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Heliport System Planning Guidelines

DOT/FAA/PM-87/33
DOT/FAA/PP-88/3

Program Engineering Service
Washington, D.C. 20591

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Final Report

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16. Abstract

State and city governments generally realize that continued vitality depends on a steady expansion of industry and services as a function of planned growth. The helicopter is a proven catalyst for enhancement of those desired growth patterns. However, without the necessary support infrastructure, this positive contribution of the helicopter cannot be realized. Determining the need for such a support system can be achieved through an understanding of local helicopter activities and the metropolitan or state-wide socio-economic dynamics in which they occur. This allows for data base development, including a fleet inventory, and analysis to provide a foundation for determining current, and forecasting future, helicopter activity and support facility requirements.

Heliport planning is a relatively new field. Previous efforts, although based on proven fixed-wing airport methods, have produced a series of uncoordinated and nonstandardized products from many various individual planners and organizations. Consequently, the data collected and the analytical processes used have not been consistant or directly comparable. This document presents fundamental planning criteria by which urban area heliport requirements may be assessed at any jurisdictional level. It offers standardization for comparability of real demand and for funding prioritization.

This is the third document in a series of three intended to encourage and assist planners in heliport system plan development. The other documents are:

Analyses of Heliport Systems Plans, DOT/FAA/PM-87/31, DOT/FAA/PP-88/1
Four Urban Heliport Case Studies, DOT/FAA/PM-87/32, DOT/FAA/PP-88/2

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1.0 BACKGROUND AND ORGANIZATION

1.1 BACKGROUND

Helicopters have the potential of becoming a versatile and valuable segment of the multi-modal transportation infrastructure of metropolitan areas. They are capable of providing point to point transportation under most weather conditions and can operate safely from both rooftop or ground level. In fact, for three decades since 1953, New York, Chicago, Los Angeles, and San Francisco all have had helicopter airlines. These airlines provided service between the various airports and the downtowns, capturing up to 5% of all airport-to-city-center commuter traffic. Even so, helicopter transportation has experienced its most dramatic growth in urban areas in the last two decades. However, in the majority of cities the lack of helicopter landing facilities within key urban activity centers has impeded the helicopter's potential as a valuable and efficient means of urban transportation.

The number one priority is therefore considered to be the development of city-center heliports. City-center locations are critical in establishing a network of heliports that integrate helicopters into the urban framework, and are the key to providing the potential for commercial transportation to/from the local commercial service airports and other significant heliports. Without strategically located landing facilities a helicopter transportation network is unlikely to exist.

The Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems (NPIAS) integrates the heliport planning goals of the Rotorcraft Master Plan into the overall air transportation system of the Nation, by encouraging development of the critical city-center heliports. The most recent NPIAS establishes a requirement for a total of 5[illegible] heliport locations, including the 25 urban area heliports included in the Rotorcraft Master Plan. In 1983, as part of expanding heliport development the FAA also announced the National Prototype Demonstration Heliport Program. The purpose of this program was to build four full service heliports in major urban areas to promote the integration of helicopter use into the urban transportation infrastructure. Three of the National Prototype Heliports are now operational.

Opened as a public use heliport in 1978 under the Indianapolis Airport Authority (IAA), the "Bee Line Heliport" was chosen to be a National Prototype in 1983, and renamed the Indianapolis Downtown Heliport. In May, 198[illegible], it was the first FAA National Prototype Heliport to open. The heliport currently has four based helicopters and supports over 10,000 annual operations. Indianapolis is a full service heliport with fuel, maintenance, passenger lounge, rental office space, and even a restaurant that offers a meal and helicopter tour of the city for one price.

The New Orleans Downtown Heliport was the second of the Federal Aviation Administration's National Prototype Heliports to be opened. It is a ground level heliport located on a 3.2 acre site with one landing pad and parking spaces for two helicopters. There is also a [illegible],500 square foot terminal building. The New Orleans Downtown Heliport was constructed as part of a multi-modal transportation center. It is situated on the Gulf Coast, which during the height of the petroleum market, experienced the highest level of civilian helicopter activity in the world. Due to the rapid decline of the oil industry, as well as other unanticipated factors, the New Orleans Downtown Heliport has not yet achieved its potential.

New York City has had four active public use heliports operating since the 1950's. The New York National Prototype, the New York Downtown Heliport (Wall Street), was officially opened in January 1988 and is expected to have 35,000 operations its first year. Activity is expected to increase in the future as additional facilities and services are added.

The success of these three heliports, as well as other urban area heliports, and the resulting competition for state and federal funding for future heliport development, points to the urgent need for more accurate heliport system planning and site selection methodology, including standardized data collection processes and analysis, and improved needs assessment procedures. These will provide for a more equitable comparison between different locations for more effective planning and funding of a much needed helicopter transportation network.

