Develop glare-resistant glass; and
  - Develop a new technology entrance system.
- *Ticket lobby (counter)*—
  - Develop a new ticket counter/check-in system which better integrates ticketing data, flight information, individual communication, and queuing function;
  - Install shelf system for seated customers; and
  - Develop standards for queuing space that accommodates persons with disabilities.

TABLE 7 TERMINAL ARCHITECTURE AND FACILITIES

AIRPORT FUNCTIONS AND FACILITIES[a]	PERFORMANCE OBJECTIVES	SUBSTITUTE OR ADAPTIVE TECHNOLOGY AVAILABLE	HIGH R&D PRIORITY
Facilitate use of airport facilities	Adequate and safe passageway throughout terminal		X
	Equal and dignified access		
Entrance doors	Operational reliability		X
	Safe operation		X
	Hands-free operation		X
	Energy economy	X	
	Full-vision door panels		X
	Clearly detectable path	X	
Ticket lobby	Counter to accommodate customer at seated working height		X
	Ability of ticket agent to work either standing or sitting		X
	Minimum or no lifting for baggage check	X	
	Maintain airline date security	X	
	Access to TDD	X	
	Adequate width in queing area for wheelchair	X	
	Seating in ticket lobby	X	
Restrooms	Doorless toilet vestibules	X	
	Adequate width for wheelchair and walking person		
	Adherence to existing standards for hardware clearance	X	
	Towels accessible from lavatory	X	
	Diaper changing area in men's and women's restrooms	X	X
	Adequate stall width/support bars	X	
	Unisex toilet facility		X

[a] Particularly affects the following disability groups: wheelchair users, other mobility, reduced agility, visual, blind, hearing, speaking, elderly, cognitive.

- *Restrooms*—
  - Conduct research on facilities to be provided in unisex restrooms (e.g., bench for changing clothes, etc.).

AIRPORT/AIRLINE INTERFACES (I.E., SECURITY GATES AND BOARDING DEVICES)

One of the more perplexing aspects of air travel is the relationship between the airport and airlines. Although airlines and airports have specific areas of responsibility and jurisdiction, the interface is at times intermingled and ill-defined. Defining interface is difficult but necessary and important for solving airport accessibility problems. Airport and airline representatives must talk and work together on disability issues.

The major legislation affecting airlines is the Air Carrier Access Act. Airports are regulated by Section 504 of the Rehabilitation Act of 1973. However, many regulations, especially those related to civil rights and affirmative action, do not specify whether it is the airport or the airline that is responsible for compliance. To further complicate the issue, airports have influence on policy matters not directly under their jurisdiction through leases, contracts, and other legal arrangements with their tenants. Airports and airlines have a landlord-tenant relationship.

The work team defined its scope to include anything that affects the smooth operation of the airport. Its approach was to do a mental "walk through" of the airport and define functions, disabilities, needs, and solutions.

Airport Functions and Facilities

The following functions, named in Table 8, were identified by the work team as relevant to the assigned subject:

- *Assistance*, defined as services or accessible structures that specified disabled passengers need to use the described facilities;
- *Wheelchairs*, the one assistive device that is used by disabled passengers in all parts of the airport, requiring interface between airport and airlines;
- *Security* services which are offered on the airport premises;
- Flight-specific *communication* needs;
- *Gate-aircraft* interface; and
- *Connecting flights/interlining.*

Disabilities and Problems of Special Concern

The following disabilities are relevant to the functional areas defined above:

- Mobility problems, including users of wheelchairs as well as other limitations or frailties that affect mobility;
- Agility problems such as bending, grasping, and other physical activities;
- Blind and visual impairments;
- Deaf and hearing impairments;
- Speech impairments;
- Cognitive problems, including emotional problems, learning disabilities, and mental retardation; and
- Hidden disabilities of various types.

Performance Objectives for Functions and Facilities

The work team recommended performance objectives in these general areas:

- Passenger assistance, including identifying disabilities to air travel personnel and emergency and evacuation management;
- Wheelchair use, security, and storage;
- Security checks involving body search, assistive devices, and sensitivity to disabled passengers;
- Flight-specific communications for different disability groups;
- Gate and aircraft access that involves level changes; and
- Connecting flights/interlining.

Design, Technology, and Logistics

For each of the performance objectives the work team suggests the following solutions:

- *Assistance*—
  - Train airline agents and check-in clerks as well as passengers;
  - In case of medical and security emergencies provide quick access to health care and police; and
  - Provide training for airline crews in emergency evacuation of people with disabilities.
- *Wheelchairs*—Provide enough good-quality airport wheelchairs and provide safe storage for personal chairs.

TABLE 8 AIRPORT/AIRLINE INTERFACE (SECURITY GATES AND BOARDING DEVICES)

AIRPORT FUNCTIONS AND FACILITIES[a]	PERFORMANCE OBJECTIVES	SUBSTITUTE OR ADAPTIVE TECHNOLOGY AVAILABLE	HIGH R&D PRIORITY
Assistance	Identification of disabilities and requirements for assistance	X	
	Response to medical emergencies	X	
	Response to security emergencies	X	
	Method of check-in	X	
	Airplane evacuation considerations	X	
Wheelchairs	Availability of airport chairs	X	
	Quality of airport chairs	X	
	Stowing wheelchairs on planes	X	
	Storage of personal chairs	X	
Security needs	Method of sensitive body search		X
	Assistive devices	X	
	Promoting emotional comfort, eliminating fear	X	
Flight-specific communications	Method to convey announcements to visually and hearing impaired	X	
	Method to communicate with cognitive/emotionally impaired	X	
Gate aircraft interface	Airbridge slope and surface to accommodate mobility and visually impaired	X	
	Where no airbridge, access to ramp or tarmac for boarding	X	
	Access to doors	X	
Connecting flight interline	Distance between gates of connecting flights	X	
	Baggage recheck on international/ domestic flights	X	

[a] Affects a broad range of disability groups, including: wheelchair users (manual, electric), mobility-frail, reduced agility, seeing, blind, low vision, hearing/ deaf impaired, speaking, cognitive, emotional, hidden disabilities

- *Security needs*—Provide awareness training for personnel to avoid demeaning searches and passenger fear. Protect assistive devices;
- *Flight-specific communications*—Develop alternate communication for visually, hearing, cognitively, and emotionally impaired travelers;
- *Gate-aircraft*—Provide two-track bridge, both rug and hard surface, to accommodate slope and surface on bridges; and
- *Connecting flights/interlining*—Provide elevators, switch-back ramp, and low-level loading.

LONG-RANGE PLANNING, COMMUNITY PROCESS, GUIDELINES, AND REGULATIONS

This work team was assigned the task of building upon the findings of the other seven work teams to design a community planning process involving all aspects of airport accessibility. It had a two-part assignment:

1. To document an airport management/community planning process for making airports accessible to people with disabilities; and
2. To review the relevant airport functions, identified in preceding workshops, and to determine where regulation is needed and where guidelines will suffice (see Table 9).

Long-Range Planning, Community Process

As a step toward developing a comprehensive planning framework, from both a technical and community process standpoint, the work team aimed to define the nature and content of such a framework. The work team recommends a four-stage planning process:

1. *Formation of a Task Force.* The task force will be composed of volunteer or appointed individuals who represent the parties of interest to airport accessibility. Possible groups to include:
   - Political policy makers;
   - Governing boards;
   - Airport operators;
   - Concessionaires;
   - Airlines;
   - A broad range of disability groups (see listing in Table 9);
   - Existing coalitions of disability groups;
   - Regulatory bodies;
   - Community groups; and
   - Private business owners.
2. *Planning.* The planning stage involves the following activities:
   - Goal setting, including situation analysis, needs assessment, and timeliness;
   - Determination of resources, existing and acquired, including leadership/staff, expertise, and credibility; and
   - Establishment of objectives and priorities.
3. *Implementation.* This stage involves the following activities:
   - Conversion, which includes awareness building or buy-in;
   - Techniques to show the economic benefit of serving disabled air travelers; and
   - Action, which includes design alternatives, priorities, budget constraints, and promotion.
4. *Evaluation.* This stage involves determining whether the accessibility plan is working.

Guidelines and Regulations

Building upon the airport functions identified in the airport planning areas, the workshop team suggested which performance objectives need to be covered by mandatory regulations and which could be accomplished through advisory and design guidelines. (**NOTE:** *Current* regulations require airports to be made accessible; the proposed changes would simply make the responsibilities of airports and carriers consistent with the Air Carrier Access Act.)

TABLE 9 GUIDELINES AND REGULATIONS

AIRPORT FUNCTIONS	RECOMMENDED APPROACH TO ACCESSIBILITY	DISABILITY GROUPS AFFECTED
Airport administration		Mobility, wheelchair, vision,
Policy	Regulations	hearing, age-related, speaking,
Personnel	ADA regulations	cognitive, deaf/blind
Training	Regulations	
Accessibility program	Regulations	
Implementation funding	Regulations	
Communication/information services		Mobility, wheelchair, vision,
Signage	Guidelines	hearing, age-related, speaking,
TDDs	Regulations	cognitive, deaf/blind
Telephones	Regulations	
Public information	Guidelines	
Publications	Guidelines	
Visual displays	Regulations/guidelines	
TV monitors	Guidelines	
Alarm systems	Regulations	
Tactile signage	Regulations	
Parking	Regulations/design standards	Mobility, wheelchair, vision, hearing, age-related, speaking, cognitive, deaf/blind
Architectural standards	Regulations/design standards	Mobility, wheelchair, vision, hearing, age-related, speaking cognitive, deaf/blind
Ground transportation		Mobility, wheelchair, vision,
Private vehicles		hearing, age-related, speaking
Bus, private and public	Regulations/guidelines	cognitive, deaf/blind
Taxi	Regulations/guidelines	
Fixed-route transit	Regulations	
Hotel vans	Regulations/guidelines	
Rental cars and vans	Regulations/guidelines	
Inter- and intraterminal movement		Mobility, wheelchair, vision,
Elevators	Regulations	hearing, age-related, speaking,
Escalators	Regulations/guidelines	cognitive, deaf/blind
Stairs	Regulations, design standards	
Moving sidewalks	Guidelines/design standards	
People-movers	Guidelines/design standards	
Depot chairs	Guidelines	
Carts	Guidelines	
Security		Mobility, wheelchair, vision,
Passenger search	Regulations/guidelines	hearing, age-related, speaking,
Fire	Regulations	cognitive, deaf/blind
Crash crew	Regulations	

APPENDIX A
DISABLED AND ELDERLY PERSONS AS A MARKET FOR AIRPORT SERVICES

Ling Suen, Transport Canada, and Brian Guthrie, Hickling Corporation

INTRODUCTION

Deregulation of the U.S. airline industry and the resulting decline in the cost of air travel has made this form of transportation more accessible to a broader range of socioeconomic groups than ever before. However, physical barriers in aircraft and airports continue to impede the use of air travel by disabled persons. Clearly, the identification and removal or easing of such barriers will help extend the usage of air travel services by this group.

The principal focus of most research in this field has been on urban buses and trains, with more recent focus on aircraft. However, the availability of important new data sources now allows investigation of those barriers which are faced by disabled persons in their use of airport terminal services. The types of barriers faced can be identified, together with the number and characteristics of disabled persons who are facing those barriers. Within this latter analysis it is possible to identify the numbers in specific disabled groups who face particular barriers. Further analysis can suggest the extent to which these barriers are limiting the potential size of the market for airport services.

With the demand for air travel services in the United States expected to grow strongly over the next decade, it is important to identify now which groups will be limited in their ability to participate in this trend. This paper seeks to both identify those barriers to air travel which exist in the airport terminal, as well as to determine the extent to which these barriers are limiting usage of air travel services by disabled persons. A secondary aim of the paper is to suggest areas in which further research is required in order to deal adequately with this problem.

DEFINING THE AIRPORT-DISABLED

People who are disabled in their ability to access air travel services are clearly a subgroup of the more generally transportation-disabled public. Certainly, not all disabled and elderly people are disabled with respect to their ability to use transportation services. For some, using both short and long distance transport services will be no more difficult than for those without any particular handicap. For others, the nature of their disability will render them housebound. Table 10 illustrates the range of disability characteristics across the general population.

TABLE 10 RELATIVE SIZES OF DISABLED POPULATIONS

Characteristics	Percentage of general population
All disabled	14.1
Transportation-disabled	8.3
Disabled with respect to long-distance transport	5.0
Trouble using air transport	0.7
Wheelchair users	0.5

Source: Health and Limitation Survey, 1986

Disability with respect to the use of airports, like more generalized transportation disability, needs to be defined functionally, given that the use of these services necessitates the performance of specific tasks, including:

- Travelling to and from the air terminal;
- Moving around the departure/arrival terminal;
- Grasping money, tickets, carrying baggage;
- Seeing timetables, viewing screens, hearing announcements, etc.;
- Understanding the operation of transportation systems (i.e., understanding routes, transfers, fares, etc.);
- Using the facilities at the terminal. including the restroom facilities, restaurants, and so on; and
- Boarding, disembarking, and riding.

An appropriate functional definition of airport-disabled persons would accordingly be those people who cannot travel by air because specific barriers limit their ability to use airports, or whose use of air travel is limited or impeded by such barriers. Within this definition is included both those who face barriers which could be overcome through the provision of special services and equipment; as well as those who could not be helped by even the most sophisticated level of service. Accordingly, when wishing to specify the disabled and elderly market for airport services, one must be careful to include only those who are not specifically airport-disabled, together with those who are or who may be able to access air terminals when special equipment and services are available.

SOURCES OF DATA

The recent availability in Canada of both the Canadian Health and Disability Survey and the more recent Health and Limitation Survey has greatly extended the information available about the size and characteristics of the population of transportation-disabled persons in Canada. In contrast, the most recent nationwide survey in the United States was carried out in 1977, and only examined local transit issues(*1*). As the Canadian data provides information significantly in excess of that currently available in the United States, it was decided for the purpose of this paper to use the proven technique of incidence rates to estimate U.S. disabled populations from the Canadian data(*2*). Thus, throughout this paper, the incidence figures quoted are Canadian, while the population figures reflect the Canadian incidence rate applied to corresponding U.S. populations.

This paper draws almost exclusively from the information provided by the Canadian Health and Limitation Survey (HALS), conducted following the 1986 national census. This survey is the most comprehensive of its kind in Canada, and indeed in North America. The survey coverage included Canadians in every province, region, and territory, both those living in institutions and those in households, and so encompassed almost 120,000 disabled respondents. In addition to extending survey coverage from previously achieved levels, HALS also incorporates an extension of previous survey definitions of disability to include individuals who are limited in the kind or amount of activity they can do because of a learning, mental, psychiatric, or emotional disability. HALS also deals more specifically than previous studies with those people who are more likely to under-report themselves as being disabled, such as older people and those with a mild disability.

HALS adopted a functional limitation approach in defining disability in the adult population aged 15 and over. Questions concerning the ability to engage normally in activities of daily living were used to determine functional limitations. This approach is consistent with the World Health Organization's definition of disability, which is "any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being."

Within the HALS survey, the following categories of disability are defined:

- Mobility: limited in ability to walk, move from room to room, carry an object for 10 metres, or stand for long periods;
- Agility: limited in ability to bend, dress or undress oneself, get in and out of bed, cut toenails, use fingers to grasp or handle objects, reach, or cut own food.;
- Seeing: limited in ability to read normal print or to see someone from 4 metres, even when wearing glasses;
- Hearing: limited in ability to hear what is being said in conversation with one other or two more persons, even when wearing a hearing aid;
- Speaking: limited in ability to speak and be understood;
- Other: limited because of a learning disability or emotional or psychiatric disability, or because of developmental delay; and
- Unknown: limited but nature not specified.

HALS is rich in transport-specific information concerning the disabled. It examines the different modes of transportation used (including long distance, short distance, and personal vehicles), as well as the travel patterns of the group as a whole. Within the data is included information about the availability of suitable transportation services, usage of the different modes available, the difficulties that are encountered when using different transport modes, as well as the special needs of disabled travellers.

MARKET ANALYSIS

Quantifying the Potential Market for Airport Services

The potential market of disabled persons for airport services is a subset of both the entire U.S. disabled population and all transportation-disabled persons in the United States.

HALS has identified 14.3 percent of the adult population (15 years and over) as reporting some level of activity limitation in 1986. Applying this incidence rate to the U.S. adult population suggests that approximately 28.1 million disabled persons reside in the United States(*3*).

