PLANNING THE STATE AIRPORT SYSTEM

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and

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DEPARTMENT OF TRANSPORTATION
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AIRPORTS SERVICE

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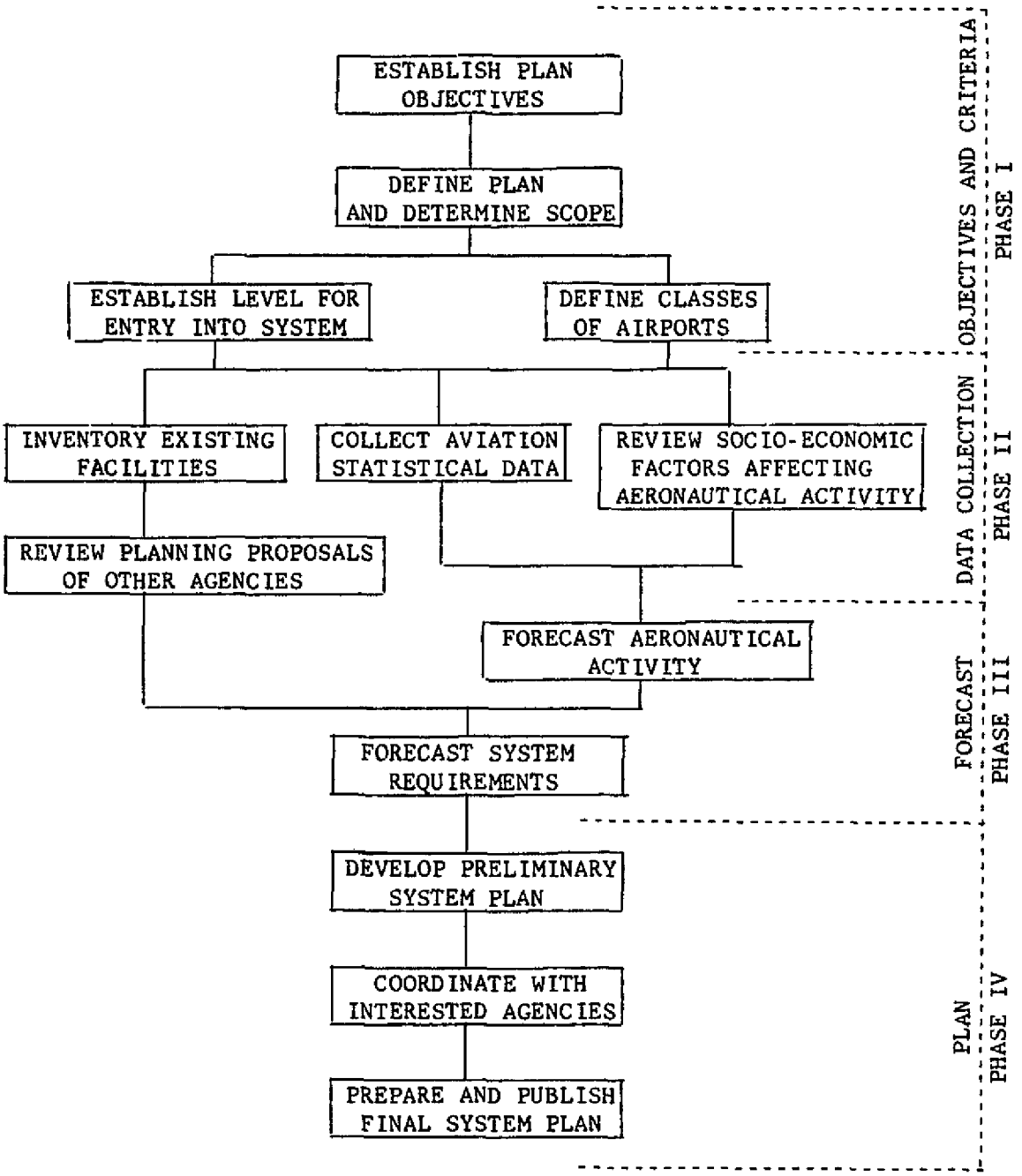

PLANNING THE STATE AIRPORT SYSTEM

CHAPTER 1. INTRODUCTION

1. General. The need for definitive guidance for the preparation of state airport system plans has been recognized for some time by both the Federal Aviation Administration (FAA) and the National Association of State Aviation Officials (NASAO). This need was brought into focus at NASAO's 36th Annual Meeting held in Oklahoma City in September 1967 with the announcement by several states of their intent to initiate such planning in the near future.

Subsequent to the Annual Meeting, the NASAO Airport System Planning Committee was organized. That Committee met with FAA in November 1967 and a joint working group composed of representatives of the states and the FAA was charged with the task of preparing the draft for this document. The following individuals composed the working group:

Representing NASAO - Charles A. Lynch, President, NASAO
Montana Aeronautics Commission

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The draft of this document was coordinated within the FAA, with the NASAO membership, and with other interested agencies and organizations. The resulting applicable suggestions have been incorporated; therefore, this publication represents the experience and best judgment of numerous agencies, organizations, and individuals.

It is anticipated that the state airport system plans prepared in accordance with guidance provided in this document will prove of value not only to the individual state, and the FAA, but also to adjoining states, metropolitan area and regional organizations, and local jurisdictions, in coordinating plans and programs for airport development.

CHAPTER 2. OBJECTIVES OF A STATE AIRPORT SYSTEM PLAN

2. Objectives of a State Airport System Plan. The primary objectives of the State Airport System Plan are:

a. To provide for the orderly and timely development of a system of airports adequate to meet the aeronautical and air transportation needs of the state and the Nation.

b. To provide a framework for airport development programs consistent with short, intermediate, and long-range needs.

c. To assure compatibility with the content, format, standards, and criteria of the National Airport Plan in order that applicable portions may be integrated into a national plan.

d. To provide a basis for coordination of airport plans, with the planning by state, metropolitan, and urban agencies in the areas of transportation, land use, economic development, and resource utilization, and for coordination with airport system plans in adjoining states.

e. To inform local, state, and national political and individual interests of aviation facility requirements, and to bring an awareness to the general public of the need for a systems approach to airport planning and development.

f. To make possible long-range coordination of airport development, air navigation facilities, airspace use, and air traffic control procedures.

g. To provide a document for use at local level in:

(1) preliminary planning
(2) master planning
(3) detail planning
(4) estimating cost of development

h. To identify the general locations of all the airports, by type and size, that will be required to make air transportation reasonably accessible to every community in the state.

i. To provide for the orderly allocation of land for airport purposes.

j. To minimize airport related environmental problems such as aircraft noise.

CHAPTER 3. DEFINITION AND SCOPE OF A STATE AIRPORT SYSTEM PLAN

3. Definition of a State Airport System Plan. The State Airport System Plan is a document which specifies the planned location of airports within the state, and sets forth the timing and estimated cost of various phases of airport development and related facilities.

4. Relation to the National Airport Plan. The State Airport System Plan prepared in accordance with this guidance document will normally contain sufficient information to render applicable portions acceptable for inclusion in the National Airport Plan.

   In formulating the National Airport Plan, the FAA will give every consideration to the inclusion of recommendations contained in the state plan, insofar as state objectives are consistent with national objectives.

5. Time Periods for the Plan. The long-range time period for the plan should be twenty years and should include the designation of locations, the identification of class and system role of all airports, and their estimated development cost, in accordance with future air transportation projections. Long-range planning beyond the 20-year period may be desirable in certain areas.

   The intermediate-range should be for a period of 10 years and should more precisely define the development requirements and cost estimates thereof than does the long-range plan.

   The short-range term of the plan should be for a period of two to five years and include a detailed description of contemplated development, with cost estimates sufficiently accurate to determine the financial needs for the immediate future budgeting period as may be required by the Congress, the various state legislatures or assemblies, and local governments in formulating their airport development programs.

   There is a great need to compile significant statistical data regarding airport development requirements for a national system of airports and the estimated cost thereof. To accomplish this individual state airport system, plans should be as uniform as possible, particularly the number of years covered by the plans. Therefore, this document contemplates that:

   a. short-range plans completed during the 1969-70 period will be to the year 1975;

b. intermediate-range to the year 1980; and

c. long-range plans to the year 1990.

The years 1980 and 1990 were selected because they coincide with National Census years and are target dates utilized by many planning agencies.

CHAPTER 4. FINANCIAL ASSISTANCE FOR THE PREPARATION OF THE STATE AIRPORT SYSTEM PLAN

6. DHUD's "701" Planning Assistance Program. The principal source of Federal financial assistance for the preparation of the State Airport System Plan is the Department of Housing and Urban Development's "701" Planning Assistance Program.

The "701" program may provide Federal grant assistance for state airport system planning when it is a part of the state's comprehensive planning program. Early contact with the appropriate regional office of DHUD should be made for determining potential means of financing this planning effort.

Following are the addresses of the Department of Housing and Urban Development Regional Offices:

Region 1: 346 Broadway, New York, New York 10013

Region 2: Widener Building, 1339 Chestnut Street, Philadelphia, Pennsylvania 19107

Region 3: Peachtree-Seventh Building, Atlanta, Georgia 30323

Region 4: 360 North Michigan Avenue, Chicago, Illinois 60601

Region 5: Federal Office Building, 819 Taylor Street, Fort Worth, Texas 76102

Region 6: 450 Golden Gate Avenue, P. O. Box 36003, San Francisco, California 94102

Region 7: P. O. Box 3869 GPO, San Juan, Puerto Rico 00936

CHAPTER 5. AIRPORTS IN THE STATE SYSTEM AND THEIR CLASSIFICATION

7. Airports in the State System. The state plan should include all airports required to develop a comprehensive system of public airports adequate to provide for the social, economic, recreational, and aeronautical needs of the people of all parts of the state.

   To accomplish this, qualifications for inclusion of locations may vary from state to state. For example, due to population distribution, geographic, or economic development factors, communities of 500 population may qualify for entry into the plan in certain states, whereas more highly populated or industrial states may have more stringent qualifications.

   In selecting the general location of the airports, due regard should also be given the major factors described in Appendix 1 of FAA Advisory Circular 150/5060-2, Airport Site Selection, and Paragraph 37b(4) and 37c of this document.

8. Classes of Airports. Airports included in state airport system plans prepared in accordance with this document shall be classified as follows:

   a. Landing Strips (LS). Landing facilities smaller than Basic Utility Airport - Stage I.

   b. Basic Utility (B). The Basic Utility type of airport is planned to accommodate 95 percent of the general aviation fleet, except for transport types and some twin-engine aircraft over 8,000 pounds gross weight. For purposes of stage development, the Basic Utility type is further subdivided into Stages I and II. (See Advisory Circular 150/5300-4A, Utility Airports.)

      Stage I has dimensions capable of accommodating most single-engine and some light twin-engine aircraft in the general aviation fleet. At basic conditions of sea level elevation and 59°F temperature, the runway length for this stage is 2,200 feet (runway length requirements are affected by conditions of site elevation and temperature). Stage I accommodates 75 percent of the (1968) general aviation fleet and normally should be capable of expansion to Stage II.

      Stage II is the final development stage of the Basic Utility type and, under the foregoing conditions, has a minimum runway length of 2,700 feet.

c. General Utility (G). The General Utility type of airport accommodates all of the current (1968) general aviation fleet except certain jets and transport type aircraft. Its runway length for basic conditions of sea level elevation and 59°F temperature is 3,200 feet.

d. Basic Transport (BT). The Basic Transport type of airport is planned to accommodate turbojet powered aircraft which are under 60,000 pounds gross weight in addition to the utility grouping of aircraft. This type of airport is planned when significant use by those aircraft often referred to as "Business Jets", "Corporate Jets", and "Executive Jets" is anticipated.

e. General Transport (GT). The General Transport type of airport is planned to accommodate transport category aircraft up to 175,000 pounds maximum gross takeoff weight.

f. Scheduled Air Transport (AT). Airports used or to be used by CAB and state certificated air carriers which use transport category aircraft.

g. Heliport (HE). A Heliport is an area, either at ground level or elevated on a structure, that is used or intended to be used for the landing and takeoff of helicopters and may include some or all of the various facilities useful to helicopter operation such as helicopter parking, waiting room, fueling, and maintenance equipment.

h. STOL port (ST). A STOL port is an airport specifically designed for aircraft with short takeoff and landing (STOL) capability. The length of runway currently recommended is 1,500 feet.

CHAPTER 6. INVENTORY OF EXISTING AERONAUTICAL FACILITIES

9. General. The initial step in inventorying the state airport facilities is to geographically locate all existing airports in the state including heliports, STOL ports, and seaplane bases. The location of these airports should be shown on a state map to indicate the general areas which have facilities for some type of air transportation service. (See Appendix B, Graphical Presentations for Volume I, and Appendix C which backs up the state map with an alphabetical listing of all airports with pertinent information.)

Most basic information required for an individual airport inventory is included on FAA Form 5010-1. (See Appendix E for a sample of this form.) In addition, the following information should be included in the inventory.

10. Building Areas. Include square footage of administrative/terminal buildings, cargo handling facilities and warehouses, hangars, T-hangars, commercial and industrial buildings.

11. Activities.

a. Flight Activities - Name and address of fixed base operator(s) and services offered.

b. Air Carrier Operators - Scheduled air carrier(s) and names and addresses of station manager(s).

c. Air Taxi - Addresses of air taxi and V/STOL operators, both scheduled and nonscheduled.

d. Air Freight - Air freight operators with names and addresses of station managers; the principal surface transportation companies, and freight forwarders. Indicate the availability and capacity for freight handling, transshipment and freight forwarding; also include information on cargo staging areas, truck parking and terminal areas, freight handling equipment, inside and security storage facilities, and whether free trade areas are available.

e. Customs Service - Indicate whether U. S. Customs officers and agents are available and hours of operation.

f. Miscellaneous - Additional information not specifically mentioned above such as rent-a-car service, rapid transit, scheduled bus, limo and taxi service, distance, and time to central business districts of nearby cities and towns.

12. Existing Airports - Additional Data

a. Airport History - Key historical factors which have influenced development of the airport.

b. Federal and State Investment - Federal and state investment in the airport.

c. Plans and Charts - Current airport layout, terminal area, approach and clear zone and master plans and charts.

d. Commercial and Industrial Development - Information on industrial and commercial sites; industrial and commercial zoning adjacent to the airport; addresses of local or area Chamber of Commerce or Development Agencies.

e. Fly-in Facilities and Accommodations at or Near the Airport - Note availability of nearby hotels, motels, and recreation facilities.

13. Apparent Limitations or Restrictions. State any apparent limitations or restrictions that may influence future development, including:

a. Airspace

b. Landing area capacity (volume of operations and types of aircraft which can be accommodated)

c. Aircraft loading and parking apron(s)

d. Terminal area facilities
   (1) Scheduled Air Transport Airports - Ticketing, lobby and waiting areas, holding rooms, baggage handling, baggage claim areas, airline operation space, concessions, public conveniences, and eating facilities.

   (2) General Aviation Airports - passenger facilities, pilot ready rooms, classrooms, toilet, and restaurant facilities.

e. Auto parking

f. Military requirements.

g. Life expectancy of privately owned airports (whether expected to terminate, when, and why).

h. Utilities: water, sewer, gas, power, telephone, etc.

i. Maintenance, hangar, service, and fueling facilities.

14. Existing Airports - Environmental Factors. An inventory should be made of the policies, programs, and plans of local governmental authorities, local and regional planning agencies, and appropriate state functional and planning agencies to determine the effects of the following factors on individual airports:

a. Land Use - In addition to consulting with local and regional planning agencies, a physical inspection of land adjacent to the airport boundaries may be advisable. Particular attention should be paid to trends in specific types of land use development. Estimates of pertinent land values should be obtained based on the most recent sales.

b. Zoning - Copies of zoning laws and regulations of local municipalities should be obtained. Document any ordinances or statutes which would facilitate or restrict airport expansion.

c. Governmental Jurisdiction and Influence - Evidence of the airport owner's right of eminent domain as it relates to the need for expansion, the attitudes of community leaders and pressure groups as well as public officials to indicate the degree of public acceptance, and the legal compatibility of the airport to the surrounding area.

15. Airspace. The inventory of existing airports should include the use of the airspace in the vicinity of each airport and the navigation aids and communication facilities which affect the use of the airspace. Additionally, the surface structures which may adversely affect its use must be considered. A requirement in the development of an airport system is that aircraft in flight must have safe separation from one another and from surface structures.

