A Preliminary Look at Ground Access to Airports

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•IN SEPTEMBER 1967 Secretary of Transportation Alan S. Boyd directed the Federal Highway Administration to initiate a program to help solve problems of access to airports. The Secretary called for close cooperation in this effort between headquarters components of the Federal Highway Administration and the Federal Aviation Administration. As a result, an effective liaison was established among these groups and their field offices in coordinating the program.

The work to be performed under this program can be divided into several categories including analysis of the problem, required highway system actions, evaluation of traffic operations improvements that might be accomplished, etc. It also can be considered to consist of an immediate-action program and a long-range continuing program. This paper reports a small portion of the immediate-action portion of the program and relates specifically to an attempt to make an immediate appraisal of present access problems.

DATA COLLECTION

Pursuant to the program, the Bureau of Public Roads issued a circular memorandum requesting certain information for all airports serving cities of over 50,000 population. The information requested included the following:

1. A map of at least 1 in. = 1 mile defining the corridor from the appropriate central business district(s) to the airport(s) serving the metropolitan area. This map should indicate either on its face or by overlay the selected access route from the CBD(s) to the airport, any significant alternate routes from the CBD(s) to the airport, and the system designation for all federal-aid routes serving the airport.
2. The travel distance from the CBD to the airport; the peak hour travel time from the CBD to the airport; the off-peak travel time from the CBD to the airport; and identification of sections of the route on which significant delay is experienced, together with a description of the conditions that cause the delay (congestion, uncoordinated signals, parking, lack of access points, etc.) for each selected route.
3. A description of present mass transit service between the CBD and the airport (limousine, bus, taxi, rail, helicopter, other), and any current proposals for improvement of mass transit service to the airport and the status of those proposals.

In addition to the primary CBD-airport linkages, routes to other business districts were also considered in these reports. The result was a rather complete file relative to ground access to airports at one point in time (late 1967 or early 1968), and such additional information as could be offered on forthcoming improvements including unfinished linkages on the Interstate System, proposed transit connections, and possible traffic operations improvements that can be put into effect.

SUMMARY AND ANALYSIS

The reports received on all large and medium hub airports as defined by the FAA were summarized and have been included here.

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TABLE 1

CONNECTIONS BETWEEN CBD'S OF 21 CITIES AND THEIR PRIMARY MAJOR HUB SERVICE

City	Airport	1960 Population (1000's)	District (miles)	Travel Time, Peak	Travel Time, Off-Peak	Speed, Peak (mph)	Speed, Off-Peak (mph)	Percent Freeway
Atlanta		768.1	8.9	24.5	12.7	21.8	42.0	93.3
Boston	Logan	2,413.2	4.0	25.0	16.0	9.6	15.0	12.5
Chicago	O'Hare	5,959.2	17.5	45.0	27.0	23.4	39.0	85.7
Cincinnati		993.6	13.0	22.8	16.8	34.2	46.5	69.2
Cleveland		1,784.9	14.0	25.0	20.0	33.6	42.0	67.9
Dallas	Love	932.3	7.5	16.5	14.0	27.3	32.2	58.6
Denver	Stapleton	803.6	6.1	17.2	15.5	21.3	23.6	0.0
Detroit	Metropolitan	3,537.7	18.3	47.0	32.0	23.5	34.5	73.8
Kansas City	International[a]	921.1	19.2	25.0	25.0	46.0	46.0	88.5
Los Angeles		6,488.8	15.0	40.0	—[c]	22.5	—[c]	36.7[b]
Miami		852.7	7.4	24.0	21.0	18.5	21.1	0.0
Minneapolis-		1,377.1	12.3	21.0	18.0	35.2	41.0	47.1
St. Paul			8.3	17.0	16.0	29.3	31.2	42.1
New Orleans		845.2	14.4	30.0	23.0	28.6	37.4	65.2
New York	Kennedy	14,114.9	14.3	50.0	30.1	17.2	28.5	49.0
New York	LaGuardia	14,114.9	7.8	31.5	19.1	14.9	24.4	87.1
New York	Newark	14,114.9	11.0	23.7	15.9	27.8	41.5	94.5
Philadelphia		3,635.2	8.9	24.0	20.0	22.0	27.7	46.1
Pittsburgh		1,804.4	17.0	—[c]	—[c]	—[c]	—[c]	—
San Francisco		2,430.6	14.5	35.0	23.0	25.0	38.0	89.6
Seattle	Seatac	864.1	14.0	22.0	20.0	38.0	42.0	92.5
St. Louis		1,667.7	14.8	25.5	21.0	35.0	42.2	92.5
Washington	National	1,808.4	4.0	17.0	13.0	14.0	18.5	12.5
Washington	Dulles	1,808.4	24.8	52.0	39.0	28.6	38.2	56.0