Of this total population of disabled persons, the potential market for airport services will only include those who are not precluded from the use of all forms of long-distance transport. Within this group will be included both those who are housebound (defined by HALS to be 7.8 percent of the total disabled population), together with those who are prevented from taking any long-distance trips because their condition or problem makes the use of long-distance transport services unsuitable. In this latter group, HALS indicates

that approximately 60 percent of the population of disabled people who are prevented from using long-distance transport services say that they do not use these services because of their condition. This implies that approximately 10 percent of the disabled population are prevented from using long-distance transport because of their condition, and a further 7.8 percent cannot because they are housebound. However, the remaining 82 percent of the disabled population are able to use long-distance transport, and accordingly are part of the potential market for airport services. This represents a potential market in the United States of 23 million persons.

Quantifying the Airport-Disabled Population

Using the HALS data sources, it is possible to quantify the population of disabled people who experience difficulties when travelling by air. It should be noted that these difficulties will incorporate problems experienced both within the air terminal and on the air carrier.

Table 11 illustrates that most disabled people do not specifically face difficulties in their use of long-distance transportation. In fact, excluding those disabled people who are housebound or otherwise precluded from long-distance travel, only 9 percent of disabled persons experience difficulties when using one or more modes of long-distance transport.

Table 12 shows that of this specific group, almost two-thirds identify difficulties when travelling by air. Thus, approximately 6 percent of people who are disabled, but are not precluded from long-distance travel, have disabilities which affect their use of air travel. Thus, the U.S. air travel-disabled population can be quantified at approximately 1.38 million people.

Table 12 also shows, more specifically, that people with hearing disabilities and seeing disabilities are the most likely groups to experience difficulties when traveling by air.

The relative incidence of difficulty encountered by disabled people when travelling by other modes of long-distance transport is also described in the table. It can be seen that the mode of transport causing the most problems for disabled groups is long-distance bus (approximately 72 percent identified this mode); the mode causing the least amount of difficulty was rail (approximately 55 percent identified this mode).

TABLE 11 DISABLED PEOPLE WHO FACE DIFFICULTIES USING LONG-DISTANCE TRANSPORT

	Percentage having difficulty		
Type	By air	By rail	By LD bus
All	0.64	0.56	0.72
Mobility	0.61	0.55	0.74
Agility	0.60	0.56	0.75
Seeing	0.67	0.62	0.73
Hearing	0.67	0.53	0.68
Speaking	0.63	0.68	0.68
Other	0.70	0.59	0.64
Unknown	0.71	0.47	0.59

TABLE 12 DIFFICULTY OF USING DIFFERENT MODES OF LONG-DISTANCE TRANSPORT

	Percentage having difficulty		
Type	By air	By rail	By LD bus
All	64	56	72
Mobility	61	55	74
Agility	60	56	75
Seeing	67	62	73
Hearing	67	53	68
Speaking	63	68	68
Other	70	59	64
Unknown	71	47	59

Characteristics of the Airport-Disabled Population

Tables 13 through 15 display the disability, gender, and age characteristics of that part of the disabled population who identify barriers to their use of air travel. In Table 13 it can be seen that over a third of the total population is over 65 years old. Further analysis indicates that almost 40 percent of people who have mobility and agility impairments, and approximately 50 percent of those with seeing and hearing disabilities are aged in

excess of 65 years. This fact suggests that at least a significant portion of these disabled groups owe their particular disability to the natural effects of ageing, rather than to any congenital or accident-related cause. Interestingly, of those disabled people who face barriers to air travel, 60 percent are female. One probable explanation for this phenomena may be derived from the heavy weighting of people aged over 65 in the sample, people who, on average, are more likely to be female.

Table 14 shows that the airport-disabled are most likely to be people with mobility or agility disabilities. Those with cognitive disabilities are the group next most likely to face difficulties in the use of air travel. The percentages in Table 14 do not add to 100 percent because many disabled people have multiple disabilities.

TABLE 13 AGE DISTRIBUTION OF PEOPLE WITH DISABILITIES WHO EXPERIENCE DIFFICULTIES IN USING AIRPORTS

Age	Percent of total	Number of people
15-34	19	262,656
35-54	26	359,424
55-65	20	276,400
65+	36	497,664
Total	100	1,382,400

TABLE 14 PERCENTAGE DISTRIBUTION OF AIRPORT-DISABLED BY DISABILITY

Type	Percentage
Mobility	73
Agility	66
Seeing	24
Hearing	35
Speaking	11
Other	40
Unknown	2

Types of Barriers Encountered at the Airport

Disabled people face a broad range of barriers in accessing airport terminal services. These barriers are often at least partially a function of the nature of the disability. Barriers to airport use exist both in accessing the airport terminal, and in using the facilities within the terminal.

Table 15 shows both the types of terminal specific barriers encountered by disabled people who are users of airport services, together with the ranking of each barrier as a source of trouble.

It is surprising to note that only a small percentage of the disabled population who are not prevented from travelling long-distance cite the existence of specific barriers to their use of airports. For example, the difficulty experienced most frequently—moving around the terminal—was only a problem for 3 percent of the population. Other barriers, including hearing announcements, seeing signs and notices, accessing the washroom facilities and getting to the terminal, affected only 1 percent of the group. In fact, as the accessibility of washroom facilities and the issue of staff supportiveness were measured generally, and not in a terminal-specific way, these barriers are possibly overstated with respect to their importance as terminal-specific barriers.

Barriers to airport use will affect people suffering from different disabilities in different ways. Table 15 also shows how different disability groups are more likely to be affected by certain barriers than are others. For example, people with speaking disabilities as a group are more likely to encounter difficulties when moving around the airport than any other group; 9 percent of people with speaking disabilities cite this as a barrier. People with visual impairments are next most likely to experience this difficulty; 7 percent of this group identify this as a barrier.

Table 15 also illustrates that certain groups of disabled people will, overall, face more difficulties in using airport terminals than will other groups. Thus, it can be seen that of those disabled people who are long-distance transport users:

- 29 percent of people with speaking impairments face terminal-specific barriers;
- 19 percent of people with visual impairments face terminal-specific barriers;
- 11 percent of people with agility impairments face terminal-specific barriers;
- 13 percent of people with cognitive impairments face terminal-specific barriers; and
- 9 percent of people with mobility or hearing impairments face terminal-specific barriers.

This last finding would seem to have important planning implications, but it should also be noted that the two groups most likely to be affected by terminal barriers are also the two smallest groups of disabled persons who are part of the defined airport-disabled population.

TABLE 15 TYPES OF DIFFICULTIES ENCOUNTERED AT THE AIRPORT

	All	Mobility	Agility	Seeing	Hearing	Speaking	Other	Unknown
Getting to terminal	1	1	1	2	1	2	1	0
Moving around terminal	3	4	4	7	3	9	5	0
Hearing announcements	1	1	1	3	3	6	3	0
Seeing signs or notices	1	1	1	5	1	5	2	0
Using washroom facilites	0	0	0	1	0	1	1	0
Unsupportive staff	0	0	0	1	0	1	1	0
Percentage of all disabled travellers who face terminal barriers	7	9	11	19	9	29	13	0
Number of disabled travellers who face barriers in use of airports	1,382,400	843,264	691,200	190,771	425,77	966,355	342,835	99,532

People with speaking disabilities account for under 5 percent of this group, while people with seeing disabilities account for under 14 percent of the group.

Another important implication of this finding is that the groups of disabled people who are most likely to be affected by terminal barriers are not those who would conform to the general notion of a disabled person—that is, a person in a wheelchair. Not only do these results dispel that myth, but it is clear that there are a large number of "invisible" disabled people, such as the speaking-disabled, who proportionately face significant barriers in airport use. Certainly, airport design needs to cater to the needs of these less visible groups. However, the fact that these groups represent only a small proportion of the population who are disabled, but able to use long-distance transport, suggests a difficult trade-off: often those disabled people who experience the greatest difficulties in the use of airport facilities will also represent a very small proportion of the total potential disabled market for airport services.

Obviously the above analysis does not investigate the entire range of barriers faced by all disabled persons in the use of airports—it simply constitutes the set for which data is available. Figure 2 illustrates a broader range of barriers that may be encountered by disabled persons when using an airport terminal.

Barriers to Airport Use and their Impact on Air Travel

Clearly the importance in defining barriers to airport use by the disabled population lies in determining the extent to which these barriers actually limit the use of air travel. Table 16 shows that those people who have difficulty in using air transport are, on average, likely to take fewer air trips than those who experience no difficulties. It should be noted that this specific analysis includes all barriers to air travel (that is, terminal barriers and aircraft barriers). Thus this analysis cannot say that it is airport-specific barriers which are responsible alone for limiting long distance travel.

TABLE 16 IMPACT THAT DIFFICULTIES HAVE ON THE NUMBER OF AIR TRIPS TAKEN

Trips taken	Percentage who experience difficulty	Percentage who do not experience difficulty
0	88.9	79.3
1	9.0	15.8
2	1.4	4.2
3-5	0.3	0.6
6+	0.4	0.1
Total	100.0	100.0

Income as a Barrier to Airport Use

As a group, disabled people are on average more likely to have lower incomes than the general population. This relates largely to the lower incidence of employment amongst the group, and a greater consequent need to rely on some form of welfare assistance. This

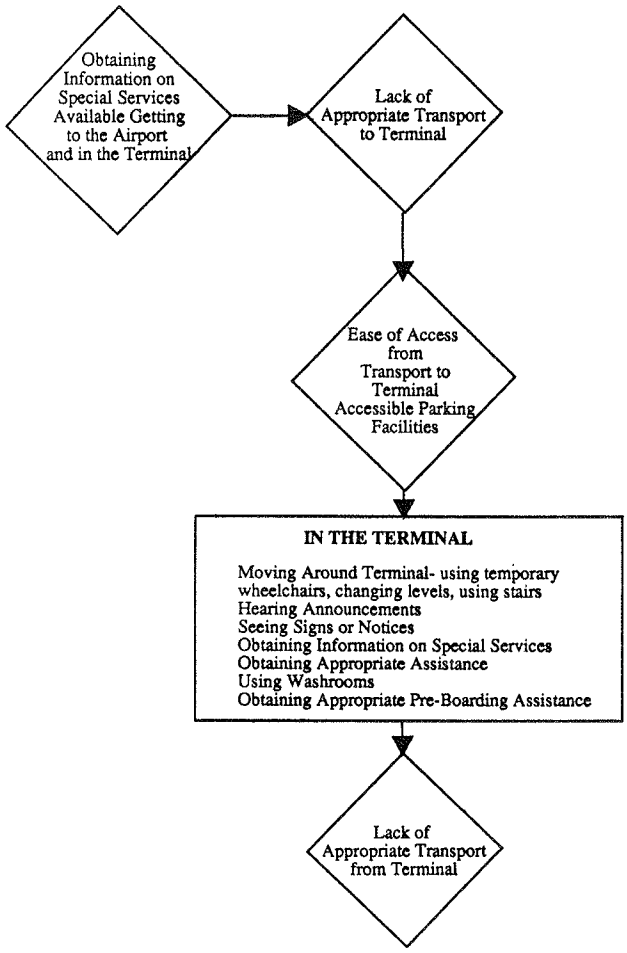

FIGURE 2 Airport barriers defined.

generalization is likely to be equally applicable to the U.S. population of disabled people as it is to the Canadian population, despite the differences in the socioeconomic characteristics of the two societies. However, given that there are significant differences between the economic profiles of the U.S. and Canadian general populations, it was decided that in this section of the paper the use of incidence rates would be inappropriate. Accordingly, the following table and analysis is all specific to Canadian populations, although general inferences about income as an effect on U.S. populations can certainly be drawn. Table 17 illustrates that 55 percent of all people who are disabled had individual annual incomes of less than $10,000. Approximately 70 percent of all disabled people had incomes of less than $15,000, (Note that Table 17 is expressed in Canadian dollars.)(4). This income pattern is also reflected in the level of air travel usage: of those with incomes less than $15,000 annually, approximately 90 percent did not take any air trips over the 3-month period measured.

In comparison, of those with incomes over $35,000, less than 80 percent took no trips. Similarly, of those with incomes under $15,000, no respondents took 3-5 air trips; in comparison, of those with incomes in excess of $35,000, approximately 4 percent took 3-5 trips in the 3-month period. These findings suggest that perhaps income is the greatest barrier of all to the use of airports by disabled people.

Special Needs of the Airport-Disabled

The special needs of airport disabled people have important planning implications. Data analysis suggests that only 3 percent of these disabled long-distance travellers identify a need for special services and facilities to assist them in their use of all modes of long-distance transport. This relatively low number is possibly an understatement of the true number who would benefit from the provision of special facilities. Certainly, if people are unaware of how certain facilities would aid in their use of transportation services, then they are unlikely to cite a need for the provision of that facility. Table 18 shows the breakdown across disability groups of those requiring special services to assist their use of long-distance transportation services. It is interesting to note here that the group of people most concerned with obtaining special services and facilities to assist their long-distance travel are people with speaking impairments. This finding supports later findings in this paper that in fact this group faces the most barriers in the use of airport services.

The inability to obtain useful information about the availability of special services and facilities for disabled persons can in itself constitute a barrier to travel. Of people who do require special services when travelling long distance, 25 percent could not easily access information about those services. This constitutes an unnecessary barrier to travel.

Disabled people often require attendants when travelling for long distances. Table 19 shows that 17 percent of disabled long-distance travellers require an attendant to assist them. The need for an attendant is greatest amongst people with speaking disabilities; almost half of this group require such assistance. People with seeing and cognitive impairments are the groups next most likely to require an attendant's assistance. It can also be seen from Table 20 that disabled people aged in excess of 65 years are more likely to require the services of an attendant than are any other age group.

TABLE 17 INCOME AS AN INFLUENCE ON AIR TRAVEL

Income	Percent of all disabled travellers	Number of air trips taken (percent) 0	1	2	3-5	6+
None	10	93	7	1	0	0
Up to 4,999	16	92	6	2	0	0
5,000-9,999	29	91	7	1	0	0
10,000-14,999	15	90	9	1	0	0
15,000-19,999	8	93	6	1	0	0
20,000-24,999	6	88	11	1	0	0
25,000-29,999	5	82	14	2	2	0
30,000-34,999	4	87	8	4	1	0
35,000+	7	79	11	5	4	1
Total	100					

TABLE 18 PERCENTAGE OF TRAVELLERS WITH DISABILITIES WHO HAVE SPECIAL NEEDS

Type	Percentage who need special services	Percentage who do not need need special services
All	3	97
Mobility	5	95
Agility	5	95
Seeing	6	94
Hearing	3	97
Speaking	9	91
Other	4	96
Unknown	1	99

TABLE 19 NEED FOR AN ATTENDANT WHEN TRAVELLING LONG DISTANCE (BY DISABILITY)

Type	Percentage who need attendant
All	17
Mobility	22
Agility	24
Seeing	37
Hearing	18
Speaking	46
Other	29
Unknown	6

TABLE 20 NEED FOR AN ATTENDANT WHEN TRAVELLING LONG DISTANCE (BY AGE)

Age	Percentage who need attendant
15-34	12
35-54	12
55-64	16
65+	25

MODEL OF THE AIRPORT-DISABLED POPULATION

The analysis completed in the paper thus far suggests that it would be useful to be able to model and quantify the airport-disabled population, as well as the impact that the availability of special services and facilities would have in extending the disabled market for airport services. The model developed in Figure 3 is a suggested framework for this further work. The model, which is largely self-explanatory, simply divides the total population who take long-distance trips (defined for the purposes of this study as trips of 80 km or more) into those who do travel by air and those who do not. The model then further subdivides these groups according to a range of functional criteria that establish their need for special equipment and services in the airport terminal. In this study, opportunities to extend the size of the current market for airport services to include more of the disabled and elderly population would derive from meeting the needs of two groups:

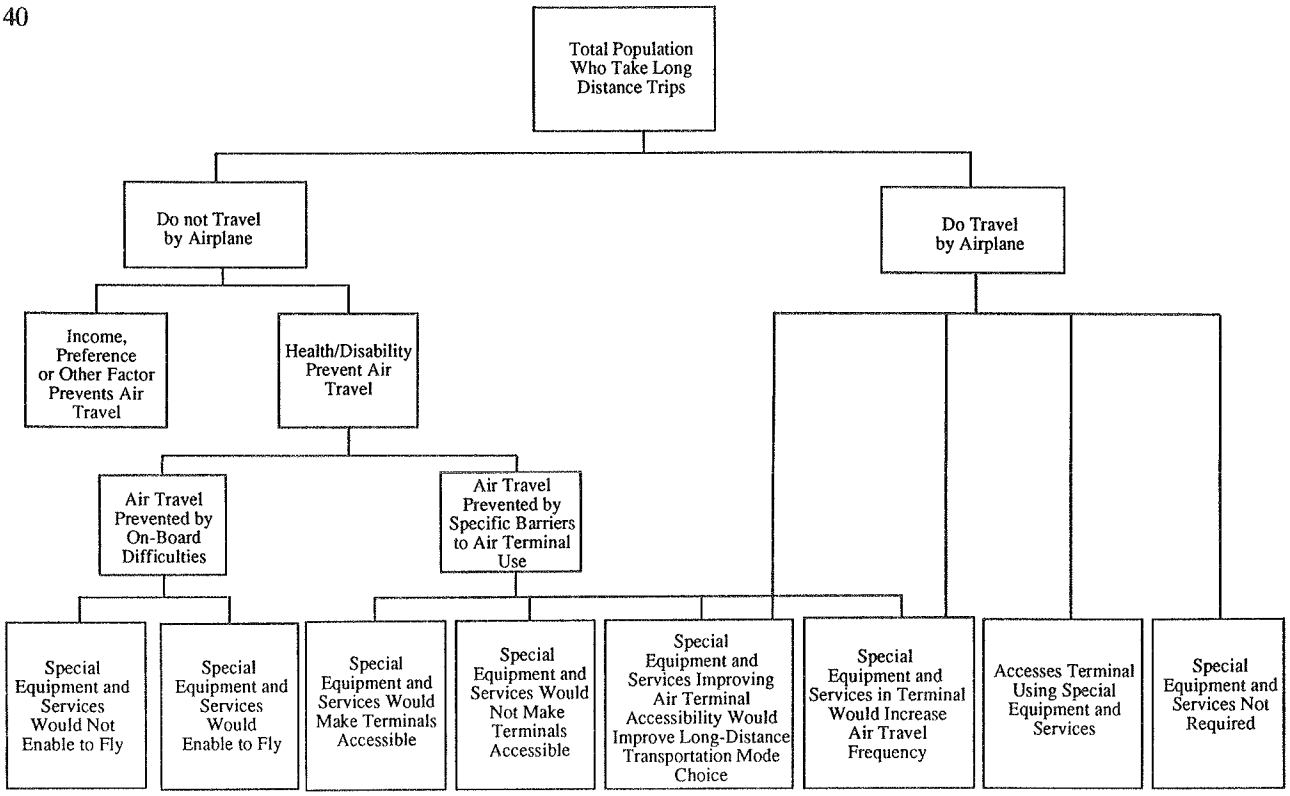

FIGURE 3 Defining the airport-disabled populations.

