

ALTERNATIVE METHODS FOR PROVIDING LANDSIDE CAPACITY AT EXISTING SITES

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OBJECTIVES

1. Identify and describe the functional types of airports and their capacity problem characteristics.
2. Identify methods for increasing landside capacity through physical, technological, and operational means and describe known and potential effectiveness of each.
3. Develop tentative priorities for which methods of increasing landside capacity are most worthwhile for specific functional types of airports.
4. Recommend research and development that includes program priorities for increasing landside capacity for the following categories: (a) resolution of areas of uncertainty regarding suitability, performance, quality of service and cost of available physical, technological, and operational methods to facilitate their implementation (i.e., analyses, demonstrations); and (b) development of new technology and managerial techniques applicable to specific capacity problem characteristics.

PARTICIPANTS

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Workshop 5 had as its primary focus the determination of available and potential technological, operational-procedural, and institutional-regulatory methods for providing additional landside capacity at existing airports in the United States. The workshop developed approximately 20 research and development state-

ments elaborating on specific areas of concern within the landside where it was apparent that there was a void in existing documentation of the nature and extent of the problems, previous successes and failures in solving those problems, and methodologies, specific actions, events, or devices that might be used to overcome the identifiable capacity constraints at existing airport facilities. The workshop dealt only with passenger-related facilities on the airport landside; no attempt was made to address landside problems associated with cargo, service, or other air-related public use facilities.

AIRPORT TYPES AND LANDSIDE FUNCTIONAL COMPONENTS

The following listings and terminologies were developed as a framework for conducting the discussions and preparing the resultant research and development statements.

Airport Types

This listing of airport types was generated to provide a measure of the degree of significance of a capacity problem on diversified types and sizes of airports in terms of function, activity levels, and user characteristics.

Scale and activity level	Purpose of travel
Large airport (>3 million enplaned passengers per year)	Business
Medium airport (1 to 3 million passengers per year)	Recreation
Small airport (500,000 to 1 million passengers per year)	Family
Passenger characteristic	Type of operation
Originating	Scheduled domestic
Terminating	Scheduled international
Transit	Charter
Transfer	Nonscheduled
	Airline characteristic
	International carrier
	Major carrier
	Supplemental carrier
	Second-level carrier
	Third-level carrier

Landside Functional Components

This listing of landside functional components was generated to establish the primary functional components of the landside system and provide the basis for identifying capacity problems and their potential solutions.

Off-airport access and egress	Hold rooms
On-airport access and egress	Aircraft loading devices
Curbside loading and unloading	Circulation corridors
Parking	Circulation devices
Internal circulation	Public services
Ticketing	Concessions
Baggage check-in	Security
Baggage handling and distribution	Federal inspection
Baggage claim	

INCREASING LANDSIDE CAPACITY: METHODOLOGIES AND TECHNIQUES

The workshop developed 3 basic categories of improvements that have been used or have the potential for providing or overcoming capacity problems at existing landside facilities.

1. Technological—Physical facilities, devices, or equipment that are currently available, under research and development, or only conceptual and that would require capital-intensive investments for demonstration and subsequent implementation.
2. Operational and procedural—Methods and sequences of operations, controls, and prescribed procedures that are currently in wide practice, under experimentation, or yet to be implemented and that tend to be noncapital types of improvements.
3. Institutional and regulatory—Policies established by law or regulation that affect procedures, operations, and sources of funds for implementation of technological improvements.

The workshop was in general agreement that the air carriers, airport authorities, and federal government through the Department of Transportation, the Federal Aviation Administration, and the Civil Aeronautics Board were the participants primarily responsible for implementing programs to increase landside capacity in all 3 categories of improvements.

It also determined that the relative benefits and costs of implementing any of these improvements would be primarily economic from the point of view of both capital and maintenance and operations.

CHARACTERISTICS OF CAPACITY PROBLEMS

The workshop developed a series of existing and anticipated landside capacity problems in terms of major issues, vehicular-related components, pedestrian-related components, and planning-design methodologies. Participants discussed at length the extent and severity of many of these problems as well as alternative methods that have been used or considered for alleviating or avoiding such problems. The research and development statements that resulted from this workshop elaborate on the nature of these problems and their potential solutions through application of existing technologies or development of new technologies, changes or revisions in operational and procedural methods, or reform of institutional-regulatory policies.

Major Issues

The following were considered to be major issues associated with increasing the capacity of existing landside facilities or accommodating new developments. Their priority in terms of resolution was considered to be considerably greater than any issue associated only with a particular component of the landside system.