[a]Estimated information on new airport. [b]Interstate freeway only. [c]Not reported.

TABLE 2

CONNECTIONS BETWEEN CBD'S OF 31 CITIES AND THEIR PRIMARY MEDIUM HUB SERVICE

City	Airport	1960 Population	District (miles)	Travel Time, Peak	Travel Time, Off-Peak	Speed, Peak (mph)	Speed, Off-Peak (mph)	Percent Freeway
Albany	Albany County	455	8.4	24.8	19.3	20.3	26.1	0
Albuquerque	Sunport	241	4.3	8.6	8.6	30.0	30.0	32
Baltimore	Friendship	1,419	10.5	17.0	16.1	37.0	39.1	0
Birmingham		521	5.1	14.0	12.0	21.8	25.4	0
Buffalo	International	1,054	9.8	22.8	18.0	25.8	32.7	0
Charlotte	Douglas	209	7.2	21.8	19.2	19.8	22.5	0
Columbus	Port Columbus	617	8.2	22.0	17.1	22.4	28.8	17
Dayton	Cox	512	13.3	23.5	18.0	34.0	44.4	74
Des Moines		241	5.2	14.0	12.4	22.2	25.1	0
El Paso		277	8.3	14.0	12.0	35.6	41.5	78
Hartford	Bradley	382	16.0	30.0	20.0	32.0	48.0	74
Indianapolis		639	7.9	24.6	20.4	19.3	23.2	18
Knoxville	McGhee-Tyson	173	14.2	18.7	17.2	49.6	40.5	6
Louisville	Standiford	607	6.0	15.0	11.0	24.0	32.8	100
Memphis		545	12.3	20.5	13.0	36.0	41.0	68
Milwaukee	Mitchell	1,150	7.5	20.7	17.0	21.8	26.5	43
Nashville	Berry	347	6.9	12.2	10.0	34.0	41.4	72
Norfolk		508	11.0	17.2	16.3	38.4	40.5	68
Oklahoma City	Will Rogers	429	10.6	18.8	16.3	33.8	39.0	47
Omaha	Eppley	390	4.5	11.0	11.0	25.0	25.0	73
Phoenix	Sky Harbor	552	7.4	17.8	15.4	25.0	28.8	0
Portland, Ore.		652	10.5	24.1	16.9	29.4	37.3	51
Providence	Green	660	10.0	15.0	15.0	40.0	40.0	78
Raleigh		94	14.5	30.1	23.3	29.0	37.3	0
Rochester	Monroe County	493	4.2	19.5	15.0	13.0	16.8	0
Sacramento	Sacramento Co.	452	12.8	21.0	20.0	36.5	38.5	23
Salt Lake City		349	8.6	22.0	22.0	36.3	36.3	27
San Antonio		642	8.5	15.0	13.0	34.0	39.3	15
San Diego		836	3.1	9.5	8.3	20.0	22.0	0
Syracuse		333	8.1	16.7	17.7	29.0	27.5	68
Tulsa		299	8.5	26.2	20.6	19.5	24.8	0