1. Those who do not currently travel by air due to their disability and related barriers to terminal use, but who could do so with the provision of special equipment and services; and
2. Those who would use air travel more frequently if special services were provided to make air terminals more accessible.

CONCLUSIONS

It is clear that despite the rapid growth evident in the U.S. air travel industry, the growth of the disabled persons' market is being limited by the existence of barriers at airport terminals. While available data resources cannot tell us the numbers of disabled people who would use air services with the removal of these barriers, we do know that a potential market of approximately 23 million people exists in the United States, and that a significant number of those people are limited in their use of air travel because of the existence of those barriers. An objective of further research would be to identify the percentage of that potential market for air travel services that is using air travel as a mode of long-distance transport. Of those who do not use air travel, it would be important to identify the extent to which surmountable barriers (such as those related to the design of the airport terminal) account for the failure to use air transport, as opposed to the extent to which more insurmountable barriers (such as income-related barriers) are responsible.

This paper suggests that the groups that are most likely to experience difficulties in using airport terminal services are amongst the smaller groups within the overall disabled population. This phenomena poses a challenge for Airport Authorities: whether available resources should be used firstly to deal with the barriers faced by the larger groups of disabled people, or whether they should be expended initially in assisting those groups which face the most severe limitations in airport use.

The paper identifies the major barriers to the use of airport services as being:

- Moving around the terminal;
- Hearing announcements in the terminal;
- Seeing signs and notices in the terminal;
- Getting to the terminal; and
- Accessing the washrooms at the terminal.

While this is clearly not an exhaustive list of terminal barriers faced by disabled people, it does constitute the full list for which data is available. Clearly, further research could extend this listing and further detail the

nature of barriers which the disabled public may face when using airport terminals. A closely related issue is the need to identify airports where facilities do already exist which are designed to ease some of the abovementioned barriers. Research is needed to identify successful models of facilities and services which do adequately meet the special needs of disabled groups in their use of airport facilities. Not only should the monitoring of such facilities provide important feedback, but further research is needed to identify the extent to which such facilities have succeeded in increasing the number of disabled persons who use those airports, or at least in increasing the ease with which disabled persons can use those airports.

Clearly, further research and a subsequent implementation strategy are required throughout the U.S. airport system if the aviation network as a whole is to be opened effectively to the disabled. This will only occur when the needs of a growing and heterogenous population of disabled and elderly people are met more adequately.

NOTES:

1. U.S. Department of Transportation National Survey.
2. D. Lewis and B. Smith, "Special Driving Needs: Definition, Market Size For Canada and The United States and Guidelines For Consumer Choice," proceedings of the Fourth International Conference on Mobility and Transport for Elderly and Disabled Persons, Canada, 1986.
3. U.S. Census statistics identify 88.5 percent of the total U.S. population as being over age 15.
4. As of May 1990, the $US equivalents of these Canadian incomes were approximately as follows:
   CAD $10,000 = US $8,440
   CAD $15,000 = US $12,660
   CAD $35,000 = US $29,540
5. The data presented in this section measures the special needs of all disabled long-distance travellers, but is thought to provide a useful indication of the special needs of people who are disabled specifically in the use of airports.

APPENDIX B
ACCESSIBILITY REQUIREMENTS AFFECTING RECIPIENTS OF FEDERAL AVIATION ADMINISTRATION FINANCIAL ASSISTANCE

Irene H. Mields, U.S. Federal Aviation Administration

BACKGROUND

Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), prohibits discrimination on the basis of handicap in any program receiving Federal assistance. On May 31, 1979, the Department of Transportation (DOT) published a Final Rule, effective July 2, 1979 (44 FR 31422), implementing Section 504. During the ensuing years, it became apparent to the Federal Aviation Administration (FAA), one of the major components of the DOT, that successful implementation of the regulations required a number of technical and substantive changes.

The technical changes were necessary to clarify the requirements. The substantive ones were needed to reflect (1) the experience gained since the effective date of the regulations, concerning the needs of persons with disabilities; (2) the relative abilities of various DOT recipients to meet these needs; and (3) new developments in the law.

An especially important legal development was the enactment of the Air Carrier Access Act (ACAA) of 1986, which prohibits discrimination by air carriers on the basis of handicap, consistent with the safe carriage of all passengers. On March 6, 1990, the DOT published a Final Rule (14 CFR Part 382) implementing the ACAA (55 FR 8008). It became effective April 5, 1990. At the same time, the DOT published for the FAA a Final Rule regulating exit row seating in air carriers of the United States (14 CFR Parts 121 and 135); an Advance Notice of Proposed Rulemaking (NPRM), asking for comments on issues related to the rulemaking to implement the ACAA (14 CFR Part 382); and, most relevant to this conference, a Final Rule amending a portion of the 1979 rule to implement Section 504 of the Rehabilitation Act (49 CFR Part 27).

All of these rules impact to a certain extent upon airport operators and owners. In addition, they are subject to the Architectural Barriers Act of 1973, as amended (42 U.S.C. 4141 *et seq.*). In addition, an NPRM published on February 9, 1990 (55 FR 4633), which would implement Section 794 of the Rehabilitation Act of 1973, as amended, concerning nondiscrimination in programs conducted *directly* by the DOT, has ramifications for some airport owners and operators, due to the presence of FAA facilities on their airports. The comment period closed just recently.

Last, but certainly not least, the courts have been extremely active in the area of transportation for persons with disabilities. A full discussion would go far beyond the 25 pages allotted to the presenters at this session, but you should be aware of at least the basic precepts established by the Supreme Court, and these will be covered herein.

KEY ISSUES

In the disabilities area, as in all other areas of civil rights law, certain questions occur—and very often reoccur—as the customs and mores of society develop; as technological changes occur; and as elected officials and key political appointments change. Sometimes the answers to these questions result in very marked philosophical swings. Sometimes the swings are moderate. If I had to characterize the 30 years since Title VI of the Civil Rights Act (42 U.S.C. 2000d *et seq.*) was passed I would say that, on balance, the path of progress in the civil rights requirements relating to Federal financial assistance has been down the middle of the road, following marked initial swings to greater rights for the group in question.

Persons with disabilities are relative newcomers in the process of asserting their needs and rights. The swing toward greater rights, therefore, still is very strong, with continuing controversy on the following key questions:

- Who are members of the protected group ("qualified handicapped persons")?
- What constitutes "reasonable accommodation"?
- Who must implement the requirements?
- Who covers the cost?

It is possible to detect, however, a balancing process in all of the regulations mentioned above and especially in the NPRM concerning amendments to 49 CFR Part 27, as it relates to federally assisted airports. The balancing process stems in large measure from two Supreme Court cases: *Southeastern Community College* v. *Davis* (442 U.S. 397, 1979) and *Alexander* v. *Choate* (469 U.S. 287, 1985).

Section 504 of the Rehabilitation Act of 1973, as amended (42 U.S.C. 794)

In *Southeastern*, the Supreme Court held that nondiscrimination on the basis of handicap does not require the imposition of undue financial and administrative burdens, nor does it require modifications that would result in a fundamental alteration of the nature of a program. In *Alexander*, the Supreme Court again examined the extent of accommodation required for persons with disabilities, finding that in *Southeastern* a balance was struck between "two powerful but countervailing considerations—the need to give effect to the statutory objectives and the desire to keep Section 504 within manageable bounds."

In *Southeastern*, the Supreme Court then went on to explain how this should be accomplished. It found the following:

1. Section 504 does not impose an affirmative action obligation on all recipients of Federal funds.
2. Failure to take affirmative action, however, might be tantamount to discrimination, through perpetuation of discriminatory past practices.
3. Failure to take affirmative action when programs could be opened up to handicapped persons "without imposing undue financial and administrative burdens on the State," (recipient) also might be tantamount to discrimination."

The FAA has made a concerted effort to understand the Supreme court cases and to give them effect in the new NPRM relating to airport access. That NPRM was issued by the Office of the Secretary of Transportation (OST), rather than by the FAA directly, but we have worked closely with OST in its development. During this discussion, you should keep clearly in mind that we are talking about Section 504 of the Rehabilitation Act and how it has been interpreted by the Courts. As of this writing, there are two bills in the Congress, S. 933 and H.R. 2273, each entitled the "Americans with Disabilities Act of 1990 (ADA)." Although neither bill deals with air transportation, each deals extensively with public and private transportation systems and with public accommodations which could impact upon airports, their contractors, and their concessionaires. These will be discussed further herein, following the review of the NPRM relating to Section 504. (The Americans with Disabilities Act of 1990 was enacted in July 1990—ed.)

The following would constitute key changes to Section 27.71, "Federal Aviation Administration—Airports" in Subpart D of 49 CFR Part 27, if the proposed amendment is adopted as a final rule:

1. *Questions concerning accessibility standards would be resolved.* Although recipients have been subject to the Uniform Federal Accessibility Standards (UFAS) since 1986 (51 FR 19017, May 23, 1986), Section 27.71(2) contains additional, somewhat confusing standards. Some of the additional standards were based upon erroneous notions concerning the needs of handicapped persons at airports. An example is the requirement that "Each airport ... ensure that there is sufficient teletypewriter (TTY) service to permit hearing-impaired persons to communicate readily with airline ticket agents and other personnel." Persons with disabilities are more apt to need a device to communicate with family or friends than to call airline ticket agents, who are seldom located on airports. Section 27.71(c)(4) would correct this problem, requiring at least one telecommunications device (TDD) in a clearly marked, readily accessible location, with airport signage clearly indicating the location, to enable persons with hearing impairments to make phone calls from the terminal.
   The NPRM also proposes an exemption procedure when compliance with the UFAS would be impracticable. Previously, exemptions were not available. The example given is that an exemption might be appropriate if the recipient would have to make extensive modifications to a terminal scheduled to be torn down in the near future upon the opening of a new, accessible terminal.
   Finally, the NPRM allows the use of a substantially equivalent standard—another indication of balancing and flexibility.
2. *Accessibility standards for terminal transportation systems (e.g., interterminal vans or buses, electric carts used for transportation within terminals, moving sidewalks) would be added.* Section 513(b) of the Airport and Airway Improvement Act of 1982, as amended, provides that projects may be allowable costs if they are "directly related to the movement of passengers and baggage in air commerce within the boundaries of the airport, including but not limited to, vehicles for the movement of passengers between terminal facilities or between terminal facilities and aircraft."
   As items covered by Federal financial assistance, there is no question, therefore, that vehicles such as buses and mobile lounges should be covered. Electric carts, on the other hand, are often owned by individual airlines and are used to transport their passengers only in the concourses in which the airlines are located. Coverage in the DOT regulation of these carts is an example of the Supreme Court's view that failure to take modest affirmative action may constitute discrimination.

Interestingly, buses and terminal vans are not presently covered under Section 27.71. During the initial promulgation of this section, there was some concern about covering vehicles that are not allowable costs for airport operators, such as buses going to parking lots, mass transit going to and from the airport, electric carts, etc. The basis for this was a line of court decisions that found that Federal agencies could not impose requirements upon recipients of Federal financial assistance that were not covered by that assistance.

The majority of the courts now support modest affirmative action, when not to engage in affirmative action would result in a discriminatory situation. Obviously, it would be discriminatory and an anomaly to prevent a person with a disability from leaving an accessible airport to go to an accessible aircraft, because the bus or van travelling between the two points is *not* accessible.

3. *There would be a provision that calls on airport operators to settle, in their contracts or leases with carriers, issues of who is responsible for compliance with accessibility requirements.* As the discussion of electric carts in the previous point illustrates, there will be times when control of the accessible item or structure is not directly in the hands of the airport owner or operator. In the regulation as it now stands, there is not a clear recognition of this. Instead, it is left to the airport owner/operator to solve any conflicts regarding responsibility.

   The task has been simplified in the Section 382.23, "Airport facilities," of the new regulations implementing the ACAA (14 CFR Part 382), mirror and place upon the airlines the same requirements that are placed upon airports, in regard to airport facilities under their respective control.

   In short, if an airline owns a terminal, it is subject, under the ACAA and 14 CFR Part 382, to the same requirements the airport operator/owner has under Section 504 and 49 CFR Part 27 in regard to a terminal it owns. The amendment to Part 27 would emphasize that responsibility must be accepted, divided, or shared, but cannot be avoided.

4. *Terminal transportation systems would be made accessible when "viewed as a whole."* DOT believes that under this standard, not every part of a facility or every vehicle need necessarily be accessible if the overall facility and service are accessible. This is not stated explicitly in the present rule. The proposed change is another example of the balancing that the Supreme Court discussed. This does not mean that under the proposed amendments to Part 27 you could expose persons with disabilities to unusual discomforts and inconvenience. It does mean, however, that a pragmatic approach to accessibility is envisioned.

   OST has asked the public to comment specifically on any cost or feasibility problems entailed by vehicle accessibility within the 3-year time frame of the proposal. Before the proposal was published, for example, an airport representative asked me whether it was necessary for all buses to be transformed into "kneeling" ones, when the cost of adding ramps to the buses was so much less. In this situation, the buses were quite low to the ground, and a detachable ramp worked well. My advice was to use the ramps. Not only did they work, but the lower cost enabled the airport to make a large number of existing buses accessible in a very short time. Depending on the views expressed in response to the NPRM, my answer might very well be different in the future. We will welcome your thoughts on the matter of how best to make airport transportation systems accessible.

5. *The proposed rule would cover "terminal facilities and services," including parking and ground transportation facilities, that are "owned, leased, or operated on any other basis . . . by an airport operator."* Here again, you have an example of permissible affirmative action, since parking lots are not allowable costs under the AAIA.

6. *The DOT seeks comment on whether, and to what extent, services and facilities provided by contractors or concessionaires also should be covered.* At present, the rule requires that the public areas leading to concessions be accessible, but it does not place requirements upon the concessionaires or contractors themselves. In a cafeteria, for example, there is no requirement that the food placement on the counters be low enough to enable someone in a wheelchair to self-serve. In a book store, there is no requirement that the aisles be wide enough to accommodate a wheelchair.

   In a variety of other regulations implementing statutes pertaining to the receipt of Federal financial assistance, concessions *are* covered as part of the airport operator/owner's airport program. In some situations, requirements also are placed directly upon the concessionaire or contractor. Under the regulations implementing Title VI or the Civil Rights act, for example, the nondiscrimination requirements "extend to any facility located wholly or in part" on the airport [49 CFR Section 21.3 (b)].

   Under the Disadvantaged Business Enterprise (DBE) (formerly the Minority Business Enterprise) regulations, recipients of DOT assistance must set

both contracting and concession goals for the participation of DBEs. In this process, non-DBE contractors and concessionaires can be required to set or meet goals for the participation of DBEs. In regard to federally assisted construction contracting, 49 CFR Part 23 is explicit on this point. In regard to the concessionaires, this has been the practice for several years. An NPRM published March 30, 1990 (55 FR 11964), would amend 49 CFR Part 23 and formalize this process [proposed Sections 23.97; 23.92 (b)(2); and 23.96 (a)(3)(4) and (5)].