The Federal Aviation Regulations (FAR's) stipulate legal requirements and procedures for notifying FAA of airport proposals and structures which affect airspace usage. Part 157 of the FAR's require that the

FAA be notified of any proposal to construct, alter, activate, or deactivate an airport so that an aeronautical study and an FAA determination can be made of its effect on the safe and efficient use of the airspace. Similarly, Part 77 of the FAR's requires notification of the proposed construction or alteration of structures which may have an effect on the use of the airspace adjacent to airports and enroute airspace environment.

By examining current issues of United States Government aeronautical and instrument approach and departure charts, Jeppeson Company, state or other recognized aeronautical charts, the basic controlled airspace use in the immediate vicinity of each airport can be easily identified.

All existing airways, control zones, etc., should be placed on a large chart of the state. Also include the locations of enroute and terminal navigational aids. Appendix F is an example which shows how to depict the radio facilities, airports, airway route structure, control zones and other useful radio facility information on the state chart.

Later in the development of the state plan new airports and expansion of existing airports can be depicted, and compatibility of airspace usage verified or adjustments to planned development made.

The FAA Order 7480.1, "Guidelines for Airport Spacing and Traffic Pattern Airspace Areas", should prove useful in familiarizing the planner with this subject.

16. Navigational Aids. Existing navigational aids should be depicted on the state chart, coded or symbolized for each identification. Include both enroute and terminal navigational facilities.

CHAPTER 7. COORDINATION WITH OTHER PLANNING PROGRAMS

17. Coordination with Plans of Other Agencies. Coordination between planning activities should be directed towards resolving inconsistencies among various plans. Whether more than this can be achieved depends upon the individuals responsible for coordination. Resolving conflicts between different plans involves either some "give and take" or sophisticated analyses for evaluating alternative planning proposals. The framework for plan coordination differs within each state. As a minimum, preliminary studies and proposals should be exchanged with interested agencies and individuals. The state airport planner should review carefully the proposals of these other agencies early in the planning process.

The agencies with whom coordination should be effected will differ from state to state. Following is a list which could probably be adapted for use in most states. Note that it might not be all-inclusive.

a. Other aviation agencies - The FAA area office, aeronautics agencies in neighboring states, local airport owners, and authorities.

b. City, County, and Metropolitan Area Planning Agencies - Local and metropolitan area airport system plans may be developed by the appropriate agencies. These should become integral parts of the state's airport system plan. The state should stimulate the development of such plans and should coordinate the integration of these plans into the state airport system.

c. Other transportation agencies - especially the state's highway department. It is important that the state airport system plan be consistent with not only the more generalized plans for handling major traffic flows but also the detailed plans for roads and streets in the vicinity of each existing and proposed airport. Consideration should be given to mass transit facilities in terms of tracked vehicles or buses, limousines or taxis for connecting each airport with likely ground destinations or origins of trips. The appropriate state agencies should be made aware of inadequacies of ground access to the state's airports.

d. Economic development agencies - These would include Federal agencies such as the Economic Development Administration or the more recent multistate developmental "regions". At the state

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level, the industrial development agencies should be involved. There may also be regional tourist/industry groups or local industrial development organizations (planning industrial parks) which should be consulted. Any of these agencies may have knowledge of proposed public, semipublic or private investment which may influence airport needs.

e. Land-use planning agencies - Because airports occupy large acreages of land and require rather sophisticated zoning protection around their perimeters for both obstruction prevention and noise abatement purposes, it is necessary that local and regional planners be made aware of airport plans. Federal statutes such as Section 204 of the Demonstration Cities and Metropolitan Development Act and Section 4(f) of the Department of Transportation Act stipulate certain requirements for coordination of transportation planning with other planning programs. Also, there are positive land use relationships that can be developed for lands surrounding airports.

f. Conservation and Recreation - Federal, state, and county conservation, forest and park departments or agencies should be consulted. New dams may create lakes overflowing existing or proposed airport land, or may create new recreation areas that should have airports. Public forests and parks can affect and be affected by airport development and use in many ways.

g. Budgetary agencies - Since the methods of financing airport development vary from state to state no specific guidelines for financing the development programs are included in this document. As many states will be required to recommend methods of implementing the airport system plan, it is suggested that close coordination be maintained with the appropriate budgetary agencies on both the local and state levels.

h. Private interests - Sometimes users of airports also have definitive plans. For example, air carriers (including scheduled air taxis) may be planning equipment changes. Fixed-base operators or private airport owners may have plans for substantial additions to their facilities. In areas surrounding airport sites, land owners might be contacted to determine potential property improvements they are contemplating. Operators of communication towers should also be consulted.

CHAPTER 8. SOURCES OF AVIATION STATISTICS AND FORECASTS

18. General. Following are the sources of aviation statistics and forecasts which are normally used for airport system planning purposes:

a. Regularly Updated Data

Subject	Frequency of Publication	Source
(1) Current airport Facilities Records (Compiled from Forms FAA 29A and 29A-1.)	Can be obtained in tape form	FAA
(2) Proposed Airport Master Record - Form FAA 5010-1	Effective 1969	FAA
(3) AOPA Airport Directory	Annual	AOPA
(4) Census of U.S. Civil Aircraft	Annual	FAA
(5) FAA Air Traffic Activity	Semiannual	FAA
(6) Air Traffic Patterns for IFR and VFR Aviation	Annual	FAA
(7) Terminal Locations for Planning Purposes	Annual	FAA
(8) Aviation Forecasts (10 years)	Annual	FAA
(9) National Airport Plan	Annual	FAA
(10) Airport Activity Statistics of Certificated Route Air Carriers	Annual	CAB/FAA
(11) Origin - Destination Survey of Airline Passenger Traffic	Quarterly	CAB/ATA
(12) Official Airline Guide - Quick Reference Edition	Bimonthly	R. H. Donnelley Corp.

	Subject	Frequency of Publication	Source
(13)	Official Airline Guide - Regular Edition	Monthly	R. H. Donnelley Corp.
(14)	Official Airline Guide - Quick Reference Travel Planner	Quarterly	R. H. Donnelley Corp.
(15)	FAA Statistical Handbook of Aviation	Annual	FAA
(16)	Scheduled Air Taxi Operators Report	Annual	FAA
(17)	(Year) Air Transport Facts and Figures	Annual	ATA

b. Reports and Publications.

(1) General Aviation - A Study and Forecast of the Fleet and its Use in 1975 - FAA, July 1966.

(2) Aviation Demand and Airport Facility Requirement Forecasts for Large Air Transportation Hubs Through 1980 - FAA, August 1967.

(3) Aviation Demand and Airport Facility Requirement Forecasts for Medium Air Transportation Hubs Through 1980 - FAA, January 1969.

(4) Airport Land Needs by Warren H. Deem and John S. Reed, Arthur D. Little, Inc., Cambridge, Massachusetts, 1966.

(5) Publications of the Air Transport Association of America (ATA).

(6) Publications of the International Air Transport Association (IATA).

(7) Publications of the National Air Taxi Conference.

(8) Publications of the Aerospace Industries Association of America (AIAA).

(9) Publications of the Association of Local Transport Airlines (ALTA).

(10) Publications of the National Business Aircraft Association, Inc.

(11) Publications of the Helicopter Association of America.

c. FAA Special Tabulations. The FAA maintains and keeps current special tabulations which may be useful in state airport system planning. Some of the current statistical tabulations are:

(1) General Aviation Aircraft Count and Flight Hours by Airport, Type, By Use, By County - RIS: AS 8070-1.

(2) General Aviation Total Based Aircraft, Rank Within State - RIS: AS 8070-5.

(3) Aircraft Make, Model, Flight Hours by Use, By Area - RIS: AS 8070-6.

(4) Aircraft by State and County, with FAA Area Code - RIS: AS 8070-7.

(5) State and County Listing of Aircraft Registrants - IBM Listing (no RIS number).

Requests for data for a particular state should be made to FAA, 800 Independence Avenue, S. W., Washington, D. C. 20590, Attention MS-220. The Reports Identification Symbol (RIS) identifies the appropriate report. In the future, the above tabulations may change as to content as well as title. Specification of the data required will also assist the agency in furnishing the proper tabulations.

d. State and Local Statistics. More detailed statistics on aircraft and airmen may also be available from state registration sources, from airport managers, and surveys of local aircraft pilots, owners, and users.

e. Surveys and Questionnaires. Surveys and questionnaires are often used to get more complete data on such subjects as operations, frequency and hours of use of general aviation aircraft, and origins and destinations of travellers.

The personal interview survey can be quite productive because (1) the interview can be conducted on the spot with no forms for the subject to complete at a later date, and (2) it is insurance against a low percentage of responses. This personal interview survey may be undertaken only every three or four years because of time or cost limitations, but whenever possible should coincide with a national census such as the 1970 U.S. Census of Population.

Because airline passengers may not respond readily to questionnaires, it is suggested that survey interviewers travel on specified flights to obtain desired data or by cooperating airline personnel taking the survey during flight. If this is not feasible, by prior arrangement with airline headquarters, forms foldable into envelope configurations might be handed to boarding passengers (along with pencils) with the request that they be completed enroute and given to the cabin attendant or dropped in the mail. The return address should be clearly identified and postage prepaid. To be fully useful, all departing flights in a specified period should be so sampled and the number of boarding passengers for each flight should be recorded. For statistical purposes the survey "universe" should be 10 percent to 20 percent of the daily passengers on that particular route. Aviation and socio-economic factors should be used together in order to best gauge the nature of aciation activity in a specified area. It is necessary that a complete analysis be done so as to measure the aviation potential and needs of the community under study.

f. Economic Impact. Data on the value of the airport to local industry and money income brought in by itinerant passengers may be available from local chambers of commerce, economic development organizations, or by local airport surveys.

CHAPTER 9. NATIONAL, STATE, AND LOCAL SOCIO-ECONOMIC FACTORS AFFECTING AMOUNT OF AERONAUTICAL ACTIVITY

19. Introduction and Sources for Socio-Economic Data. Socio-economic analyses of the state are needed to answer the basic questions regarding the type, volumes, and location of future aviation demand. This means that the determinants (what causes a market to be the size it is) of a market for airports be established. What industries need air transportation? Do they have need for better air transportation facilities? How many people will be available in the future who possess the income to make use of air service? Will the people and industries having the wherewithal to utilize the airport be there? Since people are associated with a multitude of income-earning and income-spending activities at any particular location from and to which they travel, transportation facilities are needed between those points where the future travel is expected to occur. Statistics and forecasts of population, economic activity, land uses, etc., assist in determining the future market potential. The basic step to be accomplished in any valid approach to forecasting aeronautical activity is a rational socio-economic analysis of the primary forces that determine economic change in the area being studied.

The sources for most of the statistics regarding the economic character of a state, county, or community are the Federal and state government and trade association publications.

20. Guides to the Use of Federal and State Statistics. The most important aids to the airport planner seeking economic data are two guides which show where to find the population and socio-economic data provided by the Federal and state governments. These two guides are:

a. Directory of Federal Statistics for Local Areas: 1966, the U.S. Bureau of Census, U.S. Government Printing Office.

This directory is an ideal comprehensive guide to current sources of Federally published statistics from all agencies for governmental and socio-economic units below the state level.

In general, this volume includes information useful to various individuals and organizations, such as city, county, or state planning agencies, marketers, and business firms interested in plant location and marketing possibilities or governmental and private agencies concerned with local or urban problems.

b. Measuring Markets, A Guide to the Use of Federal and State Statistical Data: 1966, Business and Defense Services Administration, Office of Marketing and Services, U.S. Government Printing Office.

This guide describes some of the more important Government and state statistical series useful in market measurements.

Part I - Describes some of the measurable characteristics and dimensions of a market.

Part II - Lists the principal statistical series of interest.

Part III - Provides a series of cases which illustrate how Government statistics can aid in measuring markets.

Part IV - Bibliography - Listing of Government and nongovernmental materials which are useful in measuring markets and arranged by sources of statistical data, methods of analysis, bibliographies, and directories.

21. Economic Data. Two Federal Government publications which provide most of the economic information needed on a state, county, or congressional district level are:

a. County and City Data Book, latest edition, (A Statistical Abstract Supplement) by the U.S. Bureau of the Census, U.S. Government Printing Office.

This publication is an excellent source of information needed on a state and county level. It gives the latest Bureau of Census statistics on population, area, vital statistics, education, employment, income, housing, banking, local and city government finances, business firms, manufacturers, retail trade, wholesale trade, selected services, mineral industries, and agriculture.

Especially of interest to the planner is the inclusion of information from the special censuses conducted between the decennial census years and the sources of population estimates prepared by state agencies.

Tables

Table 1 - Regions, Division, and States

Table 2 - Counties

Table 3 - Standard Metropolitan Statistical Areas (SMSA)

Table 4 - Cities (listed alphabetically by states)

Appendices and Maps

Appendix A - Lists of Urban Places

A-1 - Population of cities having 25,000 or more in rank order: 1960

A-2 - Population of urban places 1950 and 1960 and land area, 1960, alphabetically by state with county of location.

Appendix B - County governments and related area

Appendix C - Cities without weather station and the substituted nearby station

Appendix D - Special census conducted by the Bureau of the Census: April 1, 1960, to the latest year.

Appendix E - Sources of population estimates prepared by state agencies (Gives state, name, and address of agency preparing estimates, the area and detail available, and the frequency).

Appendix F - Definitions of Standard Metropolitan Statistical Areas (SMSA) (Maps for states showing counties, SMSA, and cities having 25,000 inhabitants or more).

b. Congressional District Data Book (Districts of the 88th Congress) and updated by Supplements, Redistricted States. Data Book prepared 1963 - U.S. Government Printing Office. Supplements - 89th Congress 1965; 90th Congress 1966, obtained on request from the Bureau of the Census, Washington, D. C. 20233.

This data book lists the population and selected economic data on the basis of Congressional Districts.

22. Private Sources of Market Statistics. Private sources of valuable market statistics are trade associations, trade papers, and special publications. An example of a trade paper would be "Sales Management" which conducted a "Survey of Buying Power" and developed the effective buying income (income after taxes) for the Standard Metropolitan Statistical Areas. Special publications are obtainable when some enterprise (railroad, utility, etc.) is striving to bring new business to its territory and publishes statistics on the market situation.

23. Integration of Economic Data. Finally, the key to the entire economic study is the integration of all appropriate material which can be of aid in making an analysis. For instance, the Civil Aeronautics Board's Origin and Destination Surveys of Airline Passenger Traffic may not seem as related to economics as employment statistics or personal income. However, O and D studies give the analyst leads as to the amount of economic community of interest between areas.

24. Minimum Data Requirements for a State Socio-Economic Information System.

The statistics presented herein pertain to economic measurements below the national level. Data and forecasts on the national level are much easier to obtain and are used to ascertain total economic health and for comparative purposes. Some of the most important standard measures are population size and its structural aspects, Gross National Product, labor force, employment, industry statistics, disposable personal income, per capita personal consumption expenditures, and per capita consumption of passenger-miles. Such national statistics should be part of the information system.

All the following statistics are available at least on the state or county level. Individual state review of the guides to sources given in Paragraph 20 may show that city or SMSA geographic coverage is available for these same measurements.

Measurement	Frequency of Publication	Source
a. Population		
(1) Population growth	Decennial (all censuses)	Federal Gov't.
(2) Resident and civilian population	Annual	"

	Measurement	Frequency of Publication	Source
(3)	Land area	Decennial (all censuses)	Federal Gov't.
(4)	Population per square mile, urban and rural	"	"
(5)	Population age distribution	"	"
(6)	Total resident population by age groups	Annual	"
(7)	Education distribution	Decennial (all censuses)	"
b. Income			
(1)	Median family income by income size classes	Decennial (all censuses)	Federal Gov't.
(2)	Total and per capita personal income	Annual	"
(3)	Aggregate personal and per capita income by type of income and industrial source	"	"
(4)	Disposable personal income	For selected years	"
(5)	Taxable income classified by size of adjusted income	Annual	"
c. Employment			
(1)	Percent employment in white collar occupations	Decennial (all censuses)	Federal Gov't.
(2)	Percent unemployment rate	"	"
(3)	Total employment	Quinquennial (all censuses)	"

	Measurement	Frequency of Publication	Source
(4)	Employment in agriculture	Quinquennial (all censuses)	Federal Gov't.
(5)	Employment in durable goods manufacturing	"	"
(6)	Employment in nondurable goods manufacturing	"	"
(7)	Employment in mineral industries	"	"
(8)	Employment in transportation communication and other public utilities	"	"
(9)	Employment in wholesale and retail trade	"	"
(10)	Employment in public administration	"	"
d. Sales			
(1)	Value added by manufacture - total industry	Annual - intercensal years	"
(2)	Retail sales	Quinquennial (all censuses)	"
(3)	Wholesale sales	"	"
e. Additional Statistics		Varies with source	State that is making the economic study

When available, the state organization that is developing the socio-economic information system should include the statistics developed by its own state economic development and planning agencies and bureaus of business research at state universities. For instance, published statistics on personal income by cities are difficult to obtain but a particular state may have developed its own estimates for this and other measurements on a finer level of geographic detail than is done by the Federal Government.