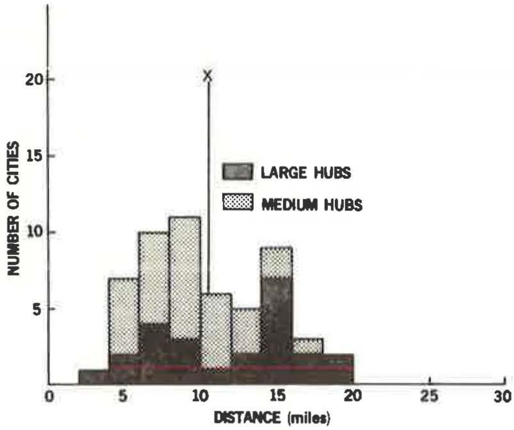

Figure 1. Distance from CBD to major airports.

For purposes of this discussion, we can probably gain more insight into the airport access problem in large cities by considering only the major route connection between the primary CBD and the airport. Tables 1 and 2 summarize distance, travel time, overall travel speed, and percent of freeway for 23 airports serving large hub cities and 31 airports serving medium hub cities, respectively.

Distance

The mean travel distance between the 23 large hub airports and their primary central business districts is 12.4 miles. Five major hub airports are located more than 15 miles from the CBD. These are Washington, D. C., to Dulles airport (24.8 miles); the new Kansas City International (19.2 miles); Detroit Metropolitan (18.3 miles); Chicago O'Hare (17.5 miles); and Pittsburgh (17.0 miles).

The mean travel distance from CBD to airport for medium hub cities is 9.1 miles, compared to 12.4 miles for major hub cities. Only one medium hub connection is over 15 miles from the CBD (Bradley Field, serving Hartford, Conn., and Springfield, Mass.—16.0 miles to Hartford CBD), and 10 others are over 10 miles. These include Raleigh, N. C. (14.5 miles—also serves Durham); Knoxville, Tenn. (14.2 miles); Dayton, Ohio (13.3 miles); Sacramento, Calif. (12.8 miles); Memphis, Tenn. (12.3 miles); Norfolk, Va. (11.0 miles); Oklahoma City, Okla. (10.6 miles); Baltimore, Md. (10.5 miles); Portland, Ore. (10.5 miles); and Providence, R. I. (10.0 miles).

Figure 1 is a frequency distribution showing the number of airports located at various distances from the central business districts.

Travel Time

Perhaps the single most important indicator of the effectiveness of airport service is the travel time for the selected major routes during both the peak travel hour and off-peak periods. Table 3 lists large hub airports having peak and off-peak travel times exceeding an arbitrary service criterion of 30 minutes.

Only one medium hub connection exceeds this service criterion. This is Raleigh, N. C. (30.1 minutes). It should be noted that this is a regional type airport designed to serve more than one city. Table 4 gives all medium hub linkages having travel times greater than 20 minutes.

TABLE 3

LARGE HUB AIRPORT-CBD LINKAGES HAVING TRAVEL GREATER THAN 30 MINUTES

	Peak Hour		Off-Peak	
Rank	Airport	Travel Time (min)	Airport	Travel Time (min)
1	Washington Dulles	52.0	Washington Dulles	39.0
2	New York Kennedy	50.0	Detroit Metropolitan	32.0
3	Detroit Metropolitan	47.0	New York Kennedy	30.1
4	Chicago O'Hare	45.0		
5	Los Angeles	40.0		
6	San Francisco	35.0		
7	New York LaGuardia	31.5		