As a subquestion, DOT asks whether coverage of concessions and contractors should be limited to those facilities and services directly related to transportation, like parking and terminal transportation systems. This was done in at least one FAA regulation in the past, 14 CFR Part 152, Subpart E, which implemented Section 30 of the Airport and Airway Development Act and then Section 520 of the Airport and Airway Improvement Act of 1982. In that regulation, affirmative action and nondiscrimination requirements relating to the provision of services and benefits and employment were levied upon only those organizations defined as "aviation-related activities": organizations providing goods or services to the public on the airport, the airport itself, or to other aviation-related activities on the airport. (While Section 520 was reenacted in the AAIA, as amended in 1987, no implementing regulations exist at present. The Office of Management and Budget failed to approve all the reporting requirements contained in Subpart E, so at present, Section 520 is considered to be a self-implementing nondiscrimination statute.)

7. *The proposal would require, under the authority of Section 504, that Essential Air Service (EAS) carriers comply with the requirements of Part 382 as a condition of receiving Federal financial assistance.* The preamble explains succinctly that in 1985, DOT inherited the EAS program from the former Civil Aeronautics Board (CAB). This program provides subsidies to some carriers—largely regional carriers—to provide service to small cities. The original CAB version of 14 CFR Part 382, which was issued under the authority of Section 504 of the Rehabilitation Act, covered the EAS carriers.

   Now, EAS carriers are covered under the new 14 CFR Part 382, issued under the authority of the ACAA, but given the demise of its predecessor Part 382, EAS carriers no longer are covered under regulations implementing Section 504. To close this gap, DOT proposes to cover EAS carriers under 49 CFR Part 27. The main reason for this is to reinstitute the sanctions which can be applied to recipients of Federal financial assistance, such as the cutoff or deferral of funding.

8. *The requirements of Section 27.71 would apply to terminal facilities and services even if the airport operator received Federal financial assistance only for other airport improvements.* This proposal reflects the long-standing view that the airport program encompasses the entire facility. A decision of the Supreme Court, *Grove City College* v. *Bell* (104 S. Ct. 1211, 1984) cast doubt on this point of view for a time. This held that civil right requirements which adhere due to the acceptance of Federal financial assistance must be "program specific"—i.e., they can apply only to the program actually receiving the money. *Grove City* was a Title IX, Education Act Amendments case, but Title VI of the Civil Rights Act, Section 504 of the Rehabilitation Act, and the Age Discrimination Act were also affected because all speak to "programs and activities." The Congress, however, took issue with the Supreme Court. On January 28, 1988, it passed, over a Presidential veto, the Civil Rights Restoration act of 1988, reinstating the previous interpretation that acceptance of Federal funds requires compliance by the entire entity and not just the portion directly affected by the funds.

9. *Outbound and inbound baggage facilities shall allow efficient baggage handling by qualified handicapped individuals.* This proposal also is an example of the balancing of interests. It would be economically and physically impossible to design a baggage facility that would allow retrieval of luggage regardless of the extent of the disability. Persons who can handle baggage despite their disability should not be subjected to barriers that would militate against self-help. The NPRM thus proposes that baggage facilities shall be designed and operated without unattended physical barriers, such as gates, that are inaccessible for individuals with handicaps.

Americans with Disabilities Act (ADA) of 1990

As previously stated, as of this writing, the Senate and House versions have not as yet been reconciled, and the President has not signed a bill into law (ADA enacted July 1990—ed.). If a law does emerge, it will have considerable impact on a wide range of governmental and private entities in the following areas:

1. Accommodations to employ persons with disabilities;
2. Provision of public services, including public transportation other than by aircraft;
3. Construction or alteration of facilities, including those related to public transportation other than by aircraft; and
4. Public accommodations, if the operations of such entities affect commerce, including a restaurant, bar, sales, or retail establishment; or a terminal, depot, or other station used for public transportation.

Airport operators/owners will recognize many of their concessionaires or contractors in the foregoing list, so whether or not these entities may be covered under Section 504 of the Rehabilitation Act may become a moot question.

Just as the Air Carrier Access Act filled a gap by covering air carriers that do not receive Federal financial assistance, the Americans with Disabilities Act would cover other entities that do not receive Federal financial assistance (as well as expanding the requirements placed upon entities that do receive Federal financial assistance for certain purposes).

It should be noted that in the House and Senate bills, privately owned transportation is covered only if it "affects commerce." "Commerce," in regard to transportation, is defined as transportation:

- Among the several States;
- Between any foreign country of any territory or possession and any State; or
- Between points in the same State but through another State or foreign country.

If this is to be taken literally, a private bus company operating between Washington, D.C., and Dulles Airport in Virginia would be covered, but a bus operating solely within Virginia would not, even though both were travelling to and from areas immediately adjacent to the airport. We will have to wait for the legislation as enacted and the Committee reports to understand the full ramifications.

The Architectural Barriers Act (ABA) (42 U.S.C. 4151 *et seq.*)

The ABA, to some extent, overlaps Section 504, since program and employment accessibility often depend on architectural or physical accessibility. Section 4151 states:

"As used in this chapter, the term building means any building or facility...the intended use for which either will require that such building or facility be accessible to the public, or may require that such building or facility be accessible to the public, or may result in the employment or residence therein of physically handicapped persons, which building or facility is --

(1) to be constructed or altered by or on behalf of the United States;
(2) to be leased in whole or in part by the United States after August 12, 1968;
(3) to be financed in whole or in part by a grant or a loan made by the United States after August 12, 1968, if such building or facility is subject to standards for design, construction, or alteration issued under authority of the law authorizing such grant or loan..."

As you can see, the ABA reaches both federally assisted and Federal building or buildings used for Federal activities. As airport operators and owners, you may have both types on your facilities—a terminal, for example, built with the assistance of Federal funds, and such installations as the air traffic control towers, a Flight Standards District Office (FSDO), General Aviation District Offices (GADOs), etc.

Exit Row Seating Rule, 14 CFR Parts 121 and 135

In closing, I will mention briefly the Exit Row Seating Final Rule, which is published in the Federal Register package you received from me. Although this is an FAA rule, rather than one published by the Office of the Secretary, it was included in this package because it relates to the Air Carrier Access Act rule.

During the regulatory negotiation to implement the ACAA, the participating groups representing persons with disabilities, the industry groups, and the Government were unable to reach agreement on the exit row seating issue. Accordingly, the OST formulated its own proposal on exit row seating (53 FR 23574, June 22, 1988). In it, OST took cognizance of the safety implications of exit row seating by proposing that carriers be prohibited from excluding persons from any seat on the basis of handicap, except in order to comply with an FAA safety rule.

On March 6, 1990, the FAA did publish a safety rule to regulate exit row seating (55 FR 8054). In brief, it will result in some persons being seated in seats other than those in exit rows, based on the application of neutral,

functional criteria. The criteria relate to the responsibilities that might fall to an exit row occupant during an emergency evacuation, such as assessing outside conditions, locating and opening the door, deploying the slide, removing and stowing an over-the-wing-exit, and others.

Exit row seating restrictions apply not only to persons with disabilities, but to parents with children; children under the age of 15; obese persons; elderly persons who are frail; persons who cannot understand or speak the English language; and pregnant women. Under the new rule, exit rows will contain special passenger information cards which:

1. Contain the criteria for exit row seating;
2. Explain the functions that may have to be performed; and
3. Ask, in the languages ordinarily used by the air carrier on its cards, that persons who do not meet the criteria or who cannot or do not wish to perform the functions, identify themselves so they can be moved to another seat.

The rule does not deny air carriage. Persons who are seated erroneously in an exit row must be reseated. Persons who do not wish to sit in an exit row must be reseated. On-demand air taxis that have nine or fewer passenger seats are exempt from the rule. The purpose of a charter flight very well may be to carry a person whose disabilities make other commercial flights unavailable. An example of the latter would be a small commuter plane in which the only space for a person with a leg cast would be in the row adjacent to the door.

RESEARCH NEEDED

As the preceding indicates, the FAA has made a concerted effort to prevent the denial of air transportation, while maximizing safety through its exit row seating policies. It is possible, however, that in some instances a person will have to turn to a charter flight to obtain air transportation. We are dealing with the reality of the space available in small commuters. Aisles are narrow, leg room is limited, manoeuvrability almost nil within the aircraft. A wheelchair occupant, especially a tall or heavy person, may have considerable difficulty in reaching a row beyond the initial one that is closest to the exit and thus not available under the rule.

As a result, the FAA embarked on a cooperative project with the Paralyzed Veterans of America (PVA), the Regional Airline Association (RAA), and the American Association of Airport Executives (AAAE) to develop a boarding chair that would be satisfactory.

At present, the FAA is working with a Canadian company, Mid-Canada. Its mandate is to produce a design that will enable movement of the passenger from the wheelchair to at least the third row from the entry. Realistically, the severe dimensional restrictions may preclude total success. The FAA calculates that some women may have more difficulty in being accommodated due to the severe dimensional restrictions of the aisles. Women, as a group, tend to have wider hips than men. Large, heavy men, of course, also will have a problem.

We often hear that the real answer lies in the elimination of seats of rows. That, of course, is an economic question. Fewer seats and rows mean higher fares that would impact on persons with disabilities as well as on other passengers. Since few airlines have a wide margin of profit, it also could mean the loss of service to some communities. Nothing occurs in a vacuum, and these are factors that *are* considered by someone (the airlines, the Congress, the Office of Management and Budget, state and local elected officials, the public, etc.), whether or not one thinks they should be.

In the course of writing the exit row rule, we also heard that the FAA should have written it in accordance with the airworthiness standard, rather than in accordance with the crashworthiness standard. Under the first, you weigh the probabilities. You build a plane that will fly the height and distance you have in mind on the theory that it will not crash. You must deal with probabilities—otherwise you would have to produce a craft so heavy that it never would get off the ground.

Under the crashworthiness standard, you presume that a crash has occurred. FAA's mandate, shared under the Federal Aviation act by the airlines, is to take all reasonable steps to ensure that as many persons as possible survive that crash. Seatbelts, baggage stowage, fire-blocking layers in seats, floor-level lighting, fire extinguishers in lavatories and cargo compartments, maximum distance restrictions between exits, and exit row seating—all these are examples of requirements that affect the ability of passengers to survive.

In view of this, our research project is of vital interest to us, since it will maximize accommodation at the same time that our interest in safety is preserved.

SUMMARY

As you can see, there exist at present three major statutes that affect accessibility on your airport in very marked ways: Section 504 of the Rehabilitation Act, the Architectural and Transportation Barriers Act, and the Air Carrier Access Act. In addition, there are a host of

single-purpose statutes, such as the FAA exit row seating rule, that also impact upon passengers with disabilities. Finally, there is prospective legislation that may be far-reaching and which may make some of your current efforts obsolete.

Although this welter of new and existing requirements may seem undecipherable, the situation today actually is much less confusing than it was in the past. For one thing, you probably have a much better understanding of what persons with disabilities want and need. The same holds true for Federal agencies. Second, what appeared unusual or even unrealistic now has begun to seem natural. You are becoming sensitized, and so are we. Finally, your presence here today signals your readiness to take action. If you're uncertain where to begin, look to your individual communities, as well as to your legal counsel. The community is almost certain to contain a number of groups, representing persons with disabilities, who will welcome your interest.

APPENDIX C
THE AIRPORT AS AN ACCESSIBLE FACILITY: THE USER'S VIEW

James Bostrom, Ruth Hall Lusher, and Ronald Mace, FAIA

OVERVIEW

Of the million who pass through airports each day perhaps a majority have some type of disability or have a close friend, colleague, or family member who is disabled. People with disabilities are like "everyone." They are of all ages and occupations. They have families, children, and business associates. They travel for business and pleasure. They travel alone or with others who may or may not have a disability of their own. And, most important, they are people with the same time constraints as other travellers—one flies because it is fast. Travellers with disabilities want and demand access to the same services, conveniences, and facilities provided to "everyone."

A brief look at statistics as well as the issue at hand will illustrate that virtually "everyone" will have a disability of limitation at some point in his or her life. (It is also important to remember that disability itself is not a medical issue. Although a particular disability may be the result of a medical condition or may have a medical condition associated with it, the disability per se has nothing to do with "illness.") A 1986 study by the Bureau of the Census concluded that of the noninstitutionalized adult population, approximately one-fifth had a functional limitation(*1*). The proportion of people with functional limitations varied by age and ranged from a low of one-twentieth of those aged 15-24 who are entering the job market, to one-seventh of those aged 35-44 who are often at the peak of their careers, to more than one-third of those aged 55-64 who may be nearing retirement. And finally, more than one-half of those aged 70-74 and almost three-quarters of those 75 years and older have functional limitations.

These numbers do not include others who also benefit from many "accessibility" features in airports or other buildings: children who benefit from the lowered drinking fountain and bathroom dispensers, parents who often push their children around in strollers, people with temporary impairments, the families or friends of people with disabilities, and almost anyone who goes to an airport with lots of luggage. It is therefore realistically stated that in providing "access" at the airport, we can accommodate everyone.

The most compelling reasons for creating universally usable airports are the human needs of people—all people—as they travel. There are clearly large numbers of people who do now and who will in the future, benefit from accessible features in airports. The features needed are for the most part well known, easy to provide, unobtrusive, and usable by everyone.

The market and the technology exist. What is missing often is a positive attitude, an understanding of related policy implications, and a commitment to apply the technology universally.

If the market factors are not a driving force, access legislation is. There are laws that mandate a certain degree of accessibility in airports. Early laws emphasized technical requirements for building accessibility whereas more recently enacted legislation has stipulated access to programs and has mandated nondiscrimination. Combined, the existing legislation applicable to airports can require fairly extensive accessibility in the facilities, services, and policies of airports.

The Architectural Barriers Act of 1968 and amendments require that buildings designed, constructed, altered, or leased with Federal funds meet minimum accessibility standards. Airports can fall into this category. Section 504 of the Rehabilitation Act of 1973 requires all programs that receive any form of Federal assistance to be accessible to everyone. Federal assistance for runways, tarmac, and other facilities requires altered and newly constructed terminals, whether or not they are directly funded with Federal money, to conform to minimum standards for accessibility. Providing accessibility in existing facilities is also one way to create "program accessibility."

The Air Carriers Act of 1986 requires airlines to provide nondiscriminatory services to persons with disabilities. Recently issued regulations will establish uniform policies and procedures for all airlines and, under some circumstances, require airlines to conform to minimum accessibility standards for facilities over which they have design control. The Public Accommodations requirements of the pending Americans with Disabilities Act of 1990 (enacted July 1990—ed.) will require that most businesses and public services in airports provide services to all people with disabilities. Thus, restaurants, shops, banking machines, vending machines and similar facilities will have to become usable by everyone. Together, these laws clearly lead toward a universally usable environment.

AIRPORT ACCESSIBILITY ISSUES FROM THE USER'S VIEW

There are four broad types of disabilities: mobility impairment, visual impairment, hearing or auditory impairment, and cognitive disabilities. The following section identifies key problems encountered and accessibility concerns of people whose disabilities fall into these broad categories. This section is illustrated with anecdotes of actual experiences of people with disabilities who travel frequently for employment reasons and is written with the attitude that independent access and freedom of choice are as essential for people with disabilities as they are for everyone.

Each person, with or without a disability, has a unique perspective but shares common problems in attempting to travel by air. For example, while people who drive to the airport must be able to find a parking space, people who need accessible parking must be able to find an accessible parking space. They may also need to drop off their luggage, then park their car and return to check-in to receive papers for their power wheelchair.

Facility accessibility is further complicated by policy decisions made by airports and the airlines themselves. The following section briefly discusses key problems/ accessibility issues and a few related policy issues from ground side to aircraft.

Accessible Parking

While most everyone recognizes that accessible parking is essential, the stories about parking problems abound. People arrive at the airport and drive around and around in search of an accessible space only to find one located a great distance from their airline. Or you arrive at the airport to find that the spaces you usually use are now marked "one hour only." Or you find a marked accessible space that is too narrow to allow you to get out of your car. Or you arrive at satellite parking only to find there is no accessible transportation or no way to call the accessible shuttle van. Then, dropping off the luggage at the curb side check-in, you find you have to circle the airport to return to parking. These experiences raise the following questions:

- Are accessible spaces available adjacent to accessible routes leading to each airline ticket area?
- Is there signage providing direction to accessible parking?
- Are the spaces appropriately designed according to the standards?
- Are they connected to entrances with accessible routes?
- Do satellite lots have accessible parking?
- Is an accessible, lift-equipped shuttle van available during all hours the airport is in operation?
- How can travellers make arrangements?
- Can people who choose to do so drop luggage off and still access parking without having to circle the airport?
- Are parking information numbers published where people can get more information about parking?
- Are these numbers accessible on TDD?