25. Other Socio-Economic Factors. The airport is very often a vital factor and major influence in increasing industrial development, resort activities, population growth, and employment. The potential value of an airport to a community's economic and social well being must be given careful consideration by state airport planners.

26. Geographic and Accessibility Factors. Of a different type, but equally important as socio-economic indicators to potential aviation growth, are geographic factors. Some geographic factors of an area have a definite bearing on the need for utilization of air transportation. One of these factors, isolation, is self-explanatory in that airports may be needed for the mere existence of these communities. In addition, accessibility in and out of the area via highways, railroads, and waterways is also a factor in studying economic potential. These accessibility factors can determine the speed and ease by which goods and personnel can move in and out of the area. Airports, of course, are another one of these factors and rather than compete with the other modes of transportation they often complement them. This data can be obtained from local and area planning and development groups.

In summary, isolation, caused by natural barriers or lack of public transportation, must be considered in placing locations in the National or State Airport Plans. Indicators such as population density, number of airports per unit square mile, amount of seasonal population, etc., could be established in this planning process. Seasonal population could be determined from seasonal retail sales, which are available from sales tax figures.

CHAPTER 10. FORECAST OF AERONAUTICAL ACTIVITY

27. General. The basic ingredient of a sound and unified approach to forecasting is a common-sense analysis of the important forces that account for air transportation demand. Socio-economic analyses of the state, regions and/or areas, including counties and local communities, are necessary to answer the basic questions regarding the type, volume, and location of future aviation demand.

The initial step in any valid approach to forecasting aeronautical activity is a rational socio-economic analysis of the primary forces that determine economic change in the area being studied. To apply this approach successfully in making forecasts, three interacting factors -- information, judgment, and analysis - are manipulated to provide the working tools needed. First, judgment is used to interpret and apply information; then it is used to select and appraise methods of analysis; and finally, it is used to evaluate forecasts already made - either one's own or someone else's.

Often the forecaster, in trying to make his predictions under the constraints of inadequate or inconclusive data, must rely on his own best judgment and experience and come up with something more in the nature of an "educated guess". Forecasting is, therefore, not an exact science, but a learning process that depends more on practice than on general principles.

Various yardsticks are helpful in evaluating forecasts, but they cannot provide exact measures of success. Reference is made here to "yardsticks" that can be applied to forecasts or projections to gauge their acceptability or merit, such as: (1) consistency with past trends; (2) comparison of forecasted trends and realization; (3) comparisons of rates of change; and (4) comparisons of economic indicators.

28. Forecasting Methods. There are many ways to predict future trends and different forecasting methods are not necessarily competitive with one another. In some instances, one method serves to supplement another. Some methods are applicable primarily to the very near future - a month, a quarter, at most a year - while others are best used for longer range forecasting. What is being forecasted may also serve to narrow the range of choice. An appropriate forecasting method can best be selected when the various possible approaches are known, including the pecularities of each. A brief description of the principal forecasting methods is given below to assist state airport

planners in the development of aeronautical activity forecasts.

a. Mechanical extrapolation. The rationale underlying extrapolation procedures is that some past tendency or trend in the variable (activity or item) being forecasted reflects what is going to happen. It may be possible to quantify (to measure the quantity of) this tendency or trend and derive forecasts by extrapolating the relation into the future.

This may be done by developing measures of correlation between series of numbers. For example, aviation growth may be, say, 1.2 times the growth in population.

Ratios are sometimes used when totals for larger areas are projected and the analyst wishes to allocate them to smaller areas. For example, if a state is projected to have 4,000 aircraft in 1980, it may be assumed that the aircraft will be distributed among counties in the same ratio as exists in current registration records.

Another mechanical method is by use of analogy. That is, it may be known that where an airport was built three years ago there are now seven based planes and an estimated 3,000 annual itinerant operations. It might then be assumed that this type of growth could occur at a similar community where a new airport is developed.

In aviation it is necessary to project some sort of growth and when this is done mechanically either a straight line type of growth or a compound interest type of growth might be assumed. A straight line type of growth assumes an addition of a constant increment each year while the compound type is similar to compound interest; that is, growth becomes greater each year in the future. In general, the straight line method is preferable in all but the most sophisticated analysis. The reason is that if calculations are carried too far into the future, the compound interest type of approach may yield exceptionally large values.

b. Surveys of anticipations or expectations. The survey approach is based on the premise that if you want to know what is going to happen in a particular sector, go out and ask those who will be making things happen. Although an informative method, it is not nearly as simple and as rational as it sounds. Surveys are usually expensive; designing meaningful questions and obtaining reliable answers are not easy tasks; and, additional uncertainty can be injected by widely varying viewpoints.

c. Analytical forecasts. In this type of approach (which essentially combines diagnosis with prediction) explanations are sought of the factors influencing the variable to be forecast, and a mathematical relationship is developed between these factors and the given variable for projecting into the future.

Analytical projection methods differ from mechanical methods only in that some additional thought is given to attempts at explaining reasons for change. For example, in analytical forecasting one would try to determine the reasons for the trip and how, over time, these reasons will change. How much of a trip can be "explained" by occurrences at the trip's origin and how much by occurrences at the trip's destination? If a person flies from his home to a resort for a vacation, is it because of his income level, because of the attractiveness of new resort facilities, or because of the time saved and convenience of flying? How do changes in other modes of transportation such as the decline of the passenger train or the completion of the interstate highway system affect demand for air travel?

For instance, it can be shown historically that the introduction of jet service into a community will accelerate the demand for air transportation.

It is probably best to have projections based on both mechanical and analytical factors. It is difficult to justify the mechanical techniques unless some form of analysis has determined their validity. One advantage of mechanical techniques is that they are easily understood. Also, they do not appear to be subjective.

d. Judgment forecasts. The judgment method is basically an estimate made by an individual who is closely acquainted with the factors related to the variable being forecast. These factors are weighed and evaluated according to the experience and intuition of the analyst. This method permits a variety of information to be brought to bear on the forecast - national trends, sales reports, political situations, etc. It is especially advantageous when used in conjunction with any of the above methods, and where there are a large number of variables for which relatively little data are available or when intangible factors are expected to play a major role. However, the resultant forecasts from use of this method alone are the most difficult to defend under close scrutiny, and may be subject to any strong bias of the individual involved in the forecasting process.

For those states which do not have an adequate planning staff, it is highly recommended that the services of a professional economist, statistician, and/or econometrician, be employed in the selection of the methods and development of the aeronautical activity forecasts to be used in state airport system planning. The possibility of arranging for such assistance from other state agencies may prove feasible and desirable.

29. Aeronautical Activity. In planning for future state airport facilities there must be a base from which requirements can be determined. Forecasts of aeronautical activity form the basis for facilities planning. There is a need to know (1) the types of civil airport users - air carrier, scheduled air taxi, general aviation, and the military services where applicable; (2) the types and volume of operational activity - aircraft operations, passengers and cargo, based aircraft, etc; and (3) the aircraft mix - supersonic and large capacity subsonic transport aircraft, smaller commercial, business, and pleasure aircraft, future VTOL and STOL aircraft, etc. Collectively, these three elements constitute the determinants of future airport requirements. (Appendix D - "Forecasts of Aviation Activity, 1970-1980" - lists the types of activity forecasts most applicable for airport facilities planning.)

30. Civil Airport Users. For uniformity, as well as ease in determining the types of future airport facilities required, it is suggested that the forecasts of aeronautical activity be developed for the following four major user categories as applicable to the airport(s) or location(s) under consideration:

a. Air Carrier. As used here, "air carrier" refers to airline aircraft operators holding Certificates of Public Convenience and Necessity issued by the Civil Aeronautics Board authorizing them to perform passenger and cargo services, as well as to intrastate carriers as identified in (4) below. This general air carrier grouping includes the certificated route all-purpose (passenger/cargo) and all-cargo carriers, and the supplemental (passenger and/or cargo charter service) carriers. Air carrier service is further classified as to:

(1) Domestic Trunk - Air carriers operating primarily within the geographical limits of the 48 contiguous states and D. C. over routes serving primarily the larger communities. (Most trunk carriers also have international and territorial operations which are classified separately.)

(2) International and Territorial - Air carriers conducting operations outside territory of the U. S., including operations between U. S. points separated by foreign territory or major expanses of international waters.

(3) Regional Service - Air carriers normally operating routes of lesser density between the smaller traffic centers and between those centers and principal centers (often referred to as "Local Service").

(4) Intrastate - Air carriers operating solely within a state which are not subject to CAB regulation.

(5) STOL - Air carriers operating STOL aircraft.

(6) Helicopter-VTOL - Air carriers operating helicopter or VTOL aircraft.

b. Scheduled Air Taxi (Commuter - Local Airlines). Aircraft operators for hire which engage in the scheduled transportation of passengers and/or property as authorized by an FAA-issued Air Taxi Operating Certificate, and which generally do not operate large aircraft (over 12,500 pounds maximum takeoff weight) nor hold a CAB issued Certificate of Public Convenience and Necessity. This category excludes unscheduled air taxi services and charter services.

c. General Aviation. As used here, "general aviation" refers to that segment of civil aviation which encompasses all facets of aviation except air carrier and scheduled air taxi as defined above. General aviation is further classified as to:

(1) Unscheduled air taxi (charter) services
(2) Business (corporate - executive transportation)
(3) Commercial (aerial application - industrial - special)
(4) Personal (recreation - flight proficiency)

d. Military. As used here, "military" refers to the operators of all military (Air Force, Army, and Navy) aircraft utilizing civil airports, including the U. S. Coast Guard, Air National Guard, and other military reserve organizations.

31. Operational Activity. Annual forecasts of airport traffic (for 5, 10, and 20-year periods) form the primary basis for future state airport facility requirement planning. It is essential to develop activity forecasts by the type of major user categories (air carrier, scheduled air taxi, general aviation, and military) as described in Paragraph 30 above.

In the development of the operational activity forecasts, it is suggested that an unconstrained approach be used for most areas. The "unconstrained" forecast represents the potential aviation market in which all of the basic factors that tend to create aviation demand are used, without regard to any constraining circumstances (i.e., limited airport expansion capability, airspace, access, etc.) that could affect aviation growth at any specific airport or location.

It is advisable to review and relate national and/or state historical needs and forecast data to the areas under study as a guide for future planning. Using this approach, it is possible to determine the theoretical development needs in accordance with the total demand potential. In the exceptionally high activity metropolitan areas, however, potential constraints and alternative methods for their reduction should also be considered. (Reference Chapter 11, Paragraph 37, Potential Constraints.)

There are five major types of operational activity forecasts considered necessary to determine future facility requirements, including airport/airfield capacity analyses, which are listed and described below:

a. Enplaning and deplaning passengers - total number of passengers (air carrier and general aviation) arriving or departing on aircraft at an airport, including originations, stopover and transfer passengers. Where applicable, domestic and international passengers should be identified separately.

b. Enplaning and deplaning air cargo - total tonnage of priority, nonpriority, and foreign mail, express and freight (property other than baggage accompanying passengers) arriving or departing on aircraft at an airport, including originations, stopover and transfer cargo. Where applicable, domestic and international cargo should be identified separately.

c. Aircraft operations (movements) - total number of landings (arrivals) at and takeoffs (departure) from an airport. There are two types of operations - local and itinerant - which should be separately identified:

(1) Local operations - performed by aircraft which (1) operate in the local traffic pattern or within sight of the tower, (2) are known to be departing for or arriving from flight in local practice and flight test areas located within a 20-mile radius of the airport and/or control tower, (3) execute simulated instrument approaches or low passes at the airport.

(2) Itinerant operations - all aircraft arrivals and departures other than local operations described above. Where applicable, domestic and international itinerant operations should be identified separately.

d. Busy hour operations - total number of aircraft operations expected to occur at an airport, averaged for two peak adjacent hours of a typically high activity day. Busy hour operations should be identified by major user category, as applicable.

e. Based aircraft - total number of active general aviation aircraft which use or may be expected to use an airport as "home base". General aviation based aircraft should be separately identified as to the number less than and the number more than 12,500 pounds gross weight and whether single or multi-engine.

32. Aircraft Mix. In determining and planning for future state airport system development and facility requirements, it is necessary to forecast the types or categories of aircraft (aircraft mix) which are to be accommodated at the airport(s) or location(s) under consideration. Therefore, it is essential to keep abreast of technological advances in aircraft design (such as the SST, large capacity subsonic transport aircraft, VTOL, STOL, airbus aircraft, etc.) in order to assure the provision of adequate airfield and terminal design at the airports from which they are to operate. Generally, passenger and cargo volume forecasts will indicate the types of terminal facilities required, whereas, volume of aircraft operations will indicate airfield configuration. Forecasts of aircraft mix should be summarized into: (1) seating capacity groups for air carrier aircraft, and (2) operational characteristics groups for all four of the major airport user categories. Reference FAA Report - Aviation Forecasts - Fiscal Years 1968-1979 (current) which is published annually and gives national and regional trends in both air carrier and general aviation aircraft mix.

33. A Forecasting Example. The FAA Report, "Aviation Demand and Airport Facility Requirement Forecasts for Large Air Transportation Hubs Through 1980", August 1967, can serve as a guide in the development of operational activity forecasts. Appendix 1 to the Report, "Methods Developed for Forecasting Aviation Demand at the Nation's Large Air Transportation Hubs, 1965-1980", contains methodology developed by the FAA to obtain unconstrained aviation demand forecasts and illustrates how various forecasting techniques can be applied. Also, the reference material and source documents used are listed with each method. These methods and techniques were developed primarily to obtain aggregate aeronautical activity forecasts for each large hub location. With some modification, they can be applied to almost any airport or location for which aviation demand forecasts are required. As a basis of data the FAA Report - Aviation Forecasts - Fiscal Years 1968-1979, was used. Large "hub" airports have, over a pattern of years, handled a relatively constant percentage of the Nation's airline passengers. In these instances, the same percentage was applied to the projected national totals.

Based aircraft were projected into the future by multiplying the present number of based aircraft by fixed percentage figures.

These percentage figures differ as to whether the aircraft are single-engine, multi-engine, or turbine. In the case of airports where no multi-engine airplanes were presently based, the instruction given was to assume one based multi-engine aircraft in 1970, two in 1975, and three in 1980.

The FAA publication, "Aviation Forecasts - Fiscal Years .....", is issued annually and state airport system planners should attempt to correlate their projections to those presented in this document. A suggested approach is, then, to take the FAA's national forecast and attempt to allocate to the state its share of the projected national activity. Then attempt to allocate to each area or airport within the state its share of the projected state activity. For example, if a state has one percent of the Nation's population and 1.2 percent of the Nation's based aircraft today, assume that in 1980 it will have 1.2 times its percentage of the Nation's population times the FAA's projected fleet. Take the FAA's allocation among single or multi-engine piston, turbine, etc., unless it is known that the state presently has a different proportional distribution of aircraft by type. These plans could than be assigned to counties or airports within the state on the basis of the same distribution which exists today or in terms of population as it is projected to be distributed in 1980. Methods such as this show how one could determine a number of based aircraft for each airport in 1980.

Similar methods could be used to project other aviation statistics for each airport. One might also assume that each air carrier community will continue to handle its percentage of national activity. In general, one should attempt to use his own intuition, as well as data gathered in specific state surveys, to assign to each airport its projected share of the FAA's projected national total figures.

These are merely suggestions for a relatively simplified approach. They are not meant to discourage more sophisticated or even simpler approaches.