1. Surface transportation—The problems associated with both off-airport and on-airport vehicular access and egress circulation, curbside loading and unloading, and parking as related to the passenger terminal facilities.
2. Automation—The problems that are associated with the extent and reliability of automation in general on the airport landside and that deal with the software program inputs as well as the hardware elements of the system for ticketing, reservations, baggage handling, and intraairport transit systems.
3. Off-airport and remote-processing terminals—The problems and potentials for reducing the need for on-airport processing facilities as the result of implementation of off-airport processing facilities and appropriate collective ground access and egress systems.

4. Passenger terminal concepts—Methodologies and effective use of centralized, decentralized, or transporter passenger-handling systems in providing landside capacity related to activity levels, land availability, passenger characteristics, and joint and preferential use facilities.

5. High-density movements—The anticipated problems and potential solutions associated with an influx of charter and nonscheduled air carrier operations on existing landside facilities.

6. Wide-bodied aircraft and high peak-hour operations—The problems and alternative solutions for accommodating wide-bodied, high-capacity aircraft using small and medium airports during concentrated hours of operation.

Vehicular-Related Landside Components

The following subjects were considered to be worthy of specific research and development efforts based on the widespread occurrence of capacity problems at the vast majority of the large and many medium and small airports.

7. Employee access and egress—The problems associated with simultaneous peaking of vehicular access and egress demands for air travelers and airport employees.

8. Highway access information systems—The orientation problems associated with locating an airport facility in an unfamiliar environment because of inadequate signing and graphics along the arterial, county, state, and federal road systems.

9. Curbside capacity constraints—The problems and potential solutions for providing additional curbside drop-off and pick-up facilities where present capacity is physically limited.

10. Intraairport transit (people movers)—The present state of the art of intraairport transit, its limitations, and potential use for providing additional capacity at major landside airport facilities.

11. Transporter vehicle development—The investigation and subsequent prototype development of an over-the-road passenger and baggage-carrying device that would provide collective ground access and egress from aircraft gate positions to off-airport and remote passenger terminals.

Pedestrian-Related Landside Components

The following subjects were considered to be significant in terms of potential research and development efforts associated with pedestrian movement and passenger processing within the passenger terminal complex.

12. Baggage handling—The problems and potential technological solutions associated with baggage check-in, sorting and distribution, and claim facilities.

13. Passenger information systems—The problems and potential solutions for providing passengers with adequate information and orientation within the passenger terminal in terms of processing procedures and location of major functional components.

14. Intermodal ticketing—The potential for providing a single ticket for the traveler's use in completing his or her total trip from specific origin and destination using ground as well as air transportation.

15. Concessions and consumer services—The extent to which revenue-producing concessionaires constrain landside capacity in terms of space use and passenger-flow characteristics.

16. Security procedures—The impact of unexpected security-related procedural requirements on the capacity and passenger-flow characteristics of landside processing facilities.

17. Federal inspection services—The problems and potential solutions associated with processing international passengers arriving at U.S. airports in terms of passenger flows and inspection procedures.

Planning and Design Methodologies

The following items were considered to be applicable to the entire landside capacity problem and not applicable to any one functional component. These issues were of varying priorities with regard to implementation potential.

18. Low-cost alternatives for increasing landside capacity—The potential solutions for increasing landside capacity with a relative nominal investment in terms of capital and labor use.

19. Forecasting methodologies—The deficiencies in determining an appropriate statistical base for identifying capacity problems and implementing appropriate technical, operational, or policy-related solutions.

20. Level-of-service characteristics—The deficiencies in defining acceptable levels of service in terms of physical, social, and economic characteristics associated with landside facilities.

The latter 2 subjects are topics that were undertaken in Workshop 1. Because these topics will be fully documented in that workshop report, they are not discussed here.

LANDSIDE CAPACITY PROBLEMS: IMPACTS AND PRIORITIES

To effectively document the impacts and priorities for conducting research and development associated with providing additional landside capacity at existing airports, a series of matrixes were prepared and are given in Tables 1, 2, 3, and 4. The existing and potential capacity problems correlated with the diversified scale, types, and users of airport landside facilities are given in Tables 1 and 2. Tables 3 and 4 give the landside capacity problems correlated with the primary landside functional components to identify their relative impacts on the landside system. Table 5 gives the landside capacity problems correlated with categories of improvements including an indication of their relative priority in undertaking research and development studies.

SUMMARY AND CONCLUSIONS

The research and development statements generated by this workshop suggest that the vast majority of the present and anticipated landside capacity problems have potential solutions in terms of the operational-procedural and institutional-regulatory medium rather than in purely technological developments. In addition, the workshop agreed that those capacity problems that have been identified as major issues are of the first priority. This is particularly true for those statements that call for documenting in an objective manner the various methods that have been used at a single airport or by a single carrier in dealing with particular landside constraints. Formalized documentation should be collected, organized, and disseminated by the appropriate federal agency to the planning and design professionals as well as to other air carriers and airport authorities encountering or anticipating landside capacity problems. Such an endeavor would be most beneficial in preventing each airport from having to "reinvent the wheel" to solve what appears to be a problem unique to a particular situation.