Curbside Check-in

Curbside check-in can be beneficial for everyone if long lines and luggage do not obstruct access and the flow of travellers into the terminal and if airline policy facilitates use by users of motorized wheelchairs or mobility-impaired or visually impaired persons who may need assistance to the gate. Some travellers have waited in

line curbside, waited in line at security, and waited in line at the gate, only find out that certification of batteries and paperwork for motorized wheelchairs can be provided only by the front ticket agents. These experiences raise the following questions:

- Is there ample space so that queues do not obstruct access?
- Do airline policies allow for curbside check-in for users of motorized wheelchairs?
- If airline policies preclude check-in of motorized carts and wheelchairs at curbside, have skycaps been trained to assist wheelchair users with their luggage inside to ticket agents to obtain appropriate papers for transporting batteries?
- Is assistance to the gate provided when requested?

Entrances

Automatic sliding doors, which are common at airports, provide the best and easiest access for everyone. They provide the widest opening and do not swing into the path of travel. While the large three-wing revolving doors can provide access, they are difficult for many to use. They often move too fast and cannot be stopped. Swinging and double doors slow traffic and can cause crowding and must be protected on edges to assure safety. Edge/side protection narrows the traffic flow. These experiences raise the following questions:

- Are entrance doors automatic?
- Do they meet the requirements of accessibility standards?

Ticket Lines/Check-In

Problems are often encountered in check-in and ticket lines. Corrals for queues may not provide sufficient width for wheelchair and luggage. Adequate space may not be available at the counter to allow check-in of wheelchair users as well as passage width for other passengers. Counters are often too high to facilitate communication between ticket agents and travellers using wheelchairs or those of short stature. Personal assistance may not be offered, or it may be forced on travellers with visual impairments or mobility impairments even when not requested. One visually impaired traveller who makes the same trip from the same airline, same gate, on a regular basis reports that the airline will not let him leave the ticket counter without an escort. These experiences raise the following questions:

- Is adequate space provided for wheelchair users and their bags in corrals and at ticket counter?
- Are ticket counter heights within the reach of wheelchair users?
- Is there a lower area for use in signing credit slips or forms?
- Is assistance to gate provided upon request, but not required by the airline for those wishing to progress independently?

Accessible Route to the Gate

Level Changes

When level changes are necessary, it is essential that the elevator be easily located and accessible for independent operation. There is nothing as frustrating as being in a hurry to catch a flight and seeing the escalator but being unable to find the elevator. These experiences raise the following questions:

- Is the elevator easily located or is it tucked around a corner into a corridor without good signage?
- Does it provide for independent use, i.e. comply with accessibility requirements for space, controls, signage, and for audible and visual cues?

Distance

Wheeling or walking long distances can be difficult or impossible for many people. Various methods can be used to provide assistance in traversing distances: electric carts, personal assistance, moving sidewalks, people-movers or automated guideway transit, and mobile lounges (as at Dulles International Airport). Hard-surfaced pathways down carpeted corridors can make it easier for wheelchair users to wheel themselves to the gate as well as provide a wayfinding cue for people with visual impairments.

Not all methods are equally useful for everyone. For example, most wheelchair users and some ambulatory mobility-impaired travellers cannot use common electric carts. Many of the moving sidewalks have signs posted prohibiting use by wheelchairs. Many walkways have slopes that exceed allowable ramp slopes defined in the standards and do not meet other access requirements such as level areas every 30 feet, handrails on both sides, etc. These experiences raise the following questions:

- Do pathways to gates promote independent travel?
- Do these pathways meet accessibility requirements contained in the standards?

- Do people movers and mobile lounges provide accessibility and both audible and visual cues?
- Can moving walks be used by wheelchair users?
- Are there alternatives to electric carts for access to gates?
- Is personal assistance to the gate available upon request?
- Are wheelchair users free to choose to use their own chair to the access gate?
- Can ticket agents provide directions and a realistic estimate of the distance to the gate to facilitate choice?

Security

Although every airline passenger recognizes the need for security, virtually no one appreciates the traffic tie-ups, delays, and fuss associated with it. People with disabilities continue to encounter great difficulties as well as embarrassment. Access through security can mean tables have to be moved out of the way. People are asked if they can leave their wheelchairs or walk or stand without assistance. Hand checks of a person's body are becoming more common. Privacy is not provided. People with disabilities have been told they had to be escorted to the gate beyond security, and that they must wait for an escort. Security officers have even drawn guns when such directives were ignored. Clearly this is one area that needs attention. These experiences raise the following questions:

- Does the security area have gates designed to permit wheelchair access without sounding the alarm or moving tables?
- Are security personnel trained to be sensitive to and respectful of the privacy needs of people with disabilities?

Restrooms and Drinking Fountains

An unfortunate holdover from earlier standards is the idea that a minimum of one accessible feature is acceptable. Nowhere is this more of a problem that at airports. Passengers who arrive at the gate often travel a great distance only to find that the one accessible restroom or drinking fountain is back on the other side of security. All restrooms and drinking fountains should provide for accessibility. Accessible restrooms should provide at a minimum one standard (5'x 5') accessible stall with properly placed grab bars, an accessible lavatory, and easily reached dispensers. A three foot wide stall with grab bars on each side will better accommodate ambulatory people with mobility impairments. A common problem in restrooms is poor design, which forces people to walk or wheel between the lavatory and paper towel dispensers or blow dryers, a great difficulty for wheelchair or crutch users. Maintenance is also a problem. Wet floors can be extremely hazardous for everyone but especially so for people who walk with crutches.

Other problems exist in the fit between some airport wheelchairs and the ability to use the restroom independently. Not only do airports frequently purchase chairs without wheelrims, but travellers being escorted from one flight to another at a hub airport are shocked to find that the airport wheelchair, fitted with a tall antitheft device, will not fit into the accessible stall.

A further need exists for a private toilet room facility where a person with a disability can receive assistance of a person of the opposite sex, have enough space to take a medication, or to straighten one's clothing in privacy, similar to the nursery areas provided at many airports.

Restrooms are areas that lend themselves to the development of universal products to save energy and water while providing a high level of accessibility. Hand dryers and lavatory faucets are now available that turn on and off automatically when hands are placed under dryer or faucet. These experiences raise the following questions:

- Does restroom design and airport equipment promote independent and accessible use of the facilities?
- Do toilet rooms provide three foot wide toilet stalls with grab bars on both sides in addition to the five foot wide standard stall?
- Are toilet rooms well designed and maintained to reduce or eliminate wet floors?
- Are unisex toilet/medication areas available where someone can receive assistance from a family member of the opposite sex?

Concession and Services

It seems everyone needs to pick up that last-minute gift or to stop by a concession for a snack. But getting a wheelchair into some of the tiny gift shops at airports is often impossible. Small self-service concessions may not have staff to provide assistance to those who can't carry trays to a table. And frequently tables are at a height appropriate only for a standing person. If seats are provided at all, they are high stools. Bars and restaurants commonly have the great majority of seating raised a step or two above the floor, or fixed seating that does

not allow wheelchair access. The scoping provisions in accessibility codes often do not preclude inaccessible dining areas. Counters at candy stores and other concessions are often too high and piled up with additional goods that making it difficult for even a standing person to receive his or her purchase from the clerk. It is interesting to note that in the airports visited recently, insurance desks seem to be the only ones consistently placed at a level accessible to everyone. Cash machines and car rental desks also need to be accessible. These experiences raise the following questions:

- Do concessions provide adequate space and maneuvering room for independent access?
- Do they provide accessible seating areas?
- Do concessions provide assistance to people who need help carrying trays to their tables?
- Are cash machines and car rental desks accessible to wheelchair users?
- Are direct line phones to taxi companies, car rental companies, and hotels accessible to users of wheelchairs and equipped with volume controls?

Signage and Communications

Airports are complex and often confusing facilities, especially for travellers who are unfamiliar with the facility. People read signage in different ways: some people must read signs at a distance, others at close proximity (within inches), others read signage using raised letters or braille and others must use auditory signage. Good directional signage is essential for everyone. Words as well as pictograms are important since many people have difficulty in interpreting pictograms. The accessibility standards call for high-contrast lettering with plain sans serif characters for assisting in readability. The issues of character size and viewing distance have not been resolved. Permanent rooms and spaces should also have raised/tactile signage placed at 54 to 60 inches above the floor on the latch side of the door.

Telephones are essential communication devices. They are needed by everyone, including travellers who use wheelchairs or hearing aids or who need increased volume. A universally designed pay phone is currently available that provides a volume control as part of every unit and can be installed to be accessible to everyone. Pay phone TDDs are also available and essential to people who are deaf or speech impaired, who need to communicate with deaf family members or colleagues, or who have other communication difficulties.

Flight and gate information and changes are generally provided only in a visual or an auditory format. Visually and hearing-impaired travellers will have great difficulty in obtaining information provided in the format inaccessible to them. It is therefore essential that critical information, such as last-minute gate changes, be provided visually as well as through auditory announcements. Stories abound about the deaf traveller who went to the appropriate gate only to miss the plane, which came in at a different gate on another concourse. Of course, the deaf traveller was told "we made several announcements on the PA system." Baltimore-Washington International (BWI) airport has recently installed information monitors to provide paging and other information for deaf travellers. Of course, directional and informational signage telling deaf travellers of these devices, their location, and the location of the pay phone TDDs is essential if the deaf community is to make use of these devices. Likewise, where not all toilet or other facilities are accessible, the use of directional signage and the use of the access symbol on facilities that are accessible is essential. These experiences raise the following questions:

- Is adequate directional signage provided?
- Does it have words as well as pictograms?
- Are letters plain sans serif characters?
- Do words and pictograms have a high contrast with the sign background?
- Is at least one telephone in each bank accessible to wheelchair users?
- Does at least one telephone in each bank have a volume control?
- Are all telephones hearing aid compatible?
- Are pay phone TDDs available?
- Are information monitors provided?
- Is informational as well as directional signage to TDDs and monitors provided?
- Is critical information (e.g., last-minute gate change, etc.) provided visually as well as through auditory announcements?

Gate Access

More than any other single feature, the modern day boarding ramps or bridges, designed to make access easy for everyone, have made it possible and even easy for people with severe mobility impairments to reach the aircraft. It is therefore particularly frustrating to encounter serious problems. Some boarding ramps are designed to incorporate steps midway down the ramp. Another encountered by the authors had two steps

immediately inside the door to the ramp. Steps immediately inside a door are hazardous to everyone and are in violation of most building codes. This unfortunate situation is in an airport constructed within the last five years.

Many older airports like Washington National Airport and small commuter airports have at least a few gates which don't allow for level boarding. In such situations, airlines often resort to carrying boarding chairs up the steps or using stair climbing devices. Both methods are inherently unsafe and unsettling to passengers. Yet while passengers are being hoisted up stairs strapped to a chair, food and beverage carts and the caterers' personnel are being raised to cabin level on an enclosed hydraulic lift truck. It seems that as much could be done for the passenger.

Other ramps installed for jumbo jets (but often used on smaller jets) result in steep slopes in excess of those allowed for accessibility. At times they are so steep that wheelchair-using travellers and escorts virtually slide down to the jet door.

"Handicapped" seating is often reserved by placing the international symbol for accessibility on a few seats inside the door to the jet gate. Why not identify and reserve a small seating area for families with children, children travelling alone, or older people, as well as people with disabilities; or simply all people who may need assistance boarding and are usually preboarded by airline personnel?

Elevators or dumbwaiters large enough to take power wheelchairs, three-wheel motorized scooters, and luggage should be located conveniently near gates to facilitate the movement to and stowage of these devices in the airplane after use by the traveller. At many airports, these expensive mobility aids are dragged down the narrow stairs of the jet gate, a procedure which is unsafe and which often leads to damage of the device. These experiences raise the following questions:

- Are jet boarding ramps provided?
- Are they free of steps and steep slopes?
- Is a seating area, not labelled "handicapped," provided for those who may need assistance or who preboard the plane?
- Are elevators or dumbwaiters large enough to accommodate motorized wheelchairs and luggage located conveniently near the gate?

The Challenge of Connecting Flights at Hub Airports

The increased use of the hub-and-spoke concept by the airlines has resulted in a growing number of connecting flights with fewer direct flights to any chosen destination. Given the inevitable late arrival of flights, connections can become harrowing. People with disabilities and older people are often the last off a flight and often must rely on assistance to get to their connecting flight. Wheelchair users may also need to stop at accessible restroom facilities between flights if they are not available on the airplane. Prompt deplaning is therefore essential if connections are to be made on time. (Virtually all toilets on aircraft are inaccessible.) Of course, the first priority is that wheelchairs and needed escorts arrive promptly upon landing.

Intraterminal Travel

The tales told by travellers are troubling. Older people, children, and wheelchair users have been taken to holding areas where their tickets are taken away from them. They are parked in wheelchairs which preclude independent use, told to transfer into a stationary chair, told they can't go to the bathroom without escort, or simply that they have to wait. Surely independent mobility, where possible, would be a better way. Wheelchairs should have hand rims that allow independent operation and assistance should be provided only when requested, not forced upon people made helpless by the airlines' equipment choices. These experiences raise the following questions:

- How is travel to the connection flight facilitated?
- Is equipment and personnel assistance/escort service readily available?
- If electric carts are used, will they accommodate wheelchairs?
- Do wheelchairs allow independent use or restroom facilities and, if requested, independent movement to the connection flight?

Interterminal Travel

Some larger new airports have "people movers," which are generally accessible. But, more often, interterminal transportation is accomplished by shuttle buses, few of which are accessible. Frequently, airlines may operate one lift-equipped van which must serve all the airline passengers unable to use the shuttle buses. Waiting times can be long. These experiences raise the following questions:

- Is there an accessible means of transport to other terminals?
- Must the traveller call to make arrangements?
- How many vehicles are available and, realistically, how much time will it take?

Arrival and Baggage Claim

Many airlines will bring passengers' wheelchairs to the boarding ramp area. Whether motorized wheelchairs or three-wheel carts can be brought up to the gate is frequently dependent upon how close to the gate an elevator or dumbwaiter is located to raise the device up to the boarding gate level. Where this service is not available, the passenger must be transported to the baggage claim area where the wheelchair and luggage can be claimed. The wheelchair is usually brought to the "large item door" where assembly is often necessary for powered chairs. Often, reassembly results in damage to sensitive electronics. These experiences raise the following questions:

- Will the airline bring the travellers' motorized wheelchair or cart up to the boarding gate area?
- If not, is transportation to the luggage area provided?
- Is assistance provided to reassemble the travellers' wheelchair?

Ground Transportation

Airports generally provide several types of ground transportation services including limousines, taxis, and shared-ride shuttle vans. Some wheelchair users can use the limousine or taxi service. Those areas where services are provided must be accessible. Some of the shared-ride shuttle bus services also have accessible vans, but these services frequently require 24-hour advance notice, and there is rarely any advance information given to the traveller flying in. These experiences raise the following questions:

- Do taxi companies or the shuttle vans provide lift-equipped service?
- Must travellers call in advance to reserve the service?
- How will travellers find out about this requirement?
- Is the local mass transit system accessible?
- How do travellers find it?

SUMMARY AND RESEARCH RECOMMENDATIONS

Throughout the world, there are hundreds of standards, both design and performance, used in planning, designing, and constructing facilities including airports. Some of the standards address designing for travellers with disabilities in great detail while others are more general. Standards are intended to be relatively simple, straightforward, and cover the most common cases. Of necessity, standards deal with elements, leaving the overall design and integration and combination individual elements to the architect or designer. Since airports are complex, with specialized facilities not specifically addressed in general type accessibility standards (such as ANSI A117.1, Standard for Buildings and Facilities Providing Accessibility and Usability for Physically Handicapped Persons), the designer must be especially sensitive and thoughtful in applying provisions. Moreover, these provisions for airport design must be applied consistently throughout the country (one has the right to expect that the features available in California will also be available in Texas, Massachusetts, North Dakota, or Virginia).

Accessibility to facilities and services must be provided regardless of the type of airport (feeder, hub, or destination). Time plays a major role. For example, if you have 30 minutes to change planes and must use the toilet, get something to eat, or make a telephone call, you must have facilities to support these needs.