34. Designing a Forecasting Approach. A recommended first step is to consult others with some experience in projecting travel demand. Usually state highway departments are experienced at this. Also, the central state planning office may have developed methods of projecting population,economic activity, and public facility needs. In addition, they can provide other data upon which aeronautical forecasts will be based.

Except for scheduled air carrier operations, relatively little statistical information is available on other aircraft operations. It may be necessary to conduct one or more surveys at airports (or mail surveys of airport users) to determine a pattern of present usage which can, with modification, be projected in the future. Surveys such as this can also be used to formulate numeric measurements such as ratio of total operations to based planes at various airports, patterns of seasonal usage, number of occupants, weight of cargo, navigation equipment aboard planes, etc.

Forecasts should also be designed so that their results can be verified. For example, attempt to use them to forecast a number of general aviation operations at a tower airport in the next year. Or attempt to borrow some highway traffic counters (or hire part time help) to physically count traffic at one or two airports. Planning and forecasting are continuing activities and any forecast methodology should be easily updated. But most important of all, one should attempt to verify this year those forecasts that were made last year. Understanding the difference between activity which was forecast and that which actually occurred is another useful analytical tool.

35. Special Problems. One difficult problem in forecasting aeronautical needs is that aviation is growing at an astounding rate. However, all aspects of aviation or aeronautical needs are now growing equally. It is very difficult to assume that present patterns will continue.

The future introduction of aircraft types which are not yet on the drawing board could drastically change air transportation patterns. Consequently, growth in aeronautics is multidimensional and no single series of numbers can be used to accurately project change.

A second major problem in state airport system planning is that for many states much aeronautical activity is actually interstate or transient in nature. A state must also build its airports to serve traffic from neighboring states. Consequently, if one is basing his state's aeronautical demand projections on all aircraft which might be using the airports in question, the relationships to air transportation demands of surrounding states must be considered as well.

It is especially difficult to project aeronautical activity at very small airports or at airports which are yet to be built. This is often a "chicken-egg" type of analytical problem. Yet, after two similar airports have been built in two similar communities, one may see that one has developed considerably more activity than the other. The reason for this is frequently a progressive fixed base operator. Possibly, a resort in the area has been able to attract a large number of customers who fly in. In any event, causes such as these are so unique that it is difficult for one to project them on a statewide basis. New airports also create activity. For years, airport advocates have spoken of the "telephone" analogy in building airports. That is, the more airports that are built the more useful each existing one becomes.

CHAPTER 11. AIRPORT SYSTEM REQUIREMENTS

36. General. In Chapter 10 guidance was provided for forecasting aeronautical activity. Now, it becomes necessary to translate the activity forecasts into system requirements. This is probably the most important single step in developing the state plan for it is at this point that the plan takes shape and the direction and format for future airport development is established. The allocation of resources and the assurance of future airport environmental compatibility will greatly depend on how well this is done. Briefly, this step involves: (a) the evaluation of existing aeronautical facilities in terms of inplace capability for meeting forecast requirements, and (b) the identification of new facilities to accommodate the balance of the forecast requirements.

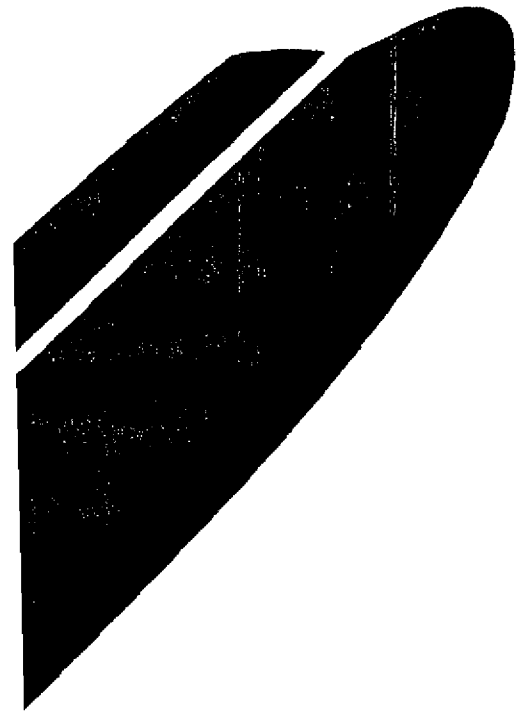
Experience has shown that planning for airports in the larger metropolitan areas is a much more complex task than planning for airports in the smaller communities. This is due, logically, to the greater demand for aeronautical services in the larger cities and the requirement to provide a sufficient number of adequate airports in densely populated areas. In addition, the aeronautical problems related to the use of the airspace, the problems of insufficient land, congestion of surfaces transportation, objections to aircraft noise, etc., highlight the complexities of metropolitan area airport planning.

Thus, in formulating the state airport plan the facility requirements for the large metropolitan areas should be determined separately from the balance of the state's communities, keeping in mind the need for properly integrating the metropolitan systems into the state system and with adjacent state systems and contiguous metropolitan areas where appropriate.

37. Planning for Communities Where Metropolitan Area System Planning is not Normally Required.

a. General. Communities which are not forecast to generate 250,000 annual enplaned airline passengers or reach 500,000 population during the 20-year planning period will not usually evidence the complexities encountered in planning for the large metropolitan areas.

ORGANIZING AND FUNDING THE PLANNING EFFORT



If such communities have trunk or regional airline service, there will not usually be a requirement for more than one airport to accommodate such air carrier service nor a requirement for separate airports to divert the general aviation traffic from the airline-served airport. The constraints that might preclude the realization of potential air traffic in the large metropolitan areas should not arise and the need for excessive surface transportation times to and from the airport, or sophisticated systems to cope with this problem, should not come about.

For airport planning purposes, these communities should be divided into two categories, those that are certificated for scheduled trunk or regional airline service and those that are not.

b. Communities Having Airline Service. As stated above, the communities which have airline service will normally only require one airport to accommodate such service. Also, if the community cannot forecast greater than 50,000 population during the planning period, it will likely not require a separate airport for general aviation.

The following procedures should generally be followed in developing the plan for these communities:

(1) Examine the existing air carrier airport in relation to the forecast of types of aircraft and operating weights and determine adequacy of runway lengths, widths, and strengths. If extension, widening, and strengthening are required, note the feasibility, cost, and time. As guidance, use the appropriate FAA Advisory Circulars (AC 150/5300 series). If the community is in close proximity to the state border, consideration of facilities in the adjacent state(s) and coordination as appropriate will be necessary.

(2) The existing capacity should be determined and, if inadequate for the forecast period, the feasibility of expansion determined and the cost and timing noted. This latter step requires an assumption of general aviation activity, whose forecast level will depend on the number and location of existing and new general aviation airports in the community.

For the initial analysis, however, the current ratio of general aviation to air carrier operations may be used. To determine capacity use the methodology contained in AC 150/5060-1A for the 5-year period. For the 10 and 20 year periods use the "simplified" approach in AC 150/5060-3.

(3) A qualitative analysis should be made of the environmental compatibility of the air carrier airport, principally from the standpoint of noise and accessibility. The results should provide a major consideration in determining whether to expand the airport or develop a replacement air carrier airport.

(4) Examine the existing public use general aviation airports in relation to the distribution of forecast demand and determine their adequacy to accommodate it in conjunction with the air carrier airport. (Communities forecasting less than 50,000 population will not usually require a separate airport for general aviation.)

If deficiencies in the general aviation airports are noted, determine the feasibility of expansion, the timing, and cost. Airports should be as close as practical to the community. The desired objective is the development of an airport within five to fifteen minutes driving time for users of the airport. Where this is not feasible, thirty minutes should be considered the maximum, as the use of an airport will tend to decrease as access to the users increases.

(5) Should step (4) indicate the need for a new general aviation airport(s) place it in a general location in accordance with (a) demand distribution; (b) airspace efficiency; (c) availability of surface transportation; (d) availability of sufficient land in a compatible environment; and (e) the role of the airport.

(6) Restudy the air carrier airport capacity if steps (4) and (5) will result in a change in the general aviation forecast demand.

(7) Determine the future potential civil use of military airports. Military airports should be examined not only on the basis of the existing and potential military traffic, but also with a view toward possible joint use, if not now applicable. Additionally, the possibility of military withdrawal from the facility and its potential for full civil usage must be carefully considered. The plan should outline the necessary steps for civil acquisition or use, from contact with the local base commander up to coordination with the Department of Defense in Washington, as appropriate.

(8) Armed with the results of steps (1) through (7) determine if the present air carrier airport should be expanded, replaced (and possibly reverted to general aviation), or supplemented. If the decision results in the need for a new air carrier airport, it will be necessary to consider a possible redistribution of the demand and an alteration of the general aviation airport plans. A most important consideration may be the possible development of one regional air carrier airport to serve adjacent cities. This kind of solution is often desirable when major airport development costs are evident and if a study indicates that a regional airport would result in a consolidation of airline service which improves schedule choice and reliability while spreading airport costs over a wider tax base. (See AC 150/5090-1, Regional Air Carrier Airport Planning.)

c. Communities not Having Airline Service. For these communities the principal role of the airport is usually:

(1) Scheduled air taxi (commuter airline) service.

(2) General purpose.

It is very possible that communities not now having airline service may at some time during the planning period be named in a CAB Certificate of Public Convenience and Necessity. For planning purposes it is not normally considered practical to forecast the introduction of such service. On the other hand, there is evidence that the air taxi operators may in the future assume a much stronger role in the provision of scheduled service to communities not now receiving it.

Aside from the stimulation of airport development provided by the Federal and state programs, existing public-use general aviation airports have come into being as a result of market demand. Thus, all existing airports should be examined in view of the demand which brought about their development.

The forecast of activity should be analyzed to determine if there is a place for the airport in the system. If so, the existing airport should be evaluated in relation to the forecasts and its adequacy or expandability determined. If the existing airport does have a place in the system, the cost and timing of development should be noted. If it is privately owned, it should be planned for public acquisition.

More than likely the activity forecasts at some point in the long-range period will signal airport inadequacies. In general, these inadequacies will show up in:

(a) Runway lengths and strengths.

(b) Capacity in volume of activity (landing area or terminal area).

(c) Ability to accommodate IFR activity.

(d) Interairport airspace conflicts.

(e) Environmental problems such as off-airport obstructions, noise complaints, surface access problems, and public opposition.

Correction of such inadequacies should be considered for the 1975, 1980, and 1990 planning periods. The cost of such corrective action should be estimated and compared to the alternatives of building replacement or supplemental airports in lieu of expansion. In considering the privately owned airports, the cost and feasibility of public acquisition must be determined. Also, if the location is in close proximity to an adjacent state, necessary coordination will be in order.

Where a new airport is required, it should be as close as practical to the community. The desired objective is the development of an airport within five to fifteen minutes driving time for users of the airport. Where this is not feasible, thirty minutes should be considered the maximum as the use of an airport will tend to decrease as access times for the users increase.

The appropriate advisory circulars, particularly the 150/5300 series, should be used in assessing airport adequacy and in determining expansion requirements. The FAA publication, "Utility Airports," will be most useful in planning airport facilities for these communities. In analyzing airport capacity and in determining capacity-oriented facility requirements, use the methodology in AC 150/5060-1A for the 5-year period and AC 150/5060-3 for the 1980 and 1990 planning periods.

38. Planning for Large Metropolitan Areas.

a. General. A large metropolitan area as used herein may be considered as a Standard Metropolitan Statistical Area (SMSA) that is expected to generate over 250,000 annual enplaned airline passengers or reach 500,000 population during the forecast period. This kind of area should be planned on an area basis with a

"metropolitan area airport system" resulting. Contiguous large metropolitan areas should be considered together. Characteristic of the large metropolitan areas is the existence of at least one high activity scheduled air transport airport. It can be predicted that these metropolitan areas will require an exceptionally high degree of airport expansion during the planning period. Another feature of these communities is the unique role of general aviation airports in the provision of relief to the air carrier airports. Separate general aviation airports tend to divert general aviation from the scheduled air transport airports thus providing separate capacity-oriented facilities at less cost and with less mutual interference of aircraft operating at different speeds and with different functions. The need to provide separate general aviation facilities, such as short parallel runways, at scheduled air transport airports will result primarily from the need to interchange passengers between air carriers and general aviation.

STOL and VTOL aircraft being integrated into the air transportation system make greater use of low altitude airspace. This, coupled with the capability of operating from small strips located on existing airports as well as special landing facilities in highly developed areas, requires the planner of the metropolitan airport system to give careful consideration to this and future innovations in air transportation.

Military airports should be examined not only on the basis of the existing and potential military traffic but also with a view toward possible joint use, if not now applicable. Additionally, the possibility of military withdrawal from the facility and its potential for full civil usage must be considered carefully. The Plan should outline the necessary steps for civil acquisition or use from contact with the local base commander up to coordination with the Department of Defense in Washington, where appropriate.

The number of airports needed to serve general aviation in the large metropolitan areas should be determined on the basis of selecting airport locations so that each airport serves a geographical area large enough to permit the airport to attain high utilization. In addition, the size of the area to be served must be limited so that the airport is reasonably accessible to potential users. In large metropolitan areas it is desirable to have relatively few but well developed airports. This is encouraged because financially an airport cannot support adequate services unless it has a sufficient number of based aircraft and annual operations. Two hundred based aircraft and/or 200,000 annual operations should be considered as a goal for which to plan.

As to what constitutes "reasonable access" to potential general aviation users, a 30-minute maximum driving time criterion is applicable. That is, the users of general aviation in metropolitan areas should not be expected to drive over 30 minutes to reach an airport. However, it may be found that a better measure than driving time alone is the distance/time reference or "accessibility index". This is defined as the sum of the distance to the airport in miles and the average driving time in minutes and is based on the assumption of an equal weighing of distance in miles and time in minutes. Thus, an "accessibility index" of 45 corresponds to a distance of 15 miles and a travel time of 30 minutes at 30 miles per hour. Contour lines may be constructed for various "accessibility indices" to establish a basis for comparative evaluation. The respective areas served by adjacent airports should be delineated by the lines of equal "accessibility indices". For metropolitan area planning for general aviation the "accessibility index" should not exceed 45.

Wherever feasible, existing airports in the metropolitan system should have IFR capability, with this being the objective for all new facilities.

Existing privately owned public-use airports should be considered for potential public ownership in the metropolitan system as a totally publicly owned system is recommended. Because there is exceptionally high competition for land in metropolitan areas, the Plan should call for early public acquisition of the privately owned airports which are to remain in the system.

Evaluation of the capabilities of existing airports in the metropolitan area to accommodate forecast activity should initially be accomplished individually. Later, after a preliminary placement of potential new airports, existing facilities must be reexamined with the new airports on a systems basis. In short, this means they must be analyzed in terms of their individual contribution to or interference with the overall objective of meeting the forecast demand.

b. Procedures for developing the metropolitan airport system plan.

(1) Examine the existing scheduled air transport airport(s) in light of the metropolitan area activity forecasts, specifically as related to (a) the geographic distribution of airline passenger surface originations and destinations; (b) the amount of general aviation and military activity that must use the scheduled air transport airports; (c) the natural role of the airport, i.e., short haul versus intermediate and long haul traffic, predominantly cargo, etc.

(2) Assuming a forecasted level of airline, cargo, general aviation and military activity, and types of equipment/haul lengths in accordance with (1) above, determine the physical adequacy (landing area facilities only) of the existing scheduled air transport airport(s) to accommodate the forecasts during the planning period. Should deficiencies be indicated determine if, or to what extent, they can be corrected, and note the limits of expandability and the cost. Deficiencies, if present, will show up in (a) runway lengths and strengths; (b) operational capacity; (c) weather minima; (d) interairport airspace conflicts; (e) environmental problems such as off-airport obstructions, noise susceptible environs, surface access inadequacies. In assessing existing airport capabilities, and in making a system capacity analysis, refer to the appropriate FAA Advisory Circulars (AC 150/5060-1A and AC 150/5060-3), and to Paragraph 39 of this document.

(3) If step (2) results in an indication of need for a new scheduled air transport airport(s) note the timing, estimated cost and likely placement (general) in accordance with (a) geographic distribution of airline passenger surface origins; (b) airspace guidelines; (c) role of airport (equipment/haul); (d) availability of surface transportation now and in the future; (e) availability of sufficient land in a compatible environment.

(4) If a new scheduled air transport airport(s) is required, redistribute the appropriate activity and adjust the timing and extent of expansion at existing scheduled air transport airports. In considering general aviation and military operations consider accommodating only that traffic which must use the scheduled air transport airports for reasons such as the interchange of passengers, size of aircraft, etc.