The general tone of discussions in this workshop, particularly that from the air carriers, indicates that many of the suggested methods of providing additional landside capacity have indeed been implemented at certain airports for a special set of circumstances. Examples of these improvements include joint and preferential use of certain facilities such as hold rooms, aircraft gate positions, and ground handling equipment; automation of baggage handling and distribution systems where peak-hour loadings justify such installations; specialized facilities with appropriate level-of-service differentials for processing charter and nonscheduled flights; and use of hybrid or combined terminal concepts within the same basic terminal complex or on the same airport such as Atlanta and St. Louis, where transporters are used in combination with fixed

Table 1. Landside capacity problems and impact on airport type in terms of activity level, passenger characteristics and travel purpose.

Landside Capacity Problems	Activity Level			Passenger Characteristic				Travel Purpose		
	Large	Medium	Small	Originating	Terminating	Transit	Transfer	Business	Recreation	Family
Major issues										
Surface transportation	X	O		X	O			X		
Automation	X	O	O	X			O	X		
Off-airport and remote processing terminals	X			X	O			X		
Passenger terminal concepts	X	X	X	X	X	O	X	X		
High-density movements (charter)	X	X	O	X	X				X	O
Wide-bodied aircraft and high peak-hour operation	X	X	X	X	X		O	X	O	O
Vehicular-related landside components										
Employee access and egress	X	O		X				O		
Highway access information systems	X	X	O	X				X	X	O
Curbside capacity constraints	X	X	X	X	X			X	O	O
Intraairport transit (people movers)	X	O		O	O		X	X		
Transporter vehicle development	O			X	X			O	O	O
Pedestrian-related landside components										
Passenger information systems	O	O	O	O	O		X	O	O	O
Intermodal ticketing	O	O		X	X			O	O	
Concessions and consumer services	X	X	O	X		X	O	O	X	O
Security procedures	X	X	X	X	O	O	X	X	X	X
Federal inspection services	X	X			X		O	O	O	
General issues										
Low-cost alternatives for increasing landside capacity	X	X	X	O	O		O	O		
Forecasting methodologies	O	O	O	O	O	O	X			
Level-of-service characteristics	O	O	O	O	O		O	O	O	O

Note: X = primary and O = secondary.

Table 2. Landside capacity problems and impact on airport type in terms of operation, and airline characteristics.

Landside Capacity Problems	Operation Type				Carrier Type				
	Scheduled			Nonscheduled	International	Major	Supplemental	Second Level	Third Level
Domestic	International	Charter							
Major issues									
Surface transportation	O	O			O	O			
Automation	X	O			O	O			
Off-airport and remote processing terminals	X					X			
Passenger terminal concepts	X	O	O	O	X	X	O	O	O
High-density movements (charter)			X	X	O	O	X		
Wide-bodied aircraft and high peak-hour operation	X	O	O	O	O	X	O		
Vehicular-related landside components									
Employee access and egress	O					O			
Highway access information systems	O					O			
Curbside capacity constraints	X	O			O	X			
Intraairport transit (people movers)	X	O			O	X			
Transporter vehicle development	O					O			
Pedestrian-related landside components									
Passenger information systems	X	X			X	X			
Intermodal ticketing	O	O			O	O			
Concessions and consumer services	X	O	O		O	X	O	O	
Security procedures	X	X	O	O	X	X	O	O	O
Federal inspection services		X	X	O	X		X		
General issues									
Low-cost alternatives for increasing landside capacity	O	O			O	O	O	O	O
Forecasting methodologies	O	O			O	O			
Level-of-service characteristics					O	O			

Note: X = primary and O = secondary.

Table 3. Landside capacity problems and impact on functional components of access and egress systems and baggage handling in terminal system.

Landside Capacity Problems	Off-Airport Access and Egress	On-Airport Access and Egress	Curbside Loading and Unloading	Parking	Baggage Check-in	Baggage Handling and Distribution	Baggage Claim
Major issues							
Surface transportation	X	X	X	X			
Automation					O	X	O
Off-airport and remote processing terminals	O	O	O	O	X	X	X
Passenger terminal concepts	O	O	X	O	O	O	O
High-density movements (charter)	O	O	X	O	X	X	X
Wide-bodied aircraft and high peak-hour operation	O	O	X	O	O	X	O
Vehicular-related landside components							
Employee access and egress	X	X					
Highway access information systems	X						
Curbside capacity constraints			X	X			
Transporter vehicle development	X	X				X	
Pedestrian-related landside components							
Passenger information systems					O		X
Intermodal ticketing	X	O					
Security procedures					X		O
Federal inspection services							X
General issues							
Low-cost alternatives for increasing landside capacity			X	O			
Forecasting methodologies			X	X			
Level-of-service characteristics			X		O		X

Note: X = primary and O = secondary.