This report, "Heliport Planning Guidelines" (DOT/FAA/PM-87/33), (DOT/FAA/PP-88/3), is the third in a series of three reports developed to strengthen both the understanding and the effectiveness of heliport planning. The other two reports are "Analyses of Heliport System Plans" (DOT/FAA/PM-87/31), (DOT/FAA/PP-88/1), and "Four Urban Heliport Case Studies" (DOT/FAA/PM-87/32), (DOT/FAA/PP-88/2).

1.1.2 Objectives

The primary objective of this document is to provide guidelines by which regions, states and municipalities may assess the need for urban area heliports in a more accurate and effective manner. In addition, this document will assist the FAA in developing standardized heliport planning methods to improve the evaluation of prospective heliports. Improved demand analysis and planning processes will provide a foundation for developing true multi-modal urban transportation systems. Specifically, the objectives of this task are:

- To recommend methodologies, planning tools, questionnaires and data base structure for the collection and analysis of information that determines demand for heliports.

- To improve and standardize methods for identifying and prioritizing the evaluation and funding of future heliport development.

1.1.3 Methodology and Discussion

The FAA encourages states and regional governments to undertake, as part of their system planning activity an evaluation of helicopter needs within their respective planning areas. This would include essential downtown heliport locations in addition to the development of heliports on existing airports within the planning region. Key downtown heliports are encouraged because they are considered critical to providing convenient air transportation to the flying public.

This study is necessary because there have been two obstacles to projecting the need for, and the planning of, heliports. The helicopter industry has been poorly documented with regard to total numbers of helicopters, numbers of hours flown, numbers of operations, mission composition and operational characteristics on an area specific basis. Although this problem has been widely recognized, and more discrete helicopter and heliport data are being collected, historically, accurate data have been difficult to obtain, and have varied dramatically between sources even from within the same area. Coupled with this, is the fact that heliport planning is new to the realm of aviation planning. Consequently, standardized guidelines to determine the need for heliports do not exist. As more and more master plans and system plans address helicopters as a significant and growing segment of air transportation, the need for standard guidelines becomes imperative.

Two FAA Advisory Circulars, "Planning the Metropolitan Airport System" (AC 150/5[illegible]), and "Planning the State Airport System" (AC 150/5[illegible]-5A), provide the generic ingredients for determining the demand for airports and their impact on airspace and environment. These advisory circulars can be used as structural guidelines for heliport system plans because several parallels can be drawn between airport and heliport planning. Both require a definition of the existing system including aircraft mix, hours flown, landing facilities, airspace utilization, environmental impact and transportation patterns. However, planning for the helicopter system requires tailoring the planning process to correspond to the unique capabilities of the helicopter and to its operational characteristics. But the heliport system planner must have a more thorough understanding of urban planning and transportation theories, than does an airport planner, because heliports bring aircraft right into the cities. This understanding must include intra-city travel patterns and impacts, land use, heliport siting requirements, etc. More involvement with urban and transportation planning should also promote more cooperation between aviation planners and those planners in state and metropolitan areas who are responsible for transportation, and therefore for urban heliport development, but who may have little knowledge of aviation needs.

1.2 ORGANIZATION

In establishing the planning guidelines, the first step was to decide what data are required to accurately represent the existing helicopter operational system as a basis for determining the demand for heliports and the system requirements. These planning criteria or elements are discussed in detail in the following sections.

The next step was to determine the order of data collection, the evaluation methods, and the presentation. The following categories are the framework for this document:

- Heliport System Plan Requirements
- Planning Goals
- Data Collection and Inventory
- Description of the Existing System
- Forecast
- Site Selection and System Alternatives
- Recommended System Plan

An outline of the elements for a comprehensive heliport system plan is found in Appendix A.

Examples of the types of data collected and how they have been presented in existing heliport system plans are given throughout this report.

2.0 HELIPORT SYSTEM PLAN REQUIREMENTS

2.1 GENERAL

Discussing the basic requirements of a heliport system provides the background for the system plan. The geographical limits of the area to be investigated should be clearly defined, as well as those of any additional regions expected to impact helicopter activity within the planning area. Defined boundaries allow all pertinent inventory data operating characteristics, and mission activity that affect demand for heliports to be identified and collected.

The requirements should also specify the plan's purpose, why it is being done and what is expected to be accomplished. It should address all aspects of other planning efforts, such as local airport master plans, aviation systems plans, and the National Plan of Integrated Airport Systems (NPIAS), which could influence the effort at hand.

Other elements that should be addressed in the requirements section are the history and technology of helicopters relative to its increased urban use, the time frame or "planning horizons" of the planning effort, development costs, and the role of the sponsoring government agency. A complete list of elements to be included in the system plan requirements section is provided in Table 2.1.