Most airport authorities and designers are sensitive to providing the features mandated and meeting minimum accessibility standards or the notion of a "few special features for a few who must travel on an occasional basis." They often have no idea that:

1. The scope of the minimum standards is too limited.
2. The features specified are not always the best. Example: the water cooler specification is awkward for everyone.
3. Some choices in the standards should not be choices. Example: wide versus narrow toilet stall. Stalls provided should not be one or the other but both, especially in a facility like an airport where people who benefit from both will be passing through the facility every day.
4. There are features needed that are not in the standards. Examples: a place to adjust clothing or do necessary treatments or medical procedures in private and clean surroundings; verbal annunciators for information at selected points or multimodal information systems.
5. There are products available that are helpful and useful for all, and some that are not yet available but badly needed. Examples of available and useful products include interactive electronic information systems, computer controlled and used with audio; and faucets and hand dryers that are controlled by the mere presence of a hand. Examples of needed products: electric service carts capable of carrying

people who cannot climb aboard (no steps, elevated floors, or seats); visual paging and announcement systems. Only airport operators and designers can create a demand for these products.

Needed Research

It is the consensus of the authors that the application of new and emerging technologies and universal design principles is more important to airport accessibility than additional research at this time. In this vein, the following recommendations are made.

1. A careful study should be made of airport facilities built in the last ten years using modern accessibility standards. The evaluations should be made by multidisciplinary teams involving airport operators, designers, researchers, airline personnel, and people with disabilities who have extensive travel experience. The goal for this research is to identify what works and what doesn't in providing accessibility to airports, to identify where the standards fall short and what solutions work best in providing services, and to identify what solutions work best at different types of airports.
2. Convene a structured, design-focused, consensus conference with the same cross-disciplinary group and universal designers. This group would use the information gathered from the above study along with other information. The goal would be to achieve agreement on the kinds and types of features and equipment that would improve airport use. The involvement of all user groups is essential to this effort.

NOTE:

1. A Disability, Functional Limitation, and Health Insurance Coverage: 1984/85, U.S. Department of Commerce, Bureau of the Census, 1986.

APPENDIX D
PROVISIONS FOR DISABLED AND ELDERLY IN AIRPORT AUTOMATED PEOPLE MOVER SYSTEMS

David M. Casselman and Theodore C. Barker, Lea+Elliott, Inc.

INTRODUCTION

The purpose of this brief is to summarize the provisions typically made by Lea+Elliott, Inc., for disabled and elderly access in Automated People-Mover (APM) systems. Numerous provisions are made which strive to make use of the airport APM system a barrier-free experience for the disabled or elderly passenger. The following summarizes the major provisions that are made and generally describes the manner in which they are implemented.

FACILITIES PROVISIONS

Facilities provisions are accomplished through a process of APM system design and facilities interface. Typically, the APM system is procured through the use of a specification that defines the performance requirements of the system. An APM supplier will then contract to provide the system, including vehicles, controls, and guideway equipment.

The station and boarding platform are implemented through the preparation of drawings and specifications. Station construction, however, is usually completed by the terminal building general contractor. Lea+Elliott, Inc., writes the APM system specifications and provides APM facilities design criteria to the terminal design team to ensure that the proper interface occurs between the APM system and the station facilities.

The following provisions are included in airport APM systems:

1. *Level Boarding.* The elevation of the station boarding platform is set to correspond to the floor level of the vehicle. The APM system specification allows a maximum deviation of 7/8 inch from the station platform elevation.

2. *Platform Walls and Doors.* Typical airport APM design criteria call for walls between the station platform and the guideway and bi-parting automatic platform doors that align and operate simultaneously with vehicle doors. This system of walls and doors is designed to prevent accidental access into the guideway.
3. *Tactile Floor Surfaces.* Airport APM system specifications require a tactile floor surface at the automatic door opening into the vehicle to inform passengers of their relative location.
4. *Horizontal Gap.* The horizontal gap between the threshold of the vehicle and the edge of the platform is specified to be a maximum of 2 inches.
5. *Station Access.* In airport APM facilities the use of turnstiles to control the entry of stations is discouraged whenever possible, due to the barrier to access that they form for many passengers.

SYSTEMS PROVISIONS

In addition to the facilities provisions, numerous communications systems are provided to assist all passengers, including the disabled and elderly, in their use of the APM system:

1. *Signage.* Both static and programmable dynamic signage are provided on the station platform to assist passengers in understanding the use of the APM system.
2. *Door Chimes.* Chimes are provided to inform passengers audibly of vehicle arrival and of imminent door closing.
3. *Closed Circuit Television System.* A closed circuit television system is provided in stations to allow the APM central control operator to monitor platform activities and provide assistance to passengers as needed.
4. *Public Address System.* A public address system is provided to allow the APM central control operator to assist passengers as required.
5. *Emergency Telephone.* An emergency telephone linked directly to APM central control operations is provided in the station area.

VEHICLE PROVISIONS

The final major area in which disabled and elderly access provisions are made is in the APM vehicle. These provisions are accomplished through the APM system specifications:

1. *Vehicle Door Width.* A minimum clear vehicle door width of 36 inches is specified in order to provide ease of access while boarding and deboarding the vehicle for all passengers, including wheelchair users.
2. *Aisle Width.* On board the vehicles, wide aisles are specified to allow for wheelchair maneuvering.
3. *Wheelchair Restraints.* Wheelchair restraints are required on board the vehicle to allow the wheelchair user the option of securing the wheelchair during the trip.
4. *Designated Seating.* The vehicles of many systems include seats near the doors which are reserved for the disabled and elderly.
5. *Handholds and Stanchions.* Numerous handholds and stanchions are provided to aid the passenger while riding the APM system.
6. *Acceleration and Deceleration.* Limitations are placed on acceleration and deceleration rates to maximize passenger ride comfort and safety.
7. *Onboard Announcements.* Onboard announcements from central control inform passengers of operational aspects as well as upcoming station information.
8. *Onboard Visual Displays.* On some systems, onboard visual displays inform passengers of their location within the system.
9. *Emergency Communications.* Emergency communications, from on board the vehicle, are provided in the form of a passenger-activated microphone and speaker system within easy access of all passengers.

SUMMARY

The provisions described above are those typically found in airport APM systems. The specific requirements of each project, such as interfacing with existing facilities and unusual owner or operator requirements, must be taken into consideration. However, the airport APM systems in operation, under construction, and being planned today all contain provisions that strive to make their use a barrier-free experience for all passengers.

APPENDIX E
THE ROLE AND CONTENT OF INTERNATIONAL GUIDELINES FOR AIRPORT ACCESSIBILITY

Pamela Shaw, International Civil Aviation Organization

INTRODUCTION

There is no denying that airports can be very stressful places, even for nondisabled persons. Just the gathering together of crowds of people can be oppressive, plus the need to absorb many and diverse pieces of information—flight numbers, gates, departure or arrival times; the whereabouts of check-in or baggage claim areas; the often physically demanding trek to and from the gate areas. The whole process of air travel can be difficult when you are fit— how much more so when you are disabled in some way.

The International Civil Aviation Organization (ICAO) has a responsibility under its founding convention to promote the free, expeditious, and unimpeded passage of an aircraft, its passengers, crew, baggage, cargo, and mail across international boundaries. So it was a natural progression for ICAO to include in its ongoing work of facilitating the international travel of passengers in general, the specific task of facilitating the international travel of elderly and disabled passengers. My mandate here today is to tell you about international guidelines on airport access, so the main emphasis will obviously be on ICAO's own work as a specialized agency of the United Nations, but I shall also be sketching in the background of the activities of the United Nations General Assembly and other international bodies, both governmental and nongovernmental, as well as touching on the activities of a few individual nations.

UNITED NATIONS ACTIONS

Since the early 1970s, the United Nations General Assembly (UNGA) has passed a number of resolutions concerning the rights of disabled persons based upon the principles of the Universal Bill of Human Rights. In 1975, the UNGA adopted the Declaration on the Rights of Disabled Persons affirming, for example, that disabled persons "have the same fundamental rights as their fellow-citizens" and "are entitled to measures designed to enable them to become as self-reliant as possible." Subsequently 1981 was proclaimed the International Year of Disabled Persons to bring about changes in attitudes and policies towards disabled persons, by a concentration and focusing of efforts within the United Nations family, which is made up of organizations such as the World Health Organization (WHO), International Labour Organization (ILO), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Children's Fund (UNICEF), as well as ICAO. In 1982, a World Programme of action was adopted and the period 1983-1992 was declared the United Nations Decade of Disabled Persons in order to promote the implementation of required measures over a longer period (*1*).

The most recent U.N. Resolution, coming out at the halfway point of the Decade of Disabled Persons, contains the Tallinn Guidelines for action on Human Resources Development in the Field of Disability. These guidelines, named for the city in Estonia where they were adopted, call upon governments to adopt, enforce, and fund legally binding standards and regulations to improve access for persons with disabilities, ensuring that buildings, streets and road, sea and air transport are barrier free, architecturally and in all other ways. As always, U.N. specialized agencies are urged to take specific action in their areas of competence.

ICAO ACTION

In the U.N. Family, ICAO is the specialized agency with responsibility for civil aviation. Its founding convention was adopted in Chicago in 1944, and at present 163 states have acceded to the convention(*2*). The legal basis for the ICAO Facilitation program lies in Articles 22 and 23 of the convention under which each Contracting State agrees to prevent "unnecessary delays to aircraft, crews, passengers, and cargo" and to establish the relevant procedures "in accordance with practices established or recommended from time to time pursuant to the Convention." With respect to facilitation matters, as mandated by Article 37, these practices and procedures are established by means of the International Standards and Recommended Practices in Annex 9, Facilitation. Under Article 38, each State is obliged to notify ICAO of any differences between an international standard and the corresponding national practice of that

country, and ICAO is obliged to notify all other Contracting States accordingly. A State is *not* obliged to notify differences in respect of Recommended Practices but is *encouraged* to do so for the information of the international community.

In Annex 9 Standards are worded "States *shall* or *shall not* do such and such" and Recommended Practices "States *should* or *should not* do so and so." By this means, Annex 9, in fact, sets up a framework of Standards and Recommended Practices that designate the minimum facilities States are to provide for passenger convenience and the maximum requirements in the way of paperwork, restrictions of freedom of movement, etc. they are to impose. States are, of course, encouraged to provide *more* than the minimum facilities and to impose *less* in the way of requirements and restrictions.

Annex 9 provisions can be amended to reflect changing needs and the changing air transport environment. From time to time, a world conference is convened, known as a Facilitation Division, attended by ICAO Member States' own experts in all the many disciplines involved in facilitation: customs, immigration, consular, passport and visa, public health, agriculture, security, and narcotics control, as well as representatives from postal services, tourism and trade departments, airport authorities, and airline operators, including forwarders and express carriers—close to 400 Delegates on occasion. The ICAO Council acts to amend the Annex provisions on the recommendations of this body.

As early as 1968, before the U.N. initiatives I have already described, the Council, on the recommendation of the Seventh Facilitation Division, adopted a Recommended Practice urging that invalid passengers be assisted in making a direct transfer from one aircraft to another. But ICAO action to improve airport access for elderly and disabled persons has primarily been a response to the United Nations World Programme of Action. In 1988, the Tenth Facilitation Division amended that early Recommended Practice to apply to elderly and disabled passengers and adopted several new Annex provisions in the form of one new Standard and several new Recommended Practices(*3*).

The standard says that "Contracting States shall take the necessary steps to ensure that facilities and services are adapted to the needs of elderly and disabled persons"(*4*). The Recommended Practices deal with the following topics and are as follows:

- *Transportation to and from the airport.* "Where access to public services is limited, every effort should be made to provide accessible and reasonably priced ground transportation services, by adapting current and planned public transit systems, or by providing special transport services for the mobility impaired"(*5*).
- *Setting down and picking up.* "For elderly and disabled persons being set down or picked up at a terminal building, reserved points should be located as close as possible to main entrances. These should be clearly marked with appropriate signs. Access routes to the check-in desk area should be barrier-free"(*6*).
- *Parking and links to terminal.* "Adequate parking facilities should be provided for wheelchair users and appropriate measures taken to facilitate their movement between parking areas and the terminal buildings"(*7*).
- *Flight information for hearing- and vision-impaired.* "Measures should be taken to ensure that the hearing and vision impaired are able to obtain flight information"(*8*).
- *Movement between terminal and aircraft.* "Contracting States should ensure that lifting systems or any other appropriate device are made available in order to facilitate the movement of elderly and disabled passengers between the aircraft and the terminal on both arrival and departure as required where telescopic passageways are not used"(*9*).

The Standard, although framed in rather general terms, is most important because States *must* comply or notify ICAO that they do not or will not, and this will be published for the aviation community to see. The Recommended Practices do not carry quite the same legal obligation but are particularly valuable here, since they pinpoint the areas of prime importance and identify the particular facilities and services States should pay attention to, in fulfilling their obligation under the Standard. All these new provisions of Annex 9 will be published in the Ninth Edition of Annex 9 at the end of July 1990 and become effective at that time. The obligation to apply the new Standard commences on 15 November 1990 and States are required to notify by 30 October any deviation from the Standard that will exist at that time. They are also invited to notify any deviation from the Recommended Practices at that time. This then is the legal framework for ICAO's international guidelines for airport accessibility for elderly and disabled passengers.

SUPPLEMENTARY ACTION

Apart from this basic framework, ICAO has also adopted more detailed guidance material. This appears

in two places: in an Attachment to the future Ninth Edition of Annex 9, and in ICAO's already published Airport Planning Manual(*10*). The Attachment to Annex 9 provides guidance on several items as follows:

- *Consultation re ground transportation.* States should, in co-operation with airport authorities and other bodies as necessary, make every effort to provide accessible airport ground transportation services, to facilitate, to the extent possible, the use of taxi services and private transport, and to ensure that parking areas and access routes to terminal buildings are suitably designed and identified.
- *Building design principles.* New airport buildings should be designed to ensure obstacle-free movement for disabled persons and the removal of physical barriers in existing buildings should be undertaken when any general improvements are made.
- *Particular needs of sensory impaired.* The provision of services and facilities at airports should be evaluated to ensure that they are both accessible and adapted to disabled users including the sensory impaired.
- *Use of passengers' own wheelchairs.* Airport authorities should, in co-operation with airlines, make it possible, where practical, for wheelchair users to use their own wheelchairs to move to and from the aircraft door.
- *Training programs for personnel.* Airport authorities should, in cooperation with airlines, establish and coordinate training programs to ensure the availability of personnel sensitive to the needs of the elderly and disabled and familiar with means of communicating with the sensory impaired.

Finally, there is Chapter 9.11 of ICAO's Airport Planning Manual, which provides even more specific and detailed guidance material to assist airport authorities to take into account the requirements of elderly and disabled persons when they are preparing master plans for the renovation or expansion of existing airports and construction of new ones. It includes recommendations for design principles, the facilities that should be provided, and their location.

Firstly, the manual provides the following guidance with respect to design principles:

- *Walkways and Floors.* Exterior pedestrian walkways should be unobstructed and at least 1.5 m wide. At places where pedestrians or wheelchair users must cross curbs, a cut or ramp should be provided. Gratings, manhole covers, and similar potential obstructions should be flush with the pavement. Pedestrian and vehicular traffic routes require effective separation. All interior public spaces should be connected by ramped paths or identified lifts, and public corridors should be free of obstructions. All abrupt changes in floor level should be clearly identified by audio and visual means. Interior and exterior floor surfaces should be level on each side of entrance doors, with floor mats recessed and fully secured and all floors should be maintained in a nonskid condition. All carpet areas should be of the low-pile, tight-loop type and fully secured to prevent movement.
- *Ramps.* Outside the terminal building, both ramps and stairs should be provided at every change in level. Ramps should not exceed one in twelve and should have nonslip surfaces. Handrails should be provided at least to one side. Inside the terminal building, ramps should be at least 1.2 m wide (1.5 m is even better) and again ramp slope should not exceed one in twelve. Surfaces should be nonslip. A level area, preferably 1.2 m long, should be provided at top and bottom of all ramps. Ramps more than 9 m long should have a level section at 9 m intervals (5 m for steeper ramps). At each change of direction a level landing should be provided. Handrails should be provided on each side of ramp. Ramps are preferable where minor changes in floor level occur. In general, unless the surface leading to a one in six ramp is flat or sloping down, wheelchair users have difficulty getting up this gradient. One in twelve ramps are difficult for other than the strongest wheelchair users; one in sixteen is better. Difficulties can also be experienced if ramps have to be approached from an angle and curbs at sides of ramps can be a problem. The height generally accepted for ramp curbs is 10 cm, although 5 cm minimum seems to be more acceptable. Curb edges need to be rounded and the finish at the top and bottom of the ramp carefully designed.
- *Stairs.* Stair treads should be of nonslip material. A landing midway in a stair run between floors is desirable. Open risers and projecting noses should be avoided. Handrails should be provided on both sides.
- *Elevators.* The only really effective way of moving chairbound people from floor to floor is by elevator. Where elevators are provided, at least one should be accessible to and usable by the disabled, including those in wheelchairs, both at the entrance level and at all levels used by the public. The elevator should be large enough to

accommodate a wheelchair and one or two standing persons. If automatic, the elevator controls should be located so they can be reached by a seated person. The cab should be self-levelling, and the doors should be adjusted to remain open for at least eight seconds, to close slowly, and to respond to both a sensitive safety edge and photoelectric cell door openers. An audio description of the floor reached is desirable. Directional signs to the lift should be placed at various points in the building.