TABLE 4

MEDIUM HUB AIRPORT-CBD LINKAGES HAVING TRAVEL TIMES GREATER THAN 20 MINUTES

	Peak Hour		Off-Peak	
Rank	Airport	Travel Time (min)	Airport	Travel Time (min)
1	Raleigh, N. C.	30.1	Raleigh, N. C.	23.2
2	Hartford, Conn.	30.0	Salt Lake City, Utah	22.0
3	Tulsa, Okla.	26.2	Tulsa, Okla.	20.6
4	Albany, N. Y.	24.8	Indianapolis, Ind.	20.4
5	Indianapolis, Ind.	24.6	Hartford, Conn.	20.0
6	Portland, Ore.	24.1	Sacramento, Calif.	20.0
7	Dayton, Ohio	23.5		
8	Buffalo, N. Y.	22.8		
9	Columbus, Ohio	22.0		
10	Salt Lake City, Utah	22.0		
11	Charlotte, N. C.	21.8		
12	Sacramento, Calif.	21.0		
13	Milwaukee, Wis.	20.7		
14	Memphis, Tenn.	20.5		

Figure 2 is a frequency distribution showing the number of airports having various peak hour travel times from CBD to the airport. Figure 3 gives comparable information for the off-peak condition.

Overall Travel Speed

Another measure of airport access service is the overall travel speed between the CBD and the airport. Table 5 gives the large hub airports having an overall travel speed less than 20 mph.

Unlike distance and travel time, overall travel speeds from CBD to medium hub airports are quite similar to those obtained for the major hubs. This would appear to be due at least in part to the much lower percentages of freeway connecting the CBD and the airport in medium hub cities. Table 6 gives those medium hub-CBD linkages having overall travel speeds of less than 20 mph.

Figures 4 and 5 are frequency distributions showing the number of airports and peak hour and off-peak travel speeds, respectively.

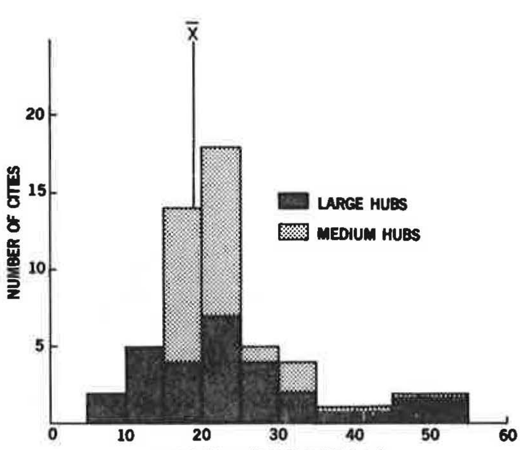

Figure 2. Peak hour travel time from CBD to major airports.

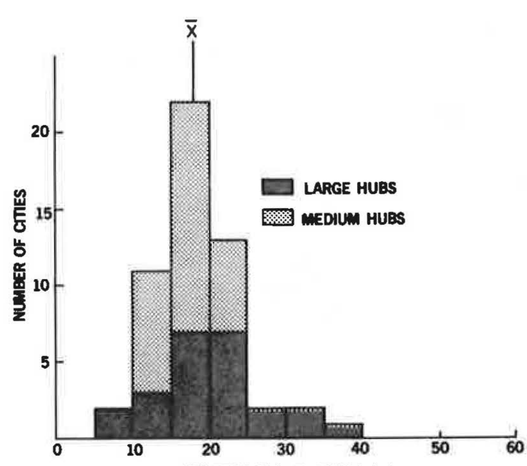

Figure 3. Off-peak travel time from CBD to major airports.