(5) Determine terminal area requirements in accordance with landing area capacity for each of the planning periods and ascertain the capability of providing sufficient gate positions, terminal building space, auto parking and airport access roads. If the nonlanding area facilities limit the airport capacity, it will be necessary to again redistribute the traffic and adjust the plan for air carrier airports.

(6) For purposes of comparison refer to the FAA Report "Aviation Demand and Airport Facility Requirements Forecasts for Large Air Transportation Hubs Through 1980". This publication shows total requirements for many of the large metropolitan areas and sets forth a methodology for determining terminal building space, terminal apron space, and gate positions, vehicular parking areas, cargo facilities, Federal inspection facilities, and general aviation apron, terminal, and vehicular parking space as related to the hub forecasts.

(7) Examine the existing public use general aviation airports in line with the guidance set forth under "General" and specifically as they relate to (a) the forecasted geographic distribution of general aviation users; (b) the forecast role of the airport (Air taxi, General Purpose); (c) location with respect to the scheduled air transport airports and the ability to divert the general aviation traffic from these airports; (d) type of ownership.

(8) Determine the adequacy of the existing airports to accommodate the forecasts during the planning period. Should deficiencies be apparent, determine to what extent they can be corrected, noting the limits of expandability and the cost. The parameters expressed under Subparagraph 38a. "General" should be followed inasmuch as it is desirable to have relatively few well located airports, IFR capable, and economically efficient rather than many unsophisticated airports in conflict. FAA Advisory Circular 150/5300-4A, "Utility Airports", should serve as adequate guidance in determining appropriate dimensional standards for general aviation airports that are not forecast to accommodate transport type aircraft. For the latter type airports the FAA Advisory Circular 150/5300-6, "Basic Transport and General Transport Airport Design Standards", should be used.

(9) If step (8) indicates a balance of demand that cannot be accommodated at existing expanded airports, additional capacity in the form of new airports is required. Also, step (8) may indicate the need to replace an existing airport or supplement one that is too costly to expand. An analysis of the distribution of the demand balance and new airport requirements should result in a general placement of new airports. The placement of these airports will depend, in addition to the demand distribution, on: (1) application of airspace guidelines; (b) role of the airport; (c) availability of surface transportation; (d) availability of sufficient land in a compatible environment.

(10) If new airports are required, redistribute the general aviation activity forecasts that had been allocated to existing airports where appropriate, and reevaluate the timing and extent of expansion for existing airports.

(11) Check the initial metropolitan plan from the standpoint of airspace efficiency and potential navigation aid capability after coordination with the FAA.

(12) Determine the existence of built-in constraints and adjust the Plan accordingly. Refer to "Potential Constraints", Paragraph 40.

(13) Check the compatibility of the metropolitan system with the State Plan for airports in proximity to the metropolitan area and adjust one or the other. Also check the Plan for compatibility with airport plans in adjacent states, if appropriate. There may be cases where the metropolitan area in one state is contiguous with one in another thus requiring coordination and cooperation at the outset of the metropolitan plan's development.

(14) Finalize the general placement of the new airports and development plans for existing ones.

39. Metropolitan Area Airport System Capacity Analysis. In performing a capacity analysis for a metropolitan airport system, the approach set forth in Appendix 1 of AC 150/5060-3 may be used for intermediate-range (1980) and long-range (1990) planning. This method may also be adapted for short-range (1975) planning provided that the detailed airport capacity methodology of AC 150/5060-1A is used for each airport.

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40. Potential Constraints. In developing the airports system plan for metropolitan areas which experience exceptionally high levels of air traffic activity, it may be found that at some point in the forecast period, the demand forecast cannot be accommodated with any reasonable system plan.

The demand constraints which begin to become apparent can be caused by:

a. Airspace limitations - under present airport spacing guidelines and air traffic control procedures, the airspace may become saturated. This would most likely be related to the ability to accommodate the IFR demand forecasts rather than VFR.

b. Airport expansion limitations - airport sites which are within reasonable access to the users become limited in terms of number of sites and individual site expansion when compared to potential demand. Expansion limitations are imposed when the cost of expansion is excessively high when compared to potential benefits.

c. Surface transportation inadequacies - the highways and forms of public transit are not capable of handling the peak airport loads.

d. Airport noise exposure - although the airports are expandable, they are severely limited due to a history of mass complaints from highly built up residential areas, hospitals, schools, etc.

When the demand constraints become apparent, it may be necessary to modify the activity forecasts to account for them. In modifying the unconstrained activity forecast, a principal objective should be to allow the annual totals to remain unchanged while modifying the components. For instance, it may be found that the forecast peak period air carrier traffic cannot be achieved. If this peaking condition can be softened by assuming a redistribution of the airline schedules, it may still be possible to achieve the annual totals of airline passengers. A constraint in annual totals could possibly result in economic penalties to the community. (Refer to Figure 9 in AC 150/5060-1A.)

Another approach to relieving the constraints, in addition to peak redistribution, might be the provision of VTOL and STOL service for short haul (200 miles and under) city-center-to-city-center passengers.

If constraints are to be caused by inadequacies in surface transport, it should be recommended that plans for highway construction and mass transit be reexamined by appropriate authorities if feasible.

The provision of airports remote from the users by normal methods of surface transport may represent a solution provided a system of rapid ground access is considered in conjunction with the remote airport facilities.

Nonaeronautical transportation such as intercity rapid rail should be investigated as a solution. This, of course, would cause a modification of the annual aeronautical activity forecasts as it would result in an intermodal transfer of travelers. It is assumed that plans for such systems have been considered in developing the unconstrained forecasts.

41. Evaluation of Other Planning Programs.

a. Existing Airports. Study of active planning programs included in the data collection phase may affect airport expansion capability and provide a basis for determining the relative value of improving existing airports as contrasted with building new ones. The most important factors to consider are: (1) compatibility with adjacent land uses and (2) convenience of airport access.

Present encroachment of high density urban development up to the airport property line might preclude economical airport expansion both as to the extension of runways to accommodate aircraft forecast during the planning period and the acreage requirements for future facility expansion. In certain cases the existing airport might still fill a system need although a new airport might be required by the largest aircraft serving the area. A typical case would be at a location which now has airline service at an airport with limited expansion capability. Such an airport might be replaced at a larger site for airline service, but still meet a portion of the future aeronautical demand by conversion to a utility airport.

In addition to intense urban development, airport expansion might be curtailed because of the proximity of other major transportation facilities such as railway main lines or major highways. The costs of relocating such facilities might well exceed the cost of providing additional airport capability elsewhere in the area.

In large metropolitan areas restriction of the growth and/or capabilities of an individual airport will require redistribution of aeronautical demand to other airports in the metropolitan area.

Evaluation of other planning programs such as those for land use, transportation, economic development, recreation and resource development, by identification of potential conflicts or compatibility of such plans with airport expansion, will provide a guide for proposing modifications to plans of other agencies to allow for necessary airport expansion.

b. New Airports. Review of the plans of other agencies will provide an effective guide for the determination of general locations for future airports. Study of urban and metropolitan comprehensive plans and urban regional transportation plans will provide useful information on the direction of urbanization, anticipated population densities and distribution, general locations of future freeways, highways and rapid rail transit systems as well as the types of land uses which are anticipated in different parts of the area. General locations for future airports can be reasonably identified subject to detailed site investigation and selection at a later date. Consideration of plans of other agencies early in the airport planning process, besides helping to find locations for future airports where accessibility and service are most advantageous, can also aid in the prevention of future conflicts with incompatible urban development.

Due to the size, number, and operating characteristics of aircraft which can be anticipated, large areas for airport purposes may need to be designated well ahead of time. New locations to serve future demands will also require very long lead times or condemnation costs may be prohibitive when the demand actually arrives.

CHAPTER 12. REQUIREMENTS FOR AIR NAVIGATIONAL AIDS

42. General. Airport traffic volume, type, and regularity of use is determined or affected by the number and types of air navigation and electronic and visual landing aids that the pilot may utilize in first navigating to and then landing at the airport.

To improve the safety and utility of airports, a growing number of states are installing and operating, either independently or in conjunction with airport owners and local governments, air navigation and communication facilities to supplement those of the Federal Government, the primary source of navigation aids. It is important that state airport system planners have a working knowledge of air navigation and communication facilities, both in use today and those under development. Early coordination with the FAA area office is recommended. The following sections are intended to invite attention to those facilities that should be studied closely, included in the inventory of existing facilities (Chapter 6) and in most cases incorporated in the state airport system plan. The FAA " Airport Planning Standards" enunciate FAA criteria for navigation aid and air traffic control services and should prove useful to the planner. Also, the FAA publication, "Terminal Locations for Planning Purposes", furnishes useful guidance for specific airports.

The development of a state airport system plan should include an identification of navigation and landing aid requirements. This will assist the FAA in planning the establishment of new facilities in addition to guiding state navigation aid programs, where applicable. In identifying navigation and communication requirements, the objective should be to assure a system which will provide maximum service with a minimum of duplication. Obviously, it will be impossible to predict the exact progression of the system due to the rapid advancement of electronic technology, but a general plan should be prepared and should remain sufficiently flexible to incorporate unexpected developments. Factors to consider include the amount and type of traffic to be served.

The primary enroute navigational system must be a standard national and international system which has relatively long range. This system should provide complete navigation for IFR and VFR traffic and terminal air navigation and landing aid facilities to permit night and low visibility landings 24 hours a day where desirable.

43. Short-Range (1975) Requirements.

a. Airspace

(1) Airways. Analyze routes which are traversed by a considerable amount of traffic but are not contained within controlled airspace. Initiate action to obtain designated controlled airspace where needed and depict the proposed routes on a state map. These routes should be protected from obstructions which would impose an adverse effect.

(2) Terminal Airspace. Terminal airspace requirements are covered in subparagraph c, "Terminal Navaids".

b. Enroute Navaids.

(1) Primary System.

(a) VHF Omnirange (VOR/VORTAC).

1 Analyze the existing system and determine which areas are greater than 40 nautical miles from a VOR. This is generally the maximum distance at which these navigational facilities can be utilized at 1000 feet above the ground in reasonably level terrain. Hilly and mountainous areas must be examined closely to determine possible interference to reception.

Complying with the 1000 feet criteria is not always possible, but sufficient facilities should be installed to provide continuous, safe, reliable navigation over the generally traveled routes.

2 Specify proposed facilities on a chart. Exact locations should be selected which will provide the greatest amount of terminal aid service in addition to enroute service. See Navaid Illustration, Appendix F.

(2) Secondary Enroute Systems.

(a) Distance Measuring Equipment (DME). Where the DME is co-located with a VOR, valuable distance information is provided to the pilot. Designate on the chart which VOR facilities do not have DME, and recommend action to add the necessary facilities.

The standard DME is expensive to purchase, intall, and operate. Thus, the Federal Government has been the only installer to date. However, the new 496-A solid state, transistorized (hybrid) equipment has been developed and brings the price within range of state or local budgets.

(b) Radar. Air traffic control radar is used for the separation of air traffic and other additional service. Areas lacking radar coverage should be plotted on the chart and brought to the attention of the FAA.

(c) Communication. Areas of weak or nonexistent Air Traffic Control Center/FSS communications should also be noted. Navigational facilities with voice capabilities can provide a valuable supplemental or back-up system, but they cannot replace the primary enroute communication system with the Centers and/or FSS.

c. Terminal Navaids.

(1) Designate airports which, because of type of use and climatological conditions, should be equipped for instrument approaches by the Federal, state, or local government.

(a) Current Federal standards for instrument approach procedures are listed in the United States Standard for Terminal Instrument Procedures (TERPS). This document also lists the minimum descent altitudes or decision heights which can be obtained by various combinations of facilities.

In general, an ILS provides the lowest minimums -- i.e., the greatest reliability of service; a localizer-outer marker system comes next; the VOR or TVOR next; and the low frequency nondirectional beacon generally has the highest minimums associated with its use--i.e., the least reliability of service.

(2) Analyze which airports can qualify for instrument approach procedures and determine if existing radio facilities can be utilized. Plot the airport radio proposed instrument approach procedure, and if appropriate, initiate action for the establishment of such procedures.

(a) VOR Approaches.

1 A VOR can presently provide track information for an instrument approach procedure up to 30 nautical miles distant. In actual practice, it is advisable to keep approaches beyond 20 nautical miles distant to a minimum.

If the VOR facility is beyond 10 miles from the airport, another facility such as DME, intersecting localizer course, and VOR or NDB should be used to supply a "final approach fix".

2 Analyze probable direction of missed approach procedure which will take aircraft away from tall structures.

3 Use TERPS to determine the shape and extent of the final approach, final approach fix, and missed approach area. Outline these flight paths for all possible approaches on a chart for later evaluation by the FAA. These areas must be kept clear of tall obstructions if reasonable minimum descent altitudes are to be obtained. (See Navaid Illustration, Appendix F).

(b) Other Approach Equipment.

At locations where approach procedures from existing facilities can be utilized such as front or back course localizer, "H" facility, outer compass locator, or DME/VOR, they should be appropriately shown on the chart. (See Navaid Illustration, Appendix F).

(3) At locations where approach procedures from existing facilities are not possible, installation of some type of radio navigation facility is required for IFR. The type of proposed facility, direction of approach, and final approach and missed approach areas should be designated on the chart as specified in Section 43c (2) (a) 3; and action initiated during the 5-year period. The description of various types of radio navigational facilities are listed below and should be considered for upgrading as well as initial installation:

(a) ILS System. An instrument landing system (ILS) complete with glideslope, outer marker, etc., is the most precise system. However, this system is very expensive and control tower justification will come first if this is to be Federally financed. The criteria for establishment and discontinuance of a control tower, ILS and other associated facilities including radar and Category II service, are contained in Table I of FAA Handbook 7031.2, Airways Planning Standard Number One.

(b) Localizer - Outer Marker System. The standard localizer system is expensive to install and maintain but does provide an accurate, straight-in approach capability for all properly equipped aircraft.

The VORLOC type of localizer system is a solid state localizer system which utilizes a different operating principle but is presented to the pilot in an identical manner. This system is less expensive and less accurate than a standard localizer and is cheaper than a VOR.

A final approach fix is required and is usually supplied by a low frequency nondirectional beacon or a marker beacon transmitter, but a VOR radio or DME fix can be used.

(c) VOR System. VOR facilities are generally installed and maintained by the FAA. Capabilities are:

1 Because of the range and accuracy it can serve as the area enroute and transition facility, often for several airports in the area.

2 A TVOR (VOR located on or adjacent to the airport) approach is almost as accurate as a localizer approach and one facility can provide more than one approach to a given airport.

3 Two or three VOR facilities can provide many routes and intersections for handling inbound, outbound, transit, and delayed traffic in an extremely high density area.

(d) Low Frequency NonDirectional Beacon (NDB). The low frequency nondirectional beacon is popular where an approach aid at a low density airport is the only requirement. This facility is economical to purchase, install, maintain, and operate. These facilities have frequencies below the commercial broadcast band and are licensed by the Federal Communications Commission for low power operation because of limited frequency availability. This low power and frequency provide about a 25-mile usable range which is reduced further during periods of heavy precipitation and thunderstorm activity.

(e) Weather Observation System. Certified weather observation service requirements and assigned IFR minimums vary with different types of approach facilities and weather observations. The current regulations should be investigated and plans made to incorporate sufficient weather services.

44. Intermediate Range (1980) Requirements.

a. Airspace. The predicted increased traffic will create serious airspace utilization problems during this period. Greater use of enroute and terminal radar and course line computers will be needed to provide more routes and greater separation. The course line computer is an airborne radio system which utilizes VOR/DME signals to permit an aircraft to follow a direct course to its destination without the necessity to fly the dogleg VOR to VOR routes.

(1) Enroute. Analyze and designate which routes are expected to increase in traffic sufficiently to require improved service. Effects of course line computers and improved radar service must be considered when determining levels of adequate service.

(2) Terminal. See Paragraph 44c, Terminal Navaids.

b. Enroute Navaids.

(1) Sufficient enroute VOR facilities should have been installed by this period to complete the primary system.

(2) The addition of DME to all VOR facilities should be completed during this period to permit extensive use of course line computers and to provide additional fix information.

c. Terminal Navaids.