- *Doors*. With respect to doors, if they are hand operated they should be openable by one hand and the handles should be of a lever type. Revolving doors are to be avoided. But where they are installed, an alternative hinged or sliding door should be provided. Door closers should be of a type to permit opening of the door with a minimum of effort and slow closing to allow uninterrupted passage of a wheelchair. Time-lapse devices that close doors after a prescribed delay should be avoided as they are dangerous to those who move slowly. Attention should be given to the direction of door swing so that wheelchair occupants can open doors without complex maneuvering. Doors in corner positions must permit easy approach and there should be an unobstructed space adjacent to the door handle. Side hung doors are preferred to sliding doors. Kick plates are recommended on doors used by wheelchairs users.
- *Security gates, belts, and check tables*. All security gates should be at least 90 cm wide. All security conveyor belts and check tables should be at a height of 76 cm above floor.

Secondly, the Manual advises airport authorities concerning facilities that should be provided and how they should be identified. These are:

- *Signs*. The standard access symbol should be prominently displayed as a ready means of identification to disabled persons of all routes and areas where suitable facilities are provided. Directional signs and room identifiers are normally useless to blind people. It is desirable that identification of certain rooms (e.g., rest rooms, restaurants, and gate positions) by raised or depressed letters be placed on walls beside doors, not on doors, as sudden opening may result in injury.
- *Warnings*. Audible and visual signals to indicate a hazardous area (e.g., a door to an area used by baggage trucks) are desirable to protect blind and deaf people. Curbs, which serve as a warning to blind people using a cane, should be provided at any change from a pedestrian area to a roadway for vehicles. Visual and audible passenger information is desirable.
- *Guide maps*. Airport guide maps for blind or otherwise handicapped persons should be available.
- *Car parking*. It is desirable to provide identified reserved parking areas for physically disabled people, using the access symbol. Regulations should be enforced to ensure exclusive use of reserved parking spaces by the disabled. The parking spaces should be flat and protected from the weather. The route from the reserved parking to the terminal should be free of curbs and obstructions and located so that disabled people do not have to pass behind parked cars. Parking meters, attendants' windows, ticket machines, and similar devices should be within the limited reach and grasp of a disabled driver. Directional signs should indicate access routes to reserved parking areas.
- *Wheelchairs*. Wheelchairs should be available for people to move to taxi, bus, or private car loading areas. This service should be clearly advertised.
- *Protected entrances and exits*. There should be at least one main entrance without steps, usable by people in wheelchairs. Automatic opening doors are highly desirable. Level areas, protected from the weather, should be provided for boarding and delivery of people from cars, buses, etc.
- *Drinking fountains*. Controls should be hand-operated. The fountain should be low enough for use by wheelchair occupants, but high enough to allow the arm of the wheelchair to move beneath it.
- *Toilets*. Facilities should be accessible to wheelchair users and should include at least one WC compartment sized and fitted for use by the disabled, including wheelchair users.
- *Telephones and post boxes*. At least one in a group of telephones should be accessible by wheelchair users, with the handset and coin slots approximately 1 m above floor level. Telephone books should be located so they can be read from a seated position. Telephone operating instructions with raised lettering are desirable. Post boxes

should have an opening that can be operated by one hand, not more than 1 m above floor. Splayed legs should be avoided.

- *Means of embarkation and disembarkation.* Passenger loading bridges or flush coupling transfer vehicles are desirable for level or ramped access to and from aircraft. Where this is not provided, alternative transfer facilities should be available.

Finally, the Manual suggests the optimum location for certain facilities to improve traffic flow and minimize difficulties for disabled persons using the airport:

- *Parking areas.* Reserved parking areas should be located close to the terminal entrance.
- *Entrances and exits.* The areas for picking up and setting down people should be adjacent to main building entrances and exits.
- *Check-in.* Facilities should be as close as possible to passenger set-down areas for cars, buses, etc.
- *Baggage claim areas.* Routes to baggage claim areas should be designated by audible and visual means. It is desirable that baggage claim areas be at the same floor level as that at which the arriving passenger enters the terminal, if ramped or elevator access is not provided. Airport or airline personnel should be readily available to provide assistance to disabled people.
- *Baggage storage.* Areas for baggage storage should be located adjacent to main entrances and baggage claim areas. Storage systems should be easily operable by persons of limited manual dexterity.

To sum up, you can see that ICAO has first adopted a basic legal framework in the Annex Standard, which requires States to take steps to adapt facilities and services to the needs of elderly and disabled persons, along with Recommended Practices, which identify the facilities and services which need attention. ICAO has then fleshed out this framework with material of a more specific nature for the guidance of States in the Attachment to the Annex and in the Airport Planning Manual.

OTHER INTERNATIONAL ACTION

ICAO is not alone in responding to the U.N. initiatives. Other international bodies have also been active. The European Civil Aviation Conference (ECAC) adopted a recommendation in 1979 urging its Member States to:

- "Bear in mind the needs of physically handicapped passengers when planning new airport passenger terminals or modifications thereto;
- "Undertake a review of existing facilities and services for handicapped persons at their airports; and
- "Endeavour where necessary to improve upon these facilities"(*11*).

In 1985, the Twelfth Triennial Session of ECAC deleted this Recommendation from its active list as being satisfactorily implemented in its Member States(*12*).

The European Conference of Ministers of Transport (ECMT) is an intergovernmental organization established as a forum for the Members of Transport of 19 European countries with four associate Members including Canada and the United States(*13*). In 1978, the ECMT adopted a Resolution that recommended that governments:

- Pursue the design and introduction of improvements intended to give handicapped persons easiest possible access to existing transport services including long-distance services; and
- Seek in this connection to make it less burdensome and easier for handicapped persons and old people to use these services by planning appropriate measures regarding access to terminal facilities and vehicles(*14*).

The ECMT is satisfied that there has been considerable progress in making air services accessible to people in wheelchairs. Current work is directed towards a more detailed look at, among other things, terminal facilities for aviation services and further consideration to the harmonization of measures between Member States.

In 1980, the Latin American Civil Aviation Commission adopted a recommendation urging its Member States to examine existing facilities to determine the most urgent measures to facilitate the movement of handicapped persons at airport terminals and during embarkation and disembarkation operations of aircraft and to take account of the needs of such persons when planning new terminals or modifying existing ones(*15*).

The World Tourism Organization (WTO) has been active through a Committee of Affiliate Members and a special working party entrusted with promoting and improving travel and tourism possibilities for disabled persons. A preliminary report tabled a number of recommendations many of which echo the substance of

the ICAO guidelines, with others ranging more widely, to cover such things as orientation tours for blind passengers and access to hotels and restaurants(*16*).

The International Civil Airports Association (ICAA) has adopted very detailed design specifications and provisions, including wonderfully clear illustrations, in their publication "The Handicapped and the Airport"(*17*). The Airport Operators' Council International has published a guide to the accessibility of terminals worldwide called "Access Travel: Airports" which lists in schematic form all the necessary facilities available, or not available as the case may be, in over 500 airports around the world(*18*).

The International Foundation of Airline Passenger Associations (IFAPA) surveyed 40 organizations representing disabled passengers and the resulting report, identifying major problems facing such passengers, was taken into account by the Tenth ICAO Facilitation Division(*19*). The Foundation also concluded that there was a need for a "directory of information" on services available for disabled passengers and is seeking sponsorship for such a project.

The International Commission on Technical Aids Housing and Transportation (ICTA), based in Sweden, has published a study called "Airlines and Disabled Travellers," primarily directed at facilities on board aircraft, but including some material on the design and content of terminal buildings(*20*).

The International Air Transport Association (IATA) has published three guides covering all aspects of the airline portion of disabled passengers on journey. Airport access is not covered per se, but much helpful advice is given in the organization's "Incapacitated Passengers Air Travel Guide" concerning preboarding, transfers, and arrival arrangements. However, the use of escorts is emphasized, and this I know is a contentious issue. IATA has published two companion documents, a "Handling Guide" and a "Physicians Guide" for incapacitated passengers which set out the Associations' recommended procedures with respect to medical clearance and all aspects of traffic handling with the aim of improving uniformity between airlines(*21*). Again, quite naturally, these stress the airline viewpoint on such matters as seating assignments.

Finally, for the sake of completeness, I need to draw your attention to the work of one more organization, the International Organization for Standardization (ISO). It has not published material specifically related to airports but its design guidelines on the needs of disabled people in buildings are relevant for airport building design(*22*).

INDIVIDUAL GOVERNMENT ACTION

To complete this international scene, I have to tell you that a large number of individual governments have adopted measures to improve access to airports and provide various facilities for the elderly and disabled in response to the United Nations initiatives and ICAO recommendations. Some states, notably Argentina, Australia, Brazil, Canada, Germany, France, Italy, the Nordic countries, the United Kingdom, the United States, and Venezuela, have adopted detailed specifications and guidance material in this field, and many useful publications have been produced, primarily by Australia, Canada, the United Kingdom, France, and the United States. There is no time for me to review these now, but any further research in this field should take them into account. It is interesting to note that some governments, such as Canada and the United States, have chosen the legislative route and others, such as Australia and the United Kingdom, have relied on the consultative process to get the desired results.

FUTURE WORK

To provide individual States with more guidance in this field, ICAO's next task is to examine the accessibility of air transport *services* to elderly and disabled persons. This would involve a review of potential problems, starting from the provision of adequate information from the first telephone contact or travel enquiry of elderly and disabled persons to the accessibility of aircraft, the ability to move about, and the facilities and services on board aircraft.

A comprehensive study would also consider the right of self-determination (i.e., for elderly and disabled persons to decide themselves whether or not they need an attendant, and to be free from requirements to sign waivers of liability); free or reduced fares for transportation of attendants; and the availability of trained personnel in all phases of the transportation arrangements. Finally, if the review is to be truly comprehensive, it would probably also need to include such aspects as aircraft interior design and aviation medicine.

CONCLUSION

My exhaustive, but hopefully not exhausting, review of international guidelines for airport accessibility should have demonstrated one thing: there is a great deal of

research material and guidance already in existence, and it is important that this material does not end up as a heap of paper to put somewhere on the bookshelf. This workshop will be a force for further research and harmonization of airport access measures in the United States, but in my view the key requirement for the future is to get similar measures harmonized and implemented worldwide.

I believe that the role of ICAO's guidelines, being underpinned as they are by the legal framework of Chicago Convention, is to provide a basis for that harmonization and worldwide implementation. States can be encouraged, if not pushed, to honor their obligation under the Convention, and this is probably a worthwhile avenue for societies or organizations representing the interests of disabled persons to pursue.

For international travel by disabled persons, another ongoing research need, in my opinion, is that of collecting current information on the status of the relevant facilities and services at airports—in other words, the degree of implementation achieved throughout the world. This information, along with information on the societies or organizations representing or providing assistance to the disabled in each country, should be disseminated, to all such organizations and to airlines, airports, and governmental authorities worldwide. Perhaps this, too, is something that disabled people can get together to do for themselves. In conclusion, I should like to quote an African proverb from a speech of the Executive Secretary of the International Year of the Disabled: "Separate and taken in isolation, the fingers of the hand are weak, but united they constitute a force"(*23*).

NOTES:

1. UNGA Resolutions:
   - Declaration on the Rights of Disabled Persons Resolution 3447XXX, 1975;
   - 1981 - International Year of Disabled Persons Resolution 32.133, 1976;
   - World Programme of Action concerning Disabled Persons, Resolution 37.52, 1982;
   - 1983-1992 United Nations Decade of Disabled Persons, Resolution 37.53, 1982; and
   - Tallinn Guidelines for Action on Human Resources Development.
2. Convention on International Civil Aviation, ICAO Doc 7300.
3. Paragraph 6.24 of Annex 9, now amended to refer to elderly and disabled passengers and re-numbered as 6.35 in the Ninth Edition of Annex 9.
4. Standard 6.1.1 in the Ninth Edition of Annex 9.
5. Recommended Practice 6.16.1 in the Ninth Edition of Annex 9.
6. Recommended Practice 6.15.1 in the Ninth Edition of Annex 9.
7. Recommended Practice 6.18.1 in the Ninth Edition of Annex 9.
8. Recommended Practice 6.13.2 in the Ninth Edition of Annex 9.
9. Recommended Practice 6.11 in the Ninth Edition of Annex 9
10. Doc 9184 - AN.902 Airport Planning Manual, Part 1, Master Planning.
11. Recommendation 14 ECAC 10th Triennial Session, 1979.
12. Recommendation 21 ECAC 12th Triennial Session, 1985.
13. Australia, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, Yugoslavia. Associate members include Australia, Canada, Japan, and the United States of America.
14. Resolution number 38 of 1978.
15. Recommendation A4-8, LACAC 4th Plenary Session, 1980.
16. Reported in U.N. Disabled Persons Bulletin No. 2.88.
17. *The Handicapped and the Airport*, 2nd Edition, ICAA, December 1981.
18. *Access Travel: Airports*, 5th Edition, AOCI, October 1985.
19. Report provided to ICAO by IFAPA, Geneva, July, 1987.
20. Airlines and Disabled Travellers ICTA Information Centre, Stockholm, 1977.
21. *Incapacitated Passengers Air Travel Guide*, 2nd Edition, IATA, Montreal, 1981; *Incapacitated Passengers Handling Guide*, 2nd Edition, IATA, Montreal, 1981; *Incapacitated Passengers Physicians Guide*, 2nd Edition, IATA, Montreal, 1981.
22. ISO - Needs of disabled people in buildings, ISO, Geneva, 1981.
23. Speech by Mrs. Z.L. N'Kanza at the opening of the Second Session of the Advisory Committee for the International Year of the Disabled.

APPENDIX F
AIRPORTS AND THE HANDICAPPED—THE ROLE AND CONTENT OF INTERNATIONAL GUIDELINES FOR AIRPORT ACCESSIBILITY

Rolf Treibel, International Civil Airports Association

OVERVIEW

Participation of handicapped persons in normal life—and hence their use of public transport—has steadily increased in recent years. This welcome development must be taken into consideration in all public places. The United Nations, in the Declaration issued in December 1975, pointed out very strongly the rights and needs of handicapped persons. But although many countries have Government regulations to meet these requirements (for railways, public buildings, etc.), there are no international guidelines that apply to airports. ICAA therefore decided to prepare recommendations for measures to help this category of airport users.

ICAA—the International Civil Airport Association—is a worldwide professional grouping of airports, organized into Regions, and has a particularly strong European representation. The Association expresses airport opinion, defends its Members' interests, and aims to coordinate technical and practical improvements in the facilities offered to airport users. In 1980 ICAA brought out the first edition of a Manual designed to help planners and airport operators provide suitable facilities for all types of handicapped persons. The distribution of this work provoked much discussion, and additional material with improvements went into the second edition which appeared in December 1981.

ICAA is now in the process of editing the third edition of this Manual, both retaining explanations of the basic concepts involved together with many simple inexpensive ideas which can be of use to airports with insufficient funds or few possibilities of obtaining sophisticated equipment, and also giving full details and diagrams of some of the most advanced aids actually available. This third edition will conform to standards being established by the International Standardisation Organization (ISO) and the European Community (EC), and is the result of the shared expertise of a specially formed ad hoc working group of professionals from many countries, including an architect commissioned by the EC for the establishment of these standards.

In these days of increased cost awareness and at a time when an airport must more and more function as just another commercial enterprise (and rarely now as a symbol of a country's prestige) a complete reference book with diagrams and illustrations is an invaluable aid to those countries which cannot afford to pay specialized planners and architects. Thus even on the lowest budget care can be taken to improve access for people requiring special facilities, so that an airport may be a transit area of easy use for all.

In this context, it should be said that in the developed world there is an increase in the proportion of those suffering from hearing and sight deficiencies, or general degeneracy (due to the greater number of older people), and this is taken account of in the new Manual. However it is frequently the poorer countries that are in the greatest need of good counselling and support as their economies develop and transport access areas of all kinds are built or modernized. Inevitably, whether the country provides the money, or payment for such works comes from special funds such as the United Nations Development Programme (UNDP), it is vital that the very best use be made of this money, and therefore vital that the very best advice be available easily to all.