Table 4. Landside capacity problems and impact on other functional components of terminal system.

Landside Capacity Problems	Internal Circulation	Ticketing	Hold Rooms	Aircraft Loading Devices	Circulation Corridors	Circulation Devices	Public Services	Concessions	Security	Federal Inspection
Major issues										
Surface transportation	X									
Automation		X				X			O	X
Off-airport and remote processing terminals	O	O	O	O	O	O	O	X	O	O
Passenger terminal concepts	O	O	X	X	X	O	O	O	X	O
High-density movements (charter)	O	X	O	O	O	O	O	O	X	O
Wide-bodied aircraft and high peak-hour operation	O	O	O	O	O	O			O	
Vehicular-related landside components										
Employee access and egress	O									
Curbside capacity constraints	X					X				
Intraairport transit (people movers)	X									
Transporter vehicle development	X		O	X					O	
Pedestrian-related landside components										
Passenger information systems		O	X		X		O	O		
Intermodal ticketing		X								
Concessions and consumer services					X		O	X		
Security procedures			X		O				X	
Federal inspection services					O					X
General issues										
Low-cost alternatives for increasing landside capacity			X	O	O			O		
Forecasting methodologies			X							
Level-of-service characteristics		X	O		O		O	O	X	X

Note: X = primary and O = secondary.

Table 5. Landside capacity problems and research and development categories and priorities.

Landside Capacity Problems	Technological	Operational and Procedural	Institutional and Regulatory	Priorities
Major issues				
Surface transportation		X	X	1
Automation	X	O		1
Off-airport and remote processing terminals	O	X		2
Passenger terminal concepts		O		2
High-density movements (charter)		O	X	3
Wide-bodied aircraft and high peak-hour operations		X	O	1
Vehicular-related landside components				
Employee access and egress		X		3
Highway access information systems		O	X	2
Curbside capacity constraints		X		1
Intraairport transit (people movers)	X	O		3
Transporter vehicle development	X	O		3
Pedestrian-related landside components				
Passenger information systems	X	O		2
Intermodal ticketing	O	X	O	3
Concessions and consumer services		X		3
Security procedures	O	X	X	1
Federal inspection services	O	X	X	2
General issues				
Low-cost alternatives for increasing landside capacity	O	X		1
Forecasting methodologies	O			2
Level-of-service characteristics		O		2

Note: X = primary and O = secondary.

gates and centralized check-in facilities.

The tone of the discussions also indicated that many present and impending capacity problems could be readily solved through low-capital development such as standardization of processing methods between air carriers providing compatible types of service, uniform systems for pedestrian information, policing of curbside roadways, and more rigorous pricing policies for short- and intermediate-term parking facilities immediately adjacent to the terminal facilities.

The major capacity questions related to off-airport access and egress facilities suggest that the primary issues revolve around who is responsible for providing the improvements and what is the basis for sharing the cost of implementing the improvements. The air carriers and airport authorities are particularly sensitive to this question. Lack of coordination between multijurisdictional bodies on priorities for airport-oriented access and egress improvements is one of the major hurdles to overcome in solving this problem in the large metropolitan areas.

Participants discussed at length the past failures of remote off-airport or downtown processing terminals and their future potential for providing additional landside capacity, particularly at the largest airports. The problem of diversified geographic origins and destinations of the air travelers in almost any given metropolitan area in this country was constantly emphasized as an obstacle. In addition, the high cost per passenger processed in relation to the potential benefits is now difficult to justify according to the air carriers. The question of who provides and pays for the collective ground access and egress interface is also an important one requiring further documentation and analysis. The problems of loss of income and revenue to the airport authorities as more facilities are located off the airport also affect the financial aspect of providing additional landside capacity by building facilities elsewhere in the metropolitan area.

The workshop agreed that research and development activities oriented toward documentation of past and current experiences are of the first order of priority. Such documentation will provide analysis and evaluation of relative successes and failures in providing additional landside capacity and guidelines for planning future landside facilities to accommodate the anticipated growth in air travel. Participants generally recognized that there are serious concerns as to when procedural changes should be implemented or automated-ticketing, baggage-handling, and people-mover devices installed; how these improvements should be financed; and what should be the extent and nature of the federal government's involvement in providing answers to these fundamental questions.

Participants in this workshop are convinced that the federal government through the Department of Transportation and the Federal Aviation Administration has a vital role to play in assuring travelers that there is an appropriate balance of capacity at our nation's airports in terms of airside and landside facilities. The system must continue to provide a level of service commensurate with the sophistication, passenger capacity, and cost of the aircraft now in commercial service and projected to be in service before the end of this decade.