(1) Analyze, designate, and plot airports which may become eligible for instrument approach procedures during this period. The associated controlled airspace to accommodate the approach procedure should also be plotted.

(2) All existing facility use potential should be explored. Adjacent airport use of VOR, localizer, radar, NDB, and DME equipment are all possibilities for investigation.

(3) During the intermediate period new radio navigation facilities should be installed at newly qualified airports and at airports where increased traffic warrants improved equipment. This will include consideration of complete new ILS systems and Category II equipment for airports which meet the specifications of Table I, FAA Handbook 7031.2, increased utilization of the VORLOC system, new TVOR's, DME colocated with ILS and improved weather observation systems.

45. Long-Range (1990) Requirements.

a. Airspace. Increased airspace utilization problems should become acute during this period. Traffic volume and even greater speed differential will be factors. Greater utilization of climb and descent corridors may be adopted. Control zones in high density areas may be modified extensively to maintain safety, which could require modification of approach procedures and controlled airspace at adjacent airports.

Thus, airspace control will still consist of obstacle control and plan modification to incorporate new facilities.

b. Enroute Navaids. Technological changes in equipment will require refinements for the control and separation of high density traffic. Ground based computerized equipment in Air Traffic Control Centers is expected to guide aircraft through their airborne auto-pilot system, to provide control and separation automatically.

Airborne navigation equipment, independent of ground facilities, is expected to provide additional enroute navigation service.

c. Terminal Navaids. Terminal navaid service will involve service to new airports and changing or supplementing lesser facilities with more sophisticated units as volume and type of traffic dictate.

More tower, ILS, radar, and Category II installations will be required. In addition, extensive use of automatic "zero-zero" (Category III) landing systems will be realized. This system will permit a more sophisticated ground based ILS system to automatically guide the aircraft through the approach and landing phase, without pilot assistance, when there is zero ceiling and zero visibility. Aircraft speed, power, control, navigation, etc. will all be controlled automatically.

d. Weather Observation System. Automated weather observation and reporting equipment should permit more complete and accurate weather information and should be implemented as soon as it is available.

CHAPTER 13. PRELIMINARY PLAN FOR A SYSTEM OF AIRPORTS

46. General. The preliminary plan for a system of airports within the state shall identify all airports, both existing and proposed, by community and airport name.

Appropriate data, forecasts, maps, and charts should be included in the preliminary plan for the purpose of eliminating discrepancies, omissions, and conflicts with development proposals of other agencies. It is also recommended that data on existing facilities be included in the preliminary plan for the guidance of reviewing agencies as collected in accordance with Appendix C, Existing Airport Data.

47. Development Recommendations. Recommendations for development of the new and existing facilities shall be broken down into the three time periods of the plan showing development contemplated for completion and the estimated cost for each of the three time periods. Recommendations for development shall include: (a) landing area; (b) taxiways and ramps; (c) terminal area; (d) visual and electronic landing aids; and (e) navigational aids.

Estimated costs for the three time periods involved should be established on the basis of present land and construction costs as follows:

a. Cost estimated sufficiently accurate for current budgeting purposes during the period to 1975.

b. Estimated cost for advance financial planning for the ten-year period 1970 to 1980.

c. Approximate development cost for the planning period 1980 to 1990.

Appendix A, Recommended Development, includes a suggested form (Exhibit DR-1) for recording proposed development, primary demand factors, and facility requirements estimates.

48. Environmental Requirements. Narrative material accompanying the development recommendations should include environmental requirements for the time periods involved as determined by the requirements for the facility involved including, but not limited to, airspace and approach zoning, land use zoning, hazard marking and lighting, and navigation/landing aids.

CHAPTER 14. COORDINATION WITH INTERESTED AGENCIES

49. General. Following compilation of the preliminary plans, all elements applicable should be coordinated with interested agencies at Federal, local, and other state agency level. This coordination effort should identify appropriate future changes in the state's long-range comprehensive planning program which are needed to accommodate the state airport requirements. During the coordination process there should be some flexibility in the state airport system plan to accommodate modifications which are, or may be necessary to conform with statewide development objectives.

Coordination should be effected with appropriate agencies such as the following, as applicable in the particular state:

a. State Department of Transportation
b. State Highway Agency
c. State Office of Planning
d. State Economic Development Agency
e. Regional Planning Agencies
f. Metropolitan Planning Agencies
g. Local Planning Agencies
h. Airport Authorities
i. FAA Area Office
j. Department of Housing and Urban Development
k. Bureau of Public Roads (FHWA)
l. Federal and State Natural Resources Agencies (Forest, Park, Conservation, Reclamation, and Agriculture)

Consideration should be given to holding several formal or semi-formal public hearings throughout the state so that all interested parties will have an opportunity to comment on the preliminary plan. This step is useful in gaining acceptance of the plan. This may also be an important step since a plan might be challenged, either politically or even legally, on the grounds that the public never had a right to participate in or comment on the plan.

CHAPTER 15. FINAL PLAN FOR A STATE SYSTEM OF AIRPORTS

50. General. Following coordination with other interested agencies and the opportunity for general public comment, the comprehensive State Airport System Plan should be printed and distributed and contain the plans for the location, cost, and timing of all phases of airport system development.

51. Sample Guide. The attached sample guide, Appendix B, is a skeleton form outlining only the basic format of each section of the plan and how it may be used as input for the National Airport Plan.

A State Airport System Plan will normally be composed of two volumes.

a. Volume 1, State Airport System Plan - Summary Report, would be a summary document of the state plan formulated for use in planning the national airport system. This volume would be for public consumption and normally would be furnished to state legislatures, local political and coordinating bodies, interested individuals, and FAA.

b. Volume II, State Airport System Plan - Technical Supplement, would be a document which includes technical analyses and detailed information regarding the locations in the plan. It would contain historical data, demand derivations, socio-economic data, cost estimates, and other backup information pertinent to the development of the plan. This volume would be used at state level for continuing interagency coordination, for refinement and updating prior to accomplishment of future plans, for discussion with individual airport owners on implementation actions, for FAA use as required, and any other purpose of the state.

52. Time Periods of the Plan. Initially, new plans prepared in accordance with this document should utilize the years 1975, 1980, and 1990 respectively for the short, intermediate, and long-range planning horizons. Such uniformity will aid the comparison of the plans of different states and will assist the FAA in preparation of the National Airport Plan.

53. Updating the Plan. It is recommended that the plan be updated as necessary and reissued at least every five years. Revisions may be made as required to account for important technological and socio-economic changes. Future revisions should utilize national census years for intermediate and long-range planning horizons.

54. Interim Plan. It might be advisable for many states to prepare an interim plan to cover the immediate needs of their states during the time period in which the Preliminary State Airport System Plan is being prepared. This would provide some planning guidance for the short term (2-5 years).

APPENDIX A

RECOMMENDED DEVELOPMENT

The following Exhibit DR-1 (4 pages) provides a simple and convenient format for the presentation of airport development recommendations for the three time periods of the State Airport System Plan. Page 1 of the exhibit is the principal display and is entitled "Development Recommendations". Page 2 "Primary Demand Factors" and pages 3 and 4 of the exhibit "Major Facility Requirements Estimates" provide the forecasts on which the development recommendations are based.

Following Exhibit DR-1 is a completed sample using as illustrations hypothetical airports and development recommendations.

EXPLANATION OF COLUMN HEADINGS FOR EXHIBIT DR-1, PAGE 1

Column No.

1. Place Name. Name of city/town/location. For "large metropolitan areas" where metropolitan system planning is indicated, the area is shown in parenthesis below the city name. Large metropolitan areas are Standard Metropolitan Statistical Areas (SMSA) that are forecast in the planning period to enplane 250,000 passengers or reach 500,000 population (generally coincides with current large and medium air traffic hubs).

2. Airport Name and Ownership. Shows the present public use airport if one exists and if it is presently in the system; shows ownership by indicating (P) for private, (M) for military, and blank for public. If there is no airport currently, the word "New" will be entered. An asterisk (*) indicates a current agreement with the Federal Government.

3. Airport Class. Show the class, as defined in Chapter 5, by planning period as follows:

   LS - Landing Strip
   B - Basic Utility
   G - General Utility
   BT - Basic Transport
   GT - General Transport
   AT - Scheduled Air Transport
   HE - Heliport
   ST - STOL ports

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Column No.

4. Short-Range Planning Period. Show first a description of the recommended development for the ensuing 5-year period. The next entry indicates the phasing of development. The following breakdown is suggested:

   Phase I - Land acquisition and airport development having a high priority for accomplishment in the first two years of the 5-year period.

   Phase II - Land acquisition and airport development having a lower priority for accomplishment in the 5-year period.

   The next step is to utilize a cost code for each entry of development. This cost code will bracket the cost of the line or block item as follows:

   COST CODE

1	below $50,000
2	$ 50,000 - $ 100,000
3	$ 100,000 - $ 200,000
4	$ 200,000 - $ 500,000
5	$ 500,000 - $ 1,000,000
6	$ 1,000,000 - $ 1,500,000
7	$ 1,500,000 - $ 2,000,000
8	$ 2,000,000 - $ 3,000,000
9	$ 3,000,000 - $ 5,000,000
10	$ 5,000,000 - $10,000,000
11	$ 10,000,000 - $20,000,000
12	$ Over $20,000,000

5. Intermediate-Range. Indicate the recommended development for the 1975 to 1980 time period by use of a work code. A suggested work code is as follows:

   1 - Minor, but necessary, improvements to existing airports.

   2 - Major paving at existing airports.

   3 - Major improvements other than major paving at existing airports.

   4 - Major terminal improvements at existing airports

   5 - Construct new airport or acquire existing airport.

6 - Land acquisition.

7 - New runway(s) at existing airports.

8 - New paving other than runways at existing airports.

9 - Navigational aids - terminal facilities.

0 - Miscellaneous buildings, utilities, and roads.

6. Long-Range. Indicate the recommended development for the 10-year period following the intermediate period. Indicate work code and cost code as for intermediate-range.

DEVELOPMENT RECOMMENDATIONS

STATE NAME

PLACE NAME	AIRPORT NAME AND OWNERSHIP	AIRPORT CLASS			SHORT RANGE PLANNING PERIOD				INTERMED		LONG RANGE	
		SHORT	INTER	LONG	DESCRIPTION OF RECOMMENDED DEVELOPMENT	PHASE I	PHASE II	COST CODE	WORK CODE	COST CODE	WORK CODE	COST CODE

EXHIBIT DR-1 (page 1 of 4)

PRIMARY DEMAND FACTORS

AIRPORT NAME	PLACE POPULATION (000)				AIRCRAFT OPERATIONS (000)				AIRLINE/AIR TAXI ENPL. PASSENGERS (000)				TOTAL BASED AIRCRAFT			
	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990

MAJOR FACILITY REQUIREMENTS

Indicate total (existing plus new) requirements for each period

AIRPORT NAME	RUNWAYS					AIR CARRIER APRON SQUARE YARDS (000)				TERMINAL BUILDING SQUARE FEET (000)			
	IDENTITY	LENGTH (100's of FT)											
		NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990

MAJOR FACILITY REQUIREMENTS

Indicate total (existing plus new) requirements for each period

AIRPORT NAME	TERMINAL AREA AUTO PARKING, SQ YDS (000)				G.A. AIRCRAFT APRON SQUARE YARDS (000)				G.A. ADMIN. BUILDING SQUARE FEET (000)				G.A. AUTO PARKING SQUARE YARDS (000)			
	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990

DEVELOPMENT RECOMMENDATIONS

STATE NAME

PLACE NAME	AIRPORT NAME AND OWNERSHIP	AIRPORT CLASS			SHORT RANGE PLANNING PERIOD				INTERMED		LONG RANGE	
					DESCRIPTION OF	PHASE		COST	WORK	COST	WORK	COST
		SHORT	INTER	LONG	RECOMMENDED DEVELOPMENT	I	II	CODE	CODE	CODE	CODE	CODE
Marshall	* Municipal	G	G	BT	Land for airport development and clear zones.	x		2	1	1	2	2
					Runway and taxiway extension.	x		2				
					Obstruction removal.	x		1				
					Lighting, taxiway construction.		x	1				
Minneapolis (Minneapolis-St. Paul)	* Anoka County-Janes Field	GT	GT	AT	Land for airport development and clear zones.		x	10	7	3	5	10
					Land for airport development and clear zones.	x		2	8	2		
					Runway and taxiway extension, widening.	x		2	9	2		
					Terminal building extension.		x	2				
					Lighting, fire/rescue bldg.	x		1				
					Miscellaneous.		x	1				
Minneapolis (Minneapolis-St. Paul)	* International	AT	AT	AT	Runway and taxiway construction.		x	5	7	6	7	8
					Runway, taxiway and apron extension.	x		4	8	4	8	5
					Lighting (CAT. II).	x		4	9	3	9	2
					Obstruction removal	x		1				

EXHIBIT DR-1 (page 1 of 4)
(completed sample)

PRIMARY DEMAND FACTORS

AIRPORT NAME	PLACE POPULATION (000)				AIRCRAFT OPERATIONS (000)				AIRLINE/AIR TAXI ENPL. PASSENGERS (000)				TOTAL BASED AIRCRAFT			
	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990
Marshall Municipal	7	9	10	14	15	22	37	60	-	-	-	-	25	75	150	375
Anoka County-Janes Field	1482	1850	2250	2750	173	240	330	590	-	-	-	8000	173	275	350	350
Minneapolis-St. Paul International	1482	1850	2250	2750	300	450	550	600	2120	4180	7055	8000	46	40	35	28

EXHIBIT DR-1 (page 2 of 4)
(completed sample)

Indicate total (existing plus new) requirements for each period

AIRPORT NAME	RUNWAYS					AIR CARRIER APRON SQUARE YARDS (000)				TERMINAL BUILDING SQUARE FEET (000)			
		LENGTH (100's of FT)											
	IDENTITY	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990
Marshall Municipal	12/30	30	37	37	52	-	-	-	-	-	-	-	-
	17/35	24	24	24	24								
	8/26	28	34	34	40								
Anoka County-Janes Field	17/35	49	60	60	100	-	-	-	150	-	-	-	500
	8/26	32	50	50	70								
	17/35	-	-	-	100								
Minneapolis-St. Paul International	4/22	82	82	82	82	100	150	285	285	400	800	1194	1194
	11/29	62	100	100	100								
	11/29	100	100	100	100								
	4/22	-	100	100	100								

EXHIBIT DR-1 (page 3 of 4)
(completed sample)

MAJOR FACILITY REQUIREMENTS

Indicate total (existing plus new) requirements for each period

AIRPORT NAME	TERMINAL AREA AUTO PARKING, SQ YDS (000)				G.A. AIRCRAFT APRON SQUARE YARDS (000)				G.A. ADMIN. BUILDING SQUARE FEET (000)				G.A. AUTO PARKING SQUARE YARDS (000)			
	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990	NOW	1975	1980	1990
Marshall Municipal	1	2	2	4	10	35	70	140	1	2	2	4	1	2	2	4
Anoka County-Janes Field	2	6	6	150	10	50	150	300	2	5	5	10	2	6	6	25
Minneapolis-St. Paul International	75	130	263	263	14	14	14	14	2	3	3	3	5	5	5	5

EXHIBIT DR-1 (page 4 of 4)
(completed sample)

APPENDIX B

SAMPLE GUIDE FOR A STATE AIRPORT SYSTEM PLAN

VOLUME I - STATE AIRPORT SYSTEM PLAN - SUMMARY REPORT

Chapter 1. Forward. A forward is a proper place to set forth the objectives of the plan, general background, comment, historical review if needed, legal authority, and facts that should be known by the reader at the outset.

Chapter 2. Legal Authority for the Plan. The legal authority for a plan should always be stated, and if there is none, this fact should be set forth. Besides authorization to establish a plan, there should also be authorization to implement the plan. Otherwise, the plan will lack stability and is advisory only. States that lack authorization for implementation may find their primary need for the first issue is (1) to bring the need of a state airport system to the attention of the legislature and (2) to provide FAA with the information necessary for the preparation of the National Airport Plan.