Even when the latest aids and the most refined planning are incorporated into a transport access area, there is one element that can maintain access for all even when funds are severely limited: this is the human element. Without properly trained, efficient, courteous, and caring personnel, the efforts of architects, planners, and operators are brought to nothing in practical terms. These personnel should be part of the airport operator's staff and/or the airline concerned. They should be easily accessible, well organized, and have a thorough knowledge of the probable requirements of all kinds of handicaps. Contact with this staff should begin at a clearly marked entrance point or counter, and their assistance should be free to users, as well as being instantaneous. It must surely be considered as discrimination and segregation if a handicapped person is obliged not only to reserve in advance any required assistance but also to pay for it.

The ICAA PHAP Manual is designed to furnish the planners of structural or organizational measures with recommendations that can be useful in new planning, as well as ideas for improvements to existing facilities. These recommendations are concerned specifically with accommodating the needs of physically handicapped persons using airports, including transfer between air

terminals and aircraft. The term "handicapped person" is used to cover all those suffering from any form of disability or incapacity, or any functional limitation, visible or invisible. It must be remembered that these passengers are not ill and therefore do not need medical care. Any problems arising can normally be solved by removing architectural barriers, by providing appropriate equipment and by training personnel. Measures described may, in addition, meet the needs of elderly persons, injured passengers, mothers and children, etc. The architectural recommendations made in the first part of the Manual also apply to staff quarters, with a view to facilitating the employment of handicapped persons.

The Working Group examined actual cases of difficulties encountered by handicapped persons getting off an aircraft. It was noted that one cause of such difficulties was the failure to transmit information regarding the presence of a handicapped person on board an aircraft, by the airport of departure to the airport of arrival or transit. Due to this lack of communication, facilities to accommodate the handicapped were often not immediately available on the aircraft's arrival. However, the Group judged that these problems, which are the sole responsibility of the airline passenger services, are not within the scope of this document.

This was also the case for "desirable" or "recommended" equipment on board aircraft, and for the definition of the sharing of responsibilities at an air terminal between the various airlines and the airport management. Design features of next generation aircraft have been omitted. Recommendations for persons who need medical care are also omitted from this Manual.

ACCESS ROADS, CURBSIDES, PARKING AREAS

Sidewalks

Every road must be provided with at least one sidewalk for pedestrians. Next to roads with fast-moving traffic there should be a sufficiently wide safety strip or a railing between the sidewalk and the roadway. Sidewalks should not be obstructed by any obstacles.

The surface structure of pavements must be clearly visible and/or distinguishable by means of touch for the blind or persons with impaired vision. Light-coloured paving could be designed to contrast with the darker colored street. Blind and persons with impaired vision can better orientate themselves when obvious changes in the surface structure between the street curb and pavement surface are taken into consideration. Rough structures such as cobblestones are dangerous for wheelchair occupants and persons with walking impediments. Oversized man-hole covers, gratings or the like in pavements should be covered in such a way that accidents are prevented for persons with walking impediments and/or wheelchair occupants.

Curbs

Edges of sidewalks should be optically distinguishable from the sidewalk surface (colored, or of a different material). The curb height from roadway to sidewalk should be the minimum that local regulations permit. At pedestrian crossings, the curb should be level with the roadway. Curbstones should not be levelled or rounded, in order to reduce the danger of falling.

Pedestrian Crossings

They should be clearly marked on the roadway by nonslip colored stripes or the like. They should also be additionally illuminated. Pedestrian islands must be provided to ease the crossing of wide roads. They should be marked by traffic signs, and wherever possible illuminated to warn passing points. If pedestrian crossings are on different levels (underpasses or overpasses), ramps must be provided in addition to steps and possibly also moving walkways or lifts.

Stairways

The first and last steps of a stairway should be marked by means of a contrasting surface texture of colour. Winding stairways should be avoided. Attention should be paid to stairways whose passage beneath is possible in order to prevent hazards for persons with impaired vision.

Ramps

The slope of any ramp, or series of ramps, must be consistent throughout. In addition to wheelchair occupants, people with walking disabilities are dependent upon ramps in that they are only able to maneuver minimal heights such as steps. The incline should not be more than 6 percent because wheelchair occupants who are restricted in their upper body movements and who operate the wheelchair themselves cannot manage steeper inclines. Handrails must always be provided on both sides of the ramp. The surface of the ramp must have a nonslip finish.

Parking Areas

A certain number of specified parking spaces must be reserved for travellers who are severely restricted in their movements. These spaces should be as near as possible to the air terminal and should be protected from the weather. The parking spaces must be quickly and easily attainable by means of signs (international symbols).

The handicapped person must be able to easily and safely reach the departure halls from the parking areas. Differences in height must be navigable through the use of ramps and lifts. Consideration should be given to the installation of a call system for assistance, which can be reached from the driver's seat, properly signposted and preferably close to the entrance to the parking area. Parking meters and automatic ticketing should be easily accessible for wheelchair users or from the driver's seat of a car.

PASSENGER TERMINAL

All areas in the air terminal building should be designed in such a way that handicapped passengers can reach and use them without difficulty. Points to avoid: doors closing too fast; doors difficult to operate; counters or push buttons too high; passages and doors too narrow. Public areas in terminals should have level or ramped access. Public corridors should be at least 150cm wide and free from any obstructions.

While the level and quality of light needed by persons with poor vision has not been quantified, glare and reflection should be eliminated by the use of matte surfaces. Special lighting should be used to accentuate stairs and handrails, particularly for the benefit of visually impaired persons, where the basic light level is low.

Entrances

Forecourts and other vehicle loading/unloading areas should be: level with main entrances; located close to entrances; protected from the elements. At least on entrance, if possible the main one, should be on the level. If the main entrance is not accessible to wheelchair users, the location of the nearest accessible entrance must be indicated. Special entrances must be marked by the international wheelchair symbol.

Moving Sidewalks

The speed of moving sidewalks with an incline of more than 8 percent must be reduced from the usual 0.5 m/sec, because the wheelchair's moment of tilt in unaided operation can lead to accidents. A reduction in speed is recommended in any case for persons with walking impediments and older persons, in that the start-up speed from 0 to 0.5 m/sec is relatively high.

Lifts

Every floor to which handicapped persons should have access has to be accessible by a lift. Every lift must be equipped with an automatic door which opens without assistance at each stop. When a normal lift is not accessible, a goods lift could be used by the handicapped person with the assistance of airport personnel. This should also be clearly signposted.

Information Desks and Check-In Counters

Information desks would be close to and visible from building entrances to provide early information and help if necessary. The design of desks and counters must be such that no difficulty in communication between handicapped passengers and staff can occur. Where special information desks or check-in counters are reserved for handicapped travellers, these should be clearly marked with the international symbol of access. An appropriate sign for those with sensory disabilities should also be installed.

Passport Control, Security Check Points, and Customs Control Areas

The passenger control areas must be accessible to handicapped passengers. If the route for ordinary passengers is not suitable for wheelchair users, a by-pass must be provided. Channels suitable for wheelchair users through security, passport, and customs controls should be marked clearly with the international symbol of access. Where automatic security detection devices are used, alternative passageways must be provided for checking handicapped passengers.

Secondary Facilities within Terminal Buildings

Shops, restaurants, banks, post offices, etc., should be readily accessible for handicapped passengers. This can be most easily accomplished by providing all or most of these secondary services on the same level as the passenger-handling facilities. The layout of these facilities should, as far as possible, guarantee the integration of the handicapped persons, and should ease communication between the staff and the handicapped persons. If there are different levels, ramps and/or lifts

must be provided. Particular attention should be paid to providing sufficient unobstructed maneuvering space for wheelchair users. Doors and corridors must be designed accordingly.

Toilets

A sufficient number of special toilets for the sole use of handicapped passengers, particularly wheelchair users, must be provided. They should be unisex. The specific number of such compartments depends on the traffic volume and the size of the terminal building. The toilets for handicapped persons should be adjacent to, or grouped with, the normal sanitary facilities in order to simplify orientation. Toilets for handicapped persons must be provided on the landside and airside of a passenger terminal.

Telephone and Other Communications Services

The group of passengers who are likely to have difficulty in using normal public telephones are those who are wheelchair bound, hard of hearing, or have speech problems. A sufficient number of telephones suitable for the use of handicapped persons, particularly wheelchair users, must be provided. The specific number of such telephones depends on the traffic volume and size of the terminal building. To facilitate orientation, the telephones for handicapped persons should be located adjacent to, or grouped with, normal telephones. A telex service for the deaf should be available on request.

SIGNS AND INFORMATION AIDS

Public information signs should be adapted to meet the special requirements of the handicapped person. Important instructions concerning handicapped persons should be permanently and prominently displayed. All facilities suitable for handicapped passengers should be marked with the international symbol of access. This sign should be used with the agreement of Rehabilitation International or its national representatives. The symbol can stand:

- On its own;
- As additional information for suitability of facility; and
- As additional information in the form of a sticker to existing signposting.

Additional lettering of signs should be in the language of the country concerned, and in English. The purpose of the sign should be to identify or advertise: accessible entrances to buildings; manageable routes through buildings; usable lifts; usable cloakroom facilities and lavatories; reserved car parking spaces; the availability of special sources of help or facilities.

For passengers with visual impairment, additional aids might be helpful: on airports with relatively small traffic volume, visual aids could be backed up by public address announcements; on airports with a large traffic volume, public address announcements might lead to confusion; in these cases, blind persons or passengers with visual impairments must therefore rely on assistance by accompanying persons or airline or airport personnel; for special facilities such as telephones, vending machines, lavatories, etc., raised symbols might be useful.

Passengers with hearing defects generally do not need additional aids at an airport, since they can rely on the normal visual aids and signposting for guidance. However, any facility or information center for passengers with impaired hearing (e.g., telephones fitted with amplifiers) should be clearly marked as such. Special facilities for the hard-of-hearing and the visually impaired should be identified with special symbols.

OPERATIONAL AND ORGANIZATIONAL MEASURES

Good airport design and construction alone will not ensure that handicapped people can board an aircraft smoothly and easily once they have arrived at the airport. Equally important are adequate operational and organizational procedures implemented at an airport to assist handicapped people. It must not be forgotten, though, that the more attention is paid to their needs at the design and construction stage, the more efficient will be the traffic flow at the airport and the less will be required in terms of organization and operation. The following recommendations should not be seen as comprehensive but should instead be viewed as general advice on how facilities to help handicapped passengers can be improved.

Overall Planning

Airport operators and planners should consider that larger numbers and different groups of handicapped persons are using air travel. Architects and planners involved in the design of airport terminals must make sure that they keep themselves fully aware of what handicapped people require and expect of airport facilities. This should be done on a regular basis during

the lifetime of any particular airport terminal, so that they can apply new developments in technical aids for disabled people, introduce appropriate changes for their benefit in the way the airport is run, and take account of any changes in the make-up of handicapped people using the airport.

Existing Airports

It is urgently recommended that the suggestions to help handicapped people should be systematically adopted in close cooperation with the airlines, handling agents, and national and international organizations serving handicapped people.

Realization and Coordination of Measures to be Taken

Responsibility for planning and implementing organizaional and operational measures to help handicapped passengers—in some cases according to national legislation—could rest with the airport authority itself, or with an airline or a handling company, or any combination of these agencies. Where responsibility is divided it is important that facilities are consistent at all points.

Cooperation and coordination between the various agencies operating at the airport are essential, including:

- Airlines and handling agencies;
- Customs, immigration, and security;
- Concession holders (e.g., restaurants, banks, shops, insurance companies, post offices, travel agents, car-hire firms, etc.);
- Companies employed by the airport authority, such as office cleaners; and
- Public transport organizations (e.g., buses and trains, as well as taxis).

All need to ensure that they offer handicapped people easy access to their facilities and that they operate these facilities with every attention to the convenience and well-being of their handicapped customers.

Different Groups of Handicapped Persons

In the past, airports have tended to concentrate on measures to help wheelchair users. In recent years, people with other types of handicaps have been making more use of air travel, in particular those with visual and hearing impairments. This development reflects both the general increase in this method of transport and the growing numbers of people within the population, both young and old, with hearing or visual problems.

All installations manned or equipped to aid the hearing-impaired person should be marked with the international "ear" symbol. For people with impaired vision, special attention should be paid to using clearly visible and distinguishable signposting. Contrasting colors and different floor surfacing for different areas also help. Blind persons are normally accompanied to the airport. The provision of escorts is in some countries the responsibility of air carriers only.

Elderly passengers are the largest single group with possible disability problems. While elderly disabled passengers in part have the same needs as younger persons, having hearing and vision difficulties or the possible need of a wheelchair, there are also disabilities in this group, such as stroke, arthritis, etc., and often a general loss of vigor and energy, which may require special services such as airport buggies for covering long distances within the airport terminal facilities.

Advance Information

It is of the utmost importance for the benefit of all concerned that disabled people should be able to obtain in advance information about conditions at the airport: where to park the car, how to move about the terminal buildings, and what kind of assistance can be expected. Airports are recommended to issue an information leaflet or brochure for handicapped people containing such necessary information. This leaflet should be readily available at all airline offices, at travel agents, and from organizations for disabled people. It should also be available by post.

Parking

First contact between handicapped people and the office concerned can be arranged when parking the car or leaving the parking deck. For this purpose a call installation should be available next to the parking area for handicapped people. It is conceivable that a handicapped person could then be met by an airport attendant, possibly with an airport- or airline-owned wheelchair, if requested.

Airport Terminal Entrance

To give handicapped passengers the opportunity of contacting the office concerned at the earliest possible moment, it is advisable to install at the main airport entrance, or any other specially designed and signposted entrance, a call installation or a telephone.

Information Desks

Every general information desk should be manned. Staff should be trained to identify handicapped people at the airport and should be able to contact the appropriate airline or airport agency to request any necessary help.

Passenger Check-In

Staff at check-in counters must be able to recognize handicapped passengers and be aware of what special help they are likely to need and advise them accordingly. With wheelchair users they should establish immediately whether the passenger wishes to retain his own wheelchair through the airport or would prefer to use an airport/airline wheelchair from that point. Wheelchair-bound passengers must be allowed to use their own wheelchair through the terminal up to the aircraft cabin door, if they wish.

Boarding

It is important to allow wheelchair-bound passengers to use their own wheelchair not only up to the cabin door, but even within the cabin whenever possible. Where the aircraft is connected to the terminal by passenger bridges, steps or narrow passages should be avoided. Similar care should be taken when mobile lounges are used.

If the aircraft is parked away from the terminals on a remote stand and mobile lounges are not used, a vehicle with a ramp and/or lifting device should be available to transport wheelchair users. Some vehicles of this type allow a wheelchair-bound passenger to be lifted directly into an aircraft. Wheelchairs should be transferred quickly from the plane entry door to the baggage hold. This process would be similar to the handling of "last minute" baggage.

Where it is not possible for a wheelchair user to retain his own wheelchair beyond the departure lounge, shortly before boarding a suitably trained attendant should be on hand to assist in the transfer to the airport- or airline-owned carrying wheelchair to take the passenger to the aircraft and ensure the safe loading of the personal wheelchair into the aircraft hold. Upon boarding the aircraft, the wheelchair user should be guided to his seat.

Vehicles and Equipment

The following vehicles and equipment should be considered obligatory for any airport:

- Airport-owned wheelchairs for transportation within terminal buildings. These wheelchairs will be on loan to passengers unable to walk long distances as well as to those who, for one reason or another, cannot use their own wheelchair. There should be a sufficient number of airport- or airline-owned wheelchairs with the following design criteria:
  - High backrests;
  - Vertically adjustable footrests;
  - Detachable armrests (for easier transfer);
  - Self-propelling wheels; and
  - At least two different seat widths.
- Carrying chairs to transport handicapped people within the aircraft; and
- Vehicles with a lifting device capable of taking the wheelchair up to aircraft door-sill height, including powered boarding equipment for smaller airliners.

Depending on circumstances at an airport, the availability of the following vehicles and equipment should be examined:

- Vehicles with the capability of transporting handicapped persons with or without their own wheelchairs within the airport building (buggies); and
- Vehicles with a ramp or a lifting device to transport a wheelchair on the apron.

TRAINING OF STAFF

All airport personnel involved with passengers, including security personnel, guards and porters, should be trained to meet the special needs of handicapped passengers. Generally such training should be provided in special and regular courses dealing with the following aspects:

- The different types of handicap–physical, sensory and mental–and the kind of help each is likely to need;
- The facilities available at the airport which might be of assistance;
- How such help can be called upon and responsibilities for providing it;
- How to offer help, bearing in mind that handicapped people like to be treated in the same way as others. Understanding of some of the psychological problems associated with handicap and disability;

- How to help wheelchair users make transfers from one wheelchair to another; how to handle wheelchairs;
- Techniques for escorting blind and visually handicapped passengers; handling and carriage of guide dogs;
- Methods of communication with deaf and hard-of-hearing people. Recognition of those who can lip read and those who rely on sign language. How to speak clearly to lip readers;
- Methods of communication with speech-impaired people;
- Information about the range of equipment which can assist handicapped people; and
- Simple first aid.

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