TABLE 5

AIRPORTS HAVING OVERALL TRAVEL SPEEDS LESS THAN 20 MPH

Peak Hour		Off-Peak	
Airport	Overall Speed	Airport	Overall Speed
Boston Logan	9.6	Boston Logan	15.0
Washington National	14.0	Washington National	18.5
New York LaGuardia	14.9		
New York Kennedy	17.2		
Miami	18.5		

TABLE 6

MEDIUM HUB AIRPORTS HAVING OVERALL TRAVEL SPEEDS LESS THAN 20 MPH

Peak Hour		Off-Peak	
Airport	Overall Speed	Airport	Overall Speed
Rochester, N. Y.	13.0	Rochester, N. Y.	16.8
Indianapolis, Ind.	19.3		
Tulsa, Okla.	19.5		
Charlotte, N. C.	19.8		

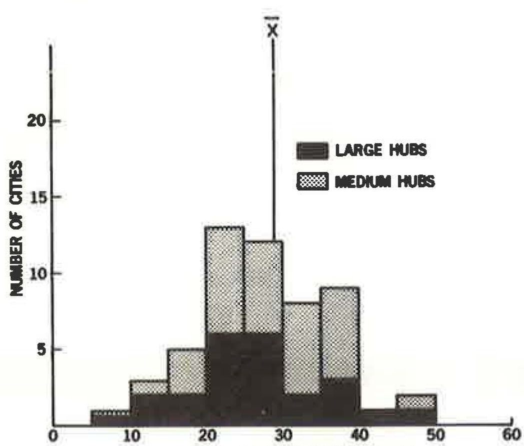

Figure 4. Peak hour travel speed from CBD to major airports.

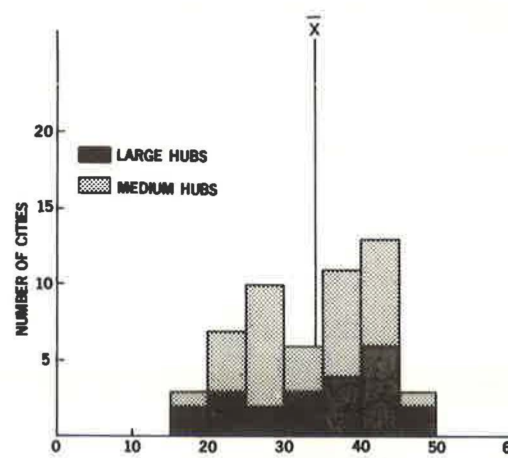

Figure 5. Off-peak travel speed from CBD to major airports.

SUMMARY AND CONCLUSIONS

The best visual summary of current travel impedance can perhaps be obtained from an evaluation of Figures 6 and 7. Figure 6 shows peak hour travel time in minutes vs distance in miles for 23 of our largest cities. These plots also allow overall travel speed to be shown as a function of these variables.

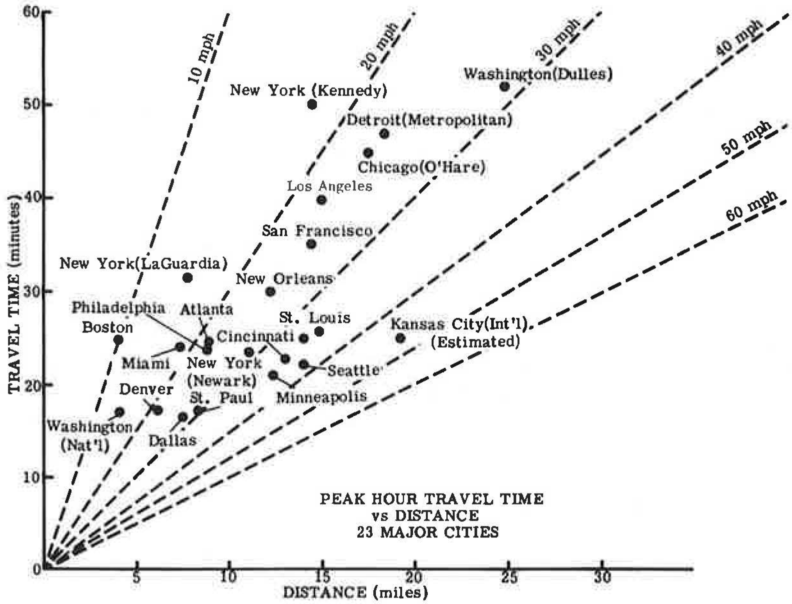

Figure 6. Peak hour travel time vs distance for major cities.