Chapter 3. Contents of the Summary Report.

a. Summary of contents, including reference to contents of Volume II.

b. Explanation of differences and scope of 1975, 1980, and 1990 plans.

c. Brief history of state aviation and background of state aviation programs.

d. Future of state aviation and its role in economic and social progress.

e. Priorities for state resource allocation.

f. Relation of the state's aviation role, policies, programs, and facilities to those of adjacent states and the Nation.

g. Highlights of major air transportation, aeronautical developments, and problems within the state and Nation, including aircraft noise and proposed methods of abatement.

h. Brief summary of statutes related to airport development such as control of tall structures, aircraft noise abatement, and compatible land use controls.

i. Definition and objectives of the state plan and its relationship to the National Airport Plan and plans for other transportation systems.

j. Existing system description - general description of airport system, how well it meets its current requirements.

Chapter 4. The Development of a State Plan.

a. General description of how data was collected on existing aeronautical facilities, aviation statistics, and related state and local factors. Also, how other planning programs were considered.

b. General description of entry criteria and the basis for same.

c. General description of important planning assumptions which were used.

d. Summary of forecasting methodologies and techniques.

Chapter 5. The Plan. This Chapter should contain the plan as outlined in the format of Appendix A.

Chapter 6. Coordination. Evidence should be indicated that coordination of the State Airport System Plan with other plans, such as state comprehensive plans, highway plans, and regional metropolitan and local land use plans has been accomplished.

Chapter 7. Airports and the Economy. The environmental and socio-economic assumptions of the plan should be covered in this Chapter.

Chapter 8. Implementation. This Chapter should discuss costs and financing and should show how the planned development is to be accomplished.

It should be designed primarily for the use of airport owners and/or sponsors so they may complete necessary advance planning of the proposed development and be assured that, within the limits of state and/or Federal funds available, requests for financial assistance will be approved.

This can be accomplished by defining the criteria, standards, and maximum limits of Federal and/or state participation in land acquisition and airport development.

GRAPHICAL PRESENTATIONS FOR VOLUME I

The amount and types of graphic presentation will vary somewhat from state to state depending on allowable printing costs and individual taste. Quite early in the planning process, advice should be sought from individuals familiar with the techniques of report preparation, graphics, and layout. Also, if photos are to be used, it is wise to collect them some time in advance so there will be a wide selection from which to choose. (Sometimes in final page layout one finds he has several blank pages or spaces which must be filled.) It is suggested that the following are best shown graphically:

a. Inventory of Existing Resources. *State map(s) for each of the following:
*

(1) Existing airports, heliports, seaplane bases, both public and privately owned, serving the public.

(2) Aircraft population and distribution by symbols.

(3) Active pilots and distribution by symbols.

(4) Existing trunk, regional, intrastate, and scheduled air taxi (commuter-local service routes).

(5) Current surface travel routes.

(6) Recreation areas to be served by air.

(7) Existing Federal airways.

(8) Location and types of existing en route navigational aids.

b. The State Plan. State maps showing --

(1) Existing airports and those needed in the system in 1975, 1980 and 1990 by class and system role. (Note: It may be necessary to use a map for each before preparing a composite map or at least use coloring to illustrate the different categories comprising the entire system.)

*See Sample maps (Mississippi and West Virginia) attached.

(2) Present and future major surface travel routes needed to serve the state by 1975, 1980, and 1990, if available.

(3) Proposed en route navigational aids.

Graphs showing forecasts for the state:

(1) Number of airports.

(2) Civil aircraft (transport and general aviation)

(3) Air carrier/air taxi enplaned passengers.

(4) General aviation flying (by classification).

(5) Aircraft by type of operation.

VOLUME II - STATE AIRPORT SYSTEM PLAN - TECHNICAL SUPPLEMENT

Chapter 1. Forward. Relate to Volume I and state that the Technical Supplement contains the backup assumptions, derivations, and methodologies used in developing the plan. This volume should also contain the inventory of existing airports.

Chapter 2. Airports in the State System and Their Classification - As developed using Chapter 5 of this document.

Chapter 3. Inventory of Existing Aeronautical Facilities. As developed using Chapter 6 of this document.

Chapter 4. Coordination with other Planning Programs. As developed using Chapter 7 of this document.

Chapter 5. Sources of Aviation Statistics and Forecasts. As developed using Chapter 8 of this document.

Chapter 6. National, State, and Local Socio-Economic Factors Affecting Amount of Aeronautical Activity. As developed using Chapter 9 of this document.

Chapter 7. Forecast of Aeronautical Activity. As developed using Chapter 10 of this document.

Chapter 8. Airport System Requirements. As developed using Chapter 11 of this document.

Chapter 9. Requirements for Navigational Aids. As developed using Chapter 12 of this document.

Chapter 10. Inventory of Airports. Data sheets for each active civil airport in the state, cross-checked with FAA Airport Master Records (5010.1) or Facilities Records (29A and 29A-1) aeronautical charts, and other recognized sources for the greatest possible accuracy. Surrounding land use information and maps may normally be obtained from responsible local comprehensive planning agencies. Include one or two maps, as appropriate, for each airport which show major airport facilities as well as identification of surrounding land uses in the airport's immediate environs.

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APPENDIX C

EXISTING AIRPORT DATA

PLACE NAME	AIRPORT NAME AND OWNERSHIP	AIRPORT DATA					
				RUNWAYS			
		CLASS	ELEV	SURFACE	LENGTH	STRENGTH	LIGHTING

APPENDIX C

EXISTING AIRPORT DATA

AIRPORT NAME	NAVAID DATA						TRANSPORTATION DATA(served by)					
	TOWER	OMNI	NDB	ASSOC FSS	IFR A/P	UNICOM	TRUNK	REG	AIR TAXI	CHAR-TER	LIMO	TAXI

APPENDIX D

FORECASTS OF AVIATION ACTIVITY, 1970-1980

OKLAHOMA CITY (M) HUB

Historical and projected activities at the following airports within the Oklahoma City air transportation hub were considered in the development of future aviation demand:

LOCATION	NAME
Norman	Max Westheimer
Oklahoma City	Expressway Junction
Oklahoma City	Wiley Post
Oklahoma City	Will Rogers World
Oklahoma City	Downtown Airpark
Yukon	Cimarron

FORECASTS OF AVIATION ACTIVITY, 1970-1980

OKLAHOMA CITY (M) HUB

AIRPORT AVIATION ACTIVITY	ACTUAL 1965	ACTIVITY FORECASTS 1970	1975	1980
A. AIRCRAFT OPERATIONS (000)				
1. Total Operations	506	725	941	1,178
a. Itinerant Operations	301	428	558	703
(1) Sched. Air Carrier	34	57	80	112
(2) General Aviation	258	360	468	581
(3) Military	9	11	10	10
b. Local Operations	205	297	383	475
(1) General Aviation	191	281	368	461
B. BUSY HOUR OPERATIONS (NO.)				
1. Sched. Air Carrier	11	17	24	33
2. General Aviation 1/	300	402	506	618
C. ENPLANED PASSENGERS (000)				
1. Total Passengers	577	1,043	1,629	2,506
2. Sched. Air Carrier	324	649	1,044	1,710
a. Domestic	324	649	1,044	1,710
B. International	-	-	-	-
3. General Aviation	253	394	585	796
D. ENPLANED AIR CARGO - TONS (000)	3	8	16	31
E. BASED AIRCRAFT, G.A. (NO.)				
1. Total Based Aircraft	507	631	803	938
2. Single-engine	386	476	576	658
3. Multiengine	121	155	227	280

1/ Not same hour as Air Carrier

FORECASTS OF AVIATION ACTIVITY, 1970-1980

OKLAHOMA CITY (M) HUB

AIRPORT AVIATION ACTIVITY	ACTUAL 1965	ACTIVITY FORECASTS 1970	1975	1980
F. AIRCRAFT MIX (TYPES) - (% Distr.)				
1. Air Carrier - Operations	100.0	100.0	100.0	100.0
a. Group A	14.5	11.9	11.2	8.3
b. Group B	85.5	88.1	88.8	91.7
c. Group C	-	-	-	-
2. Air Carrier - Passenger/Cargo	100.0	100.0	100.0	100.0
a. Group X (Over 200 seats)	-	-	-	1.5
b. Group L (120 - 199 seats)	14.5	11.9	14.9	16.5
c. Group M (75 - 119 seats)	32.6	68.4	74.2	79.5
d. Group S (55 - 74 seats)	9.3	-	-	-
e. Group T (54 seats and under)	43.6	19.7	10.9	2.5
3. General Aviation - Operations*	100.0	100.0	100.0	100.0
a. Group C	3.0	4.9	7.0	8.8
b. Group D & E	97.0	95.1	93.0	91.2
4. Military - Operations	100.0	100.0	100.0	100.0
a. Group B	40.0	40.0	40.0	40.0
b. Group C	60.0	60.0	60.0	60.0

* General Aviation - Passenger/Cargo - all Group T aircraft.

FORM APPROVED: BUDGET BUREAU NO. 04-R0051

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
FAA AIRPORT MASTER RECORD

[redacted]

DATE OF PRINT	10/29/68
1 SITE NUMBER	62120.1
5 REGION & AREA	EA BOS
6 ARPT OPEN TO PUBLIC	Y
8 ASSOCIATED CITY	ANY CITY
9 STATE	MASS
21 DSTC & DRCTN TO ARPT FM ASSOCD CITY	10 S
22 NAP/FEDERAL AGREEMENTS	NX
10 OFFICIAL AIRPORT NAME	ANY CITY MUNICIPAL
23 ARPT LAT.	45 22 33N
24 LONG.	127 02 33W SRVD
25 ARP	Y
26 ELEVATION	485
11 NEAREST CITY	ANY CITY
12 STATE	MASS
27 HUB TYPE	S
28 MAGNETIC VARIATION	1400W
29 NORMAL MAX. TEMP.	78
13 COUNTY (Arpt located in)	BARNSTABLE
14 STATE	MASS
30 RESERVED	
31 SMSA	
15 OWNER: NAME	ANY CITY AIRPORT AUTH
16 ADDRESS	5010 AIRPORT ROAD, ANY CITY, MASS 02020
17 OWNERSHIP CLASS	PU
18 MANAGER: NAME	A. B. SMITH
19 ADDRESS	5010 AIRPORT ROAD, ANY CITY, MASS 02020
20 PHONE	123-456-1234

33 RUNWAY	34 PHYS LENGTH	35 WIDTH	36 SURFACE COMPOSITION	FAA GROSS WT. STRENGTH (1000 lbs.) 37 SNGL WHL	38 DUAL WHL	39 DUAL TAND	40 % EFF GRADIENT	41 % WIND COVERAGE	42 MARKING TYPE-CONDITION	43 CL LGTS	RUNWAY LGTS 44 TYPE	45 INTST
5/23	6010	75	ASPH	100	120	200	1.41	85.0	ALL WEA-G	Y	L802	H

71 STANDARD TIME ZONE	
72 DAYLIGHT SAVING TIME	Y
73 RNWY LGT OPER SKED	DUSK-2330
74 AIRPORT ATTENDANCE SCHEDULE: MONTHS / DAYS / HOURS	ALL / TUE-SUN / 0700-2330
75 ARPT BEACON LGT	C-G
76 OPERATING SCHEDULE	DUSK-DAWN
77 LANDING FEES FOR NON-COMMERCIAL USERS	Y
78 STATE LICENSING CLASSIFICATION	
79 CUSTOMS AIRPORT OF ENTRY	N
80 CUSTOMS LANDING RIGHTS AIRPORT	N
81 TAXIWAY LIGHTS	N
82 WIND INDICATOR	Y
83 SEGMENTED CIRCLE	Y
84 AC 150/5210-6 INDEX	3
85 FIRE & RESCUE EQPMT AS SUGGESTED BY AC 150/5210-6	Y
IF NOT: 86 GAL. WATER & / LBS. CHEMICAL IMMEDIATELY AVAIL.	
87 EMGCY MED FACILITIES AS SUGGESTED BY AC150/5210-2	Y
88 SNOW REMOVAL PLAN	Y
90 WRECKAGE REMOVAL PLAN	Y
91 EMGCY READINESS PLAN	Y
92 DESIGNATED CD SHELTER	N
93 HELIPAD ON AIRPORT	N
94 WEATHER STN ON ARPT	N
95 ADMIN/TRML BLDG	Y
98 NO. T-TYPE HANGARS	0
99 NO. CONVENTIONAL HNGRS	2
ENGINE OIL 100 PISTON	Y
101 TURBINE	N
REPAIRS AIRFRAME 102 MAJOR	J
103 MINOR	N
POWER PLANT 104 MAJOR	N
105 MINOR	Y
OXYGEN 106 HI PRESSURE	N
107 LO PRESSURE	N
OXYGEN REPL BOTTLES 108 HI PRESSURE	N
109 LO PRESSURE	N
111 ARPT AIRSPACE ANALYSIS DTRMN	NO OBJECTION
112 NUMBER OF FIXED BASE OPERATORS	4
113 TYPES OF FIXED BASE OPERATORS	INSTR/SALES/CHARTER

RUNWAY END		47 HI SPEED EXIT	48 APPROACH	49 TD ZONE	50 REIL	51 APCH SLOPE INDCR	52 RVR	53 RVV	54 CTLG OBSTRUCTION (Marked-Lighted)	55 DSTC FM THRESH	56 APCH RATIO	57 CLOSE IN OBST	58 RGT TFC	59 BLAST FENCE	60 TYPE ARRESTING DEVICE (For end)
5		N	ALSA	Y	Y	VASI	N	N	TREES	1000	50-1	N	N	N	
23		N	ALSA	Y	Y	NONE	N	N	POLE ML	500	45-1	N	N	N	

114 FUEL AVAILABLE FOR PUBLIC SALE

TYPE	UNDERGROUND (100 GAL)	ABOVE GROUND (100 GAL)
F-12		
F-15	20	
F-18	20	
F-22	20	
F-30		
F-34		
F-40		
F-45		

RUNWAY END	61 THRESHOLD DISPLACED	62 DAY	63 NIGHT	64 DAY	65 NIGHT	66 LANDING	67 TAKEOFF	68 LATITUDE	69 LONGITUDE	70 ELEVATION
5										
23										

115 MILITARY JOINT USE AGREEMENT	N
117 BASED MILITARY & TYPE OPERATIONS	
118 TYPE & NO. MILITARY ACFT	
119 ESTD. TOTAL ANNUAL MILITARY OPERATIONS	0
120 ESTIMATED ANNUAL AIR TAXI OPERATIONS	200

ESTD. GENERAL AVIATION OPERATIONS

121 ANNUAL LOCAL	122 ANNUAL ITNRNT	123 TOT. PEAK MO.
6000	10000	4500

BASED GEN. AVIATION ACFT		SEAPLANE BASE DATA	
124 SINGLE ENG. 4 PLACE & OVER	2	129 SHELTERED	
125 SINGLE ENG. UNDER 4 PLACE	8	130 MOORING BUOYS	
126 MULTI-ENG	2	131 DOCKS	
127 HELICOPTER	0	132 RAMP	
128 SEAPLANE	0	133 BEACHING GEAR	
		SEE INSTRUCTIONS	

134 AIRPORT SERVED BY SCHEDULED AIR CARRIER	Y
135 LATEST INSP OR INFO REQ.	5/12/68
136 INSP.	Y

137

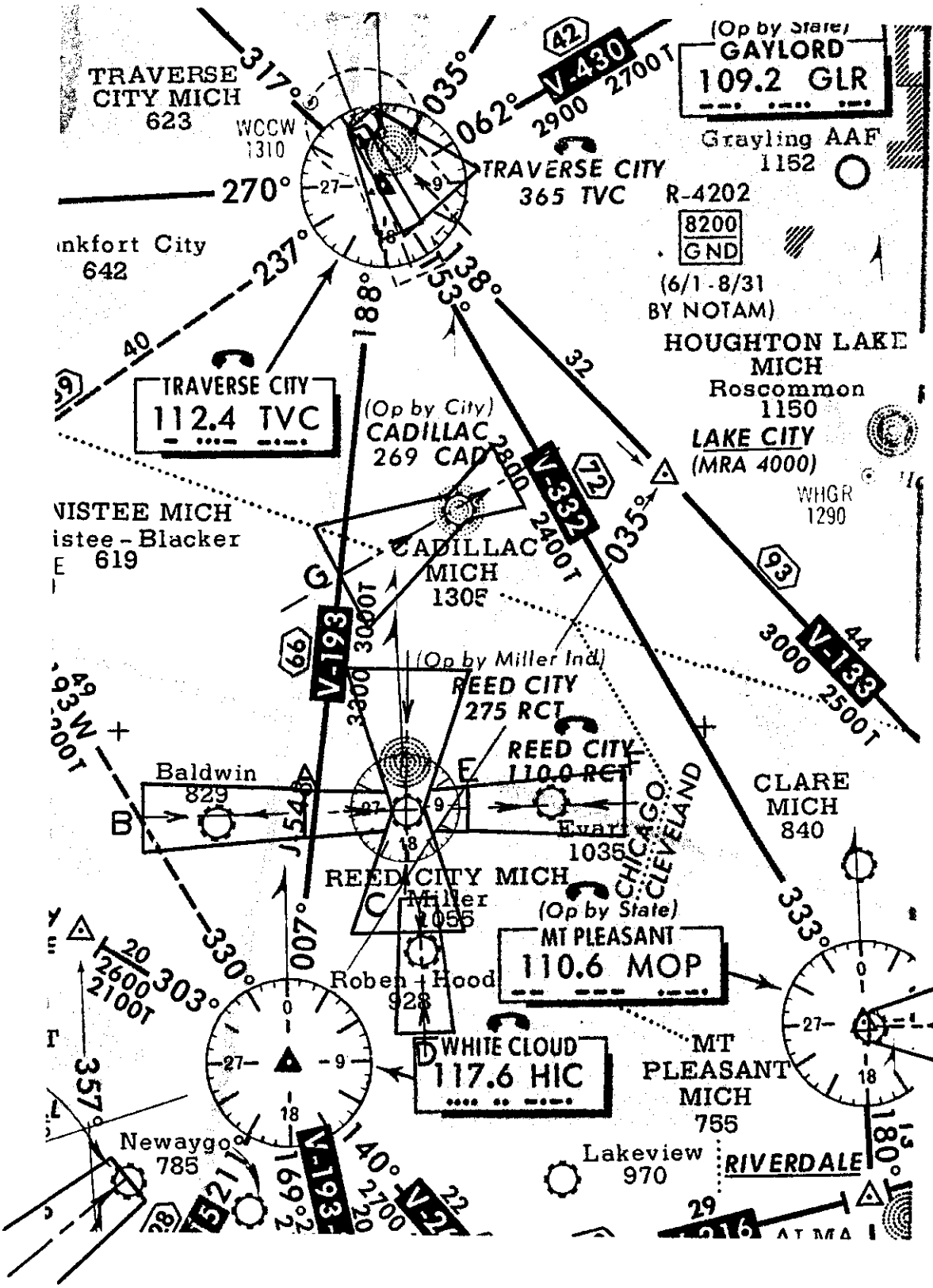
(See reverse side of form for sketch.)

FAA Form 5010-1 (9-68) SUPERSEDES FAA FORM 29A

"Y"-YES; "N"-NO; "◆"-SEE REMARKS IN ITEM ◆137. ABBREVIATIONS ARE LISTED IN THE CONTRACTIONS HANDBOOK, ORDER 7340.1

APPENDIX F

NAVIGATIONAL AIDS ILLUSTRATION



APPENDIX G

BIBLIOGRAPHY

A. FAA publications not listed in Chapters 8 and 9.

1. Advisory Circulars.

a. AC 150/5050-1, Airport Planning as a Part of Comprehensive State Planning Programs. (To be superseded by this document.)

b. AC 150/5060-1A, Airport Capacity Criteria Used in Preparing the National Airport Plan.

c. AC 150/5060-2, Airport Site Selection.

d. AC 150/5060-3, Airport Capacity Criteria Used in Long-Range Planning. (To be printed early in 1969.)

e. AC 150/5070-2, Planning the Metropolitan Airport System.

f. AC 150/5070-3, Planning the Airport Industrial Park.

g. AC 150/5070-4, Planning for Rapid Urbanization Around Major Metropolitan Airports.

h. AC 150/5090-1, Regional Air Carrier Airport Planning.

i. AC 150/5300-2, Airport Design Requirements for Terminal Navigational Aids.

j. AC 150/5300-4A, Utility Airports. (To be published early 1969.)

k. AC 150/5300- 6 , Basic Transport and General Transport Airport Design Standards. (To be published early 1969.)

l. AC 150/5310-2, Airport Planning and Airport Layout Plans.

m. AC 150/5325-4, Runway Length Requirements for Airport Design.

n. AC 150/5325-5A, Aircraft Data.

o. AC 150/5325-7, Is Your Airport Ready for the Boeing 747.

p. AC 150/5330-3, Wind Effect on Runway Orientation.

APPENDIX G. BIBLIOGRAPHY (Continued)

q. AC 150/5335-1, Airport Taxiways.

r. AC 150/5335-2, Airport Aprons.

s. AC 150/5340-13A, High Intensity Runway Lighting System.

t. AC 150/5340-14A, Economy Approach Lighting Aids.

2. Federal Aviation Regulations.

a. Part 77, Objects Affecting Navigable Airspace.

b. Part 151, Federal Aid to Airports.

c. Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports.

3. Order.

Order 7480.1, Guidelines for Airport Spacing and Traffic Pattern Airspace Areas.

4. Other FAA Publication.

The Airport - Its Influence on the Community Economy.

B. General Publications.

1. 1967 Air Transportation Facts and Figures - Air Transport Association of America, Washington, D. C.

2. Planning the Airport Environment - American Society of Planning Officials, Chicago, Illinois.

3. Airport Capacity - Airborne Instrument Laboratory, Deer Park, Long Island, New York. (A research report prepared for the FAA and distributed by the U. S. Department of Commerce.)

4. Land Use Planning Relating to Aircraft Noise - Bolt, Beranek, and Newman, Inc., Washington, D. C.

5. Air Transportation in the 1970's: Problems and Opportunities - The Rand Corporation, Santa Monica, California.

APPENDIX G. BIBLIOGRAPHY (Continued)

6. Public Investment in General Aviation Airports: An Application of Cost-Benefit Economics - Mathematica, Princeton, New Jersey. (Prepared for the FAA.)

7. Studies in Travel Demand - Mathematica, Princeton, New Jersey. (Prepared for the U. S. Department of Commerce, Northeast Corridor Transportation Project.)

8. Business Flying - National Business Aircraft Association, Inc., Washington, D. C.

APPENDIX H

GLOSSARY

This Glossary provides definitions of terms which are not fully defined in the text of this document.

Air Navigation Facilities: those electronic facilities which enable a pilot or navigator to determine the aircraft's relative position using compatible airborne equipment to provide direct indication of distance bearing and/or altitude from a reference point without resorting to radio voice communication.

Airport Capacity: the number of aircraft operations an airport can accommodate either hourly or annually assuming a given level of average delay.

Airport Traffic Control Tower (ATCT): a central operations facility in the terminal air traffic control system, consisting of a tower cab structure, including an associated IFR room if radar equipped, using air/ground communications and/or radar, visual signaling, and other devices, to provide safe and expeditious movement of terminal air traffic.

Air Route Traffic Control Center (ARTCC): a central operations facility in the air route traffic control systems using air/ground communications and/or radar, primarily providing en route separation and safe, expeditious movement of aircraft operating under instrument flight rules within the controlled airspace of that center.

Airspace: space in the air above the surface of the earth or a particular portion of such space, usually defined by the boundaries of an area on the surface projected upward.

Airway: a path through the navigable airspace designated by appropriate authority within which air traffic service is provided.

Category II: instrument weather conditions of between 1200 feet and 2400 feet visibility (runway visual range) under which airport aircraft operations can be conducted providing certain advanced navigation equipment is available both in the aircraft and on the ground.

Civil Aeronautics Board (CAB): a Federal regulatory agency which exercises economic control over civil aviation such as the awarding of routes and service to cities and the establishment of air fares.

Control Zone: airspace extending upward from the surface of the earth which may include one or more airports and is normally a circular area of five statute miles in radius with extensions where necessary to include instrument approach and departure paths.

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Controlled Airspace: airspace, designated as continental control area, control area, control zone, or transition area, within which some or all aircraft may be subject to air traffic control.

Course Line Computer: airborne equipment which accepts bearing and distance information from receivers in an aircraft, processes it, and presents navigational information enabling flight on courses other than directly to or from the ground navigation aid being used.

Distance Measuring Equipment (DME): electronic equipment used to measure, in nautical miles, the slant range of the aircraft from a navigational aid.

Federal-aid Airports Program (FAAP): a Federal Program which provides matching funds for eligible airport development. The Federal Airport Act of 1946, as amended, established the FAAP.

Federal Aviation Administration (FAA): a government administration under the Department of Transportation which exercises Federal jurisdiction for civil aviation matters as specified in the Department of Transportation Act and related statutes.

Glide Slope: an ILS navigation facility in the terminal area electronic navigation system, providing vertical guidance for aircraft during approach and landing by radiating a directional pattern of VHF radio waves modulated by two signals which, when received with equal intensity, are displayed by compatible airborne equipment as an "on-path" indication.

Gross National Product: the dollar value of all goods and services produced in the nation in a given year.

"H" Facility: a facility used for high frequency communications once used extensively for air-to-ground voice communications but now reduced to a relatively minor role by VHF and UHF for air traffic control; still used for overseas point-to-point and air/ground communication.

Instrument Flight Rules (IFR): FARs that govern the procedures for conducting instrument flight.

Instrument Landing System (ILS): a system which provides to the aircraft, the lateral, longitudinal and vertical guidance necessary for a landing.

Localizer: an ILS navigation facility in the terminal area electronic navigation system, providing horizontal guidance to the runway centerline for aircraft during approach and landing by radiating a directional pattern of VHF radio waves modulated by two signals which, when received with equal intensity, are displayed by compatible airborne equipment as an "on-course" indication, and when received in unequal intensity are displayed as an "off-course" indication.

National Airport Plan: an annually revised FAA document required by the Federal Airport Act of 1946, as amended. The plan lists the locations in the National System of Airports and the recommended development at each. The development is limited to those items eligible for Federal financial assistance under the Federal-aid Airport Program which does not include items such as terminal buildings.

National Air Transportation System: the total system of airports and air navigation aids which allows air access to the Nation's communities.

National Association of State Aviation Officials: an association of state aviation agencies whose purpose is as follows - to foster aviation as an industry, as a mode of transportation for persons and property and as an arm of the national defense; to join with the Federal government and other groups in research, development, and advancement of aviation; to develop uniform aviation laws and regulations; and to otherwise encourage cooperation and mutual aid among the several states.

National System of Airports: airports for which there is a national interest and thus eligible for financial assistance under the Federal-aid Airport Program. Such airports are included in the FAA National Airport Plan.

Non-directional Radio Beacon: a low frequency radio facility used for homing.

Outer Marker Beacon (OM): an ILS navigation facility in the terminal area electronic navigation system located 4 to 7 miles from the runway edge on the extended centerline transmitting a 75 mcs fan-shaped radiation pattern, modulated at 40 cps, keyed at two dashes per second, received by compatible airborne equipment, indicating to the pilot, both aurally and visually, that he is passing over the facility and can begin his final approach.

Outer Marker Compass Locator: a facility in the terminal area electronic navigation system, located at the outer marker beacon, which transmits a continuous carrier, L/MF radio wave in an omnidirectional pattern, enabling the pilot of an aircraft equipped with a direction finder to determine his bearing relative to the outer marker.

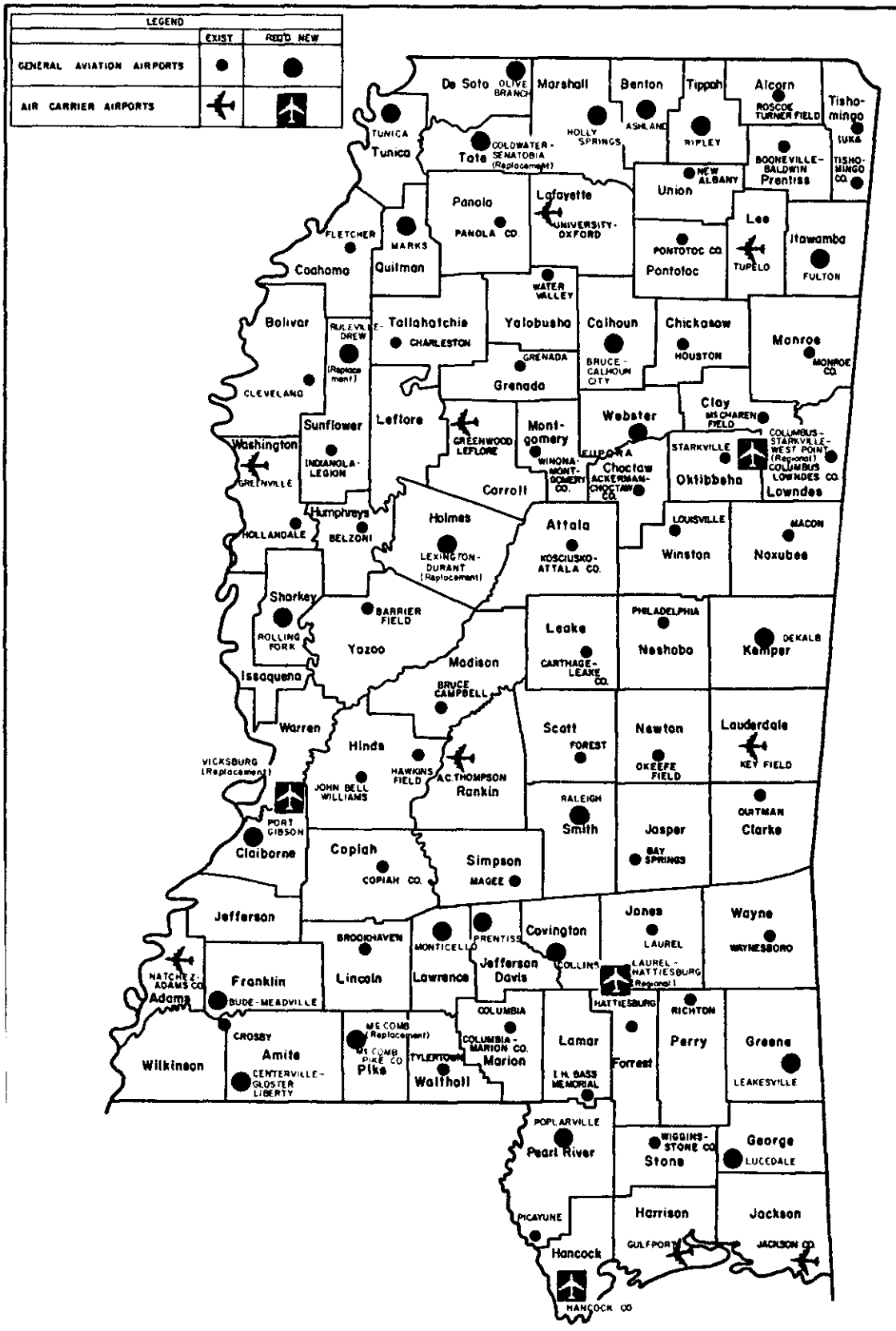
Radar (Radio Detection and Ranging): a device which, by measuring the time interval between transmission and reception of radio signals and correlating the angular orientation of the radiated antenna beam or beams in azimuth and/or elevation, provides information on range, azimuth and/or elevation of objects in the path of the transmitted signals.

Standard Metropolitan Statistical Area (SMSA): an area designated principally for statistical purposes which meets certain criteria of population and metropolitan character. Additionally, in establishing the boundaries of the SMSA, consideration is given to the extent of social and economic integration between the county of the central city and adjacent counties which are metropolitan in character. A city population of 50,000 is a principal criterion for SMSA designation by the Bureau of the Budget. The Bureau establishes the definitions and titles of standard metropolitan statistical areas with the advice of the Federal Committee on Standard Metropolitan Statistical Areas, composed of representatives of the major statistical agencies of the Federal Government.

Terminal VOR (TVOR): very high frequency terminal omnirange station. (FAR Part 1) (located on or near an airport and used primarily as an approach aid).

VFR: operation of aircraft under visual flight rules.

Very High Frequency Omnirange Station (VOR): a specific type of range operating at VHF and providing radial lines of position in any direction as determined by bearing selection within the receiving equipment. Note: this facility emits a nondirectional "reference" modulation and a rotating pattern which develops a "variable" modulation. Lines of position are determined by comparison of phase of the variable with that of the reference.



MISSISSIPPI AIRPORT PLAN

STATE OF MISSISSIPPI
(SAMPLE MAP)

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