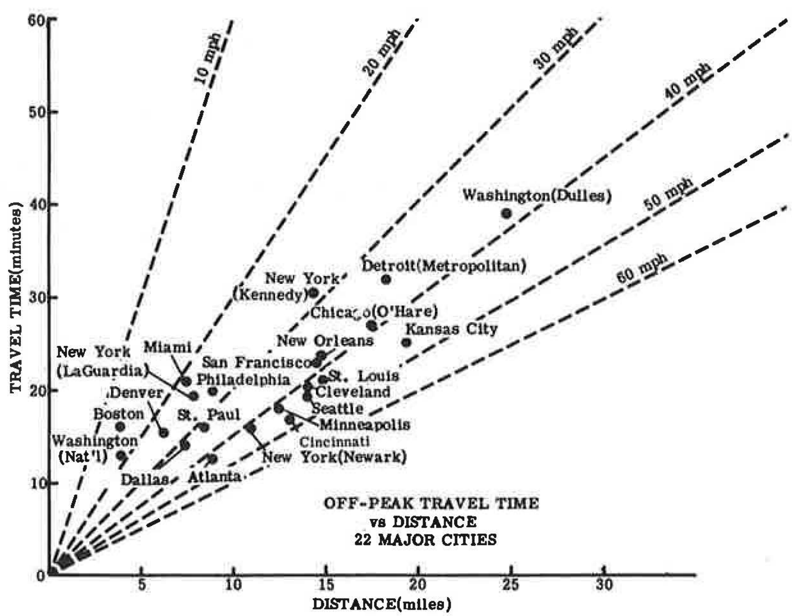

Figure 7. Off-peak travel time vs distance for major cities.

It is difficult to generalize on the magnitude of any specific airport access problem in the context of many different sets of local conditions. The charts do, however, allow for some measure of comparative analysis. On such a plot it is possible to show any "acceptable" travel time criterion by a horizontal line and an "acceptable" speed criterion on one of the sloping speed rays. The obvious problem is one of defining acceptability, and this will vary between individuals. Once defined, however, any airport plot located above the time criterion line and to the left of the speed criterion line could than be said to constitute one of the more critical ground access problems. Consideration of these inputs along with other necessary factors warrants consideration in the early planning and location of new airport facilities.

Figure 7 shows similar information for the off-peak condition. Many of the problems that appear to be critical in the peak hour are not so critical in off-peak periods. This normally represents an airport served by a congested freeway in cities of this size, since the freeway may not be congested in the off-peak period. For airports of this type an alternative to improve highway or transit service might include the rescheduling of flights to periods of off-peak urban travel if good air service can still be provided. Other airports appear to have similar access problems in both the peak and off-peak periods. Improvement of access in these cases would appear to be possible only by provision of better highway or transit service.

It quickly becomes obvious in working with these data that while similar problems exist at certain airports, each airport access problem must be considered on its own merits. This was also attempted as a part of the immediate-action study, but is not discussed in detail here. Many spot improvements are possible where congestion occurs on the access route. Although such improvements should be made where advisable, it may be found that they do not significantly improve the travel time of an individual vehicle. One of the more obvious improvements in accessibility to be evidenced in this study is the completion of Interstate Highway links serving the airport. This is most obvious when considering before and after data that are available for certain cities.

Dispersion of the non-airport end of the trip is one of the more discouraging aspects of trying to improve airport access. Although the CBD normally attracts the greatest single portion of airport travel, it is not the only corridor needing service. More information on the dispersion of airport-oriented trips is highly desirable to help solve airport access problems.

The problem of ground access to airports will only be solved by a systems approach and a cooperative effort by all agencies interested in a solution. Definition of the problem is only the beginning, and its solution will be far more difficult.

ACKNOWLEDGMENTS

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