TABLE 2.1 ELEMENTS FOR HELIPORT SYSTEM PLAN REQUIREMENTS

PLANNING AREA

- Specific Geographical Boundaries
- Market Area

PURPOSE

OTHER AVIATION PLANNING DOCUMENTS

- National (i.e., NPIAS, etc.)
- State
- Local

BRIEF HISTORY/DEVELOPMENT OF HELICOPTER TECHNOLOGY AND OPERATIONS

- Importance to Demand
- Standard Categories of Helicopter Missions (primary use)
- Capability of Helicopter as Transportation Mode
- Intermodal Relationships
- Alternative to Ground Transportation

PLANNING HORIZONS

ROLE OF SPONSORING AGENCY

2.1.1 Planning Area

The planning area should be determined by the sponsoring agency at the time the preliminary objectives are established. Generally the geographical limits corresponds to those of the sponsoring agency, whether it a city, a council of governments, a state, etc. However, this area should not be regarded as an isolated entity, particularly where there is a high degree of helicopter activity.

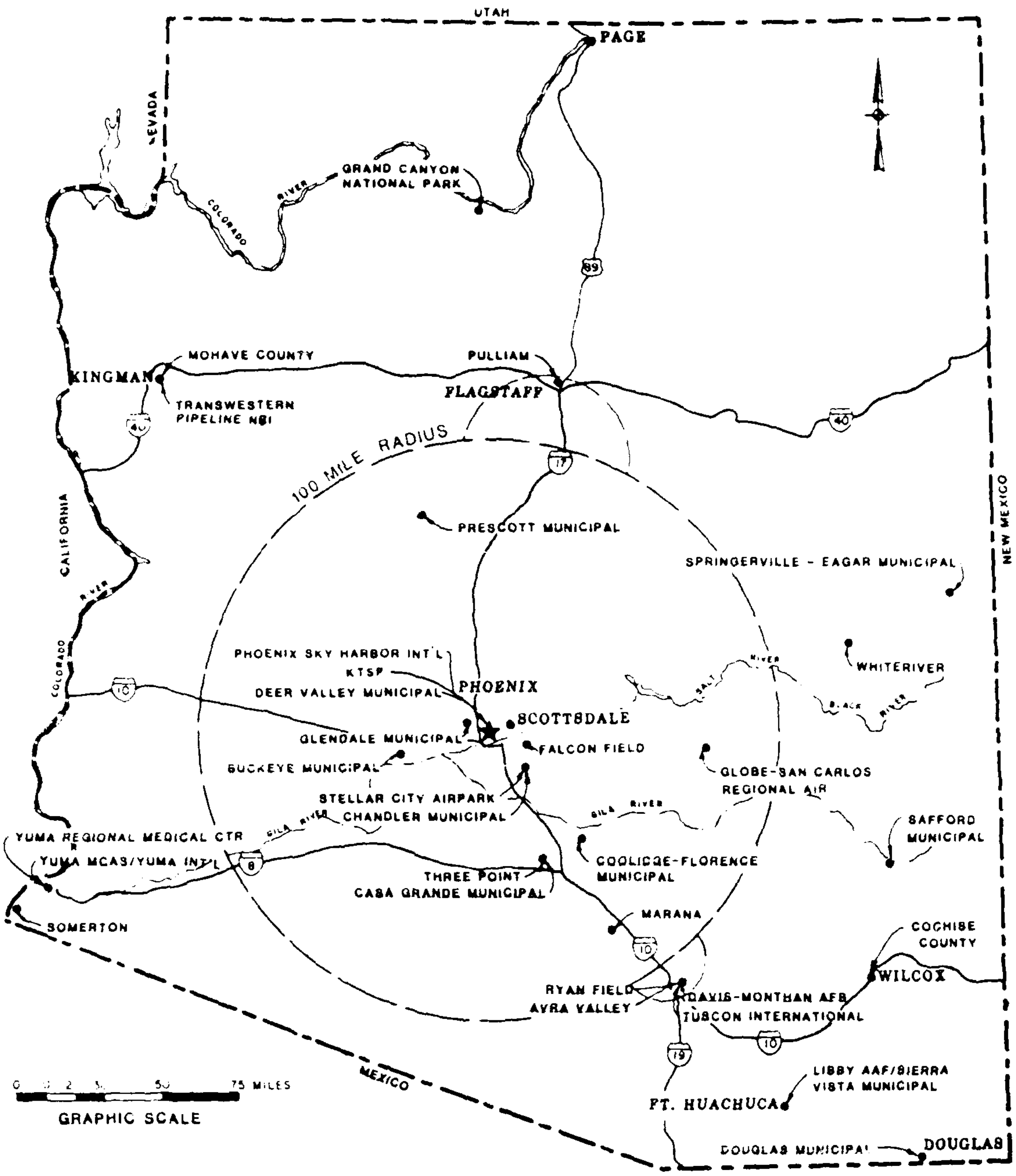
The typical maximum stage length of a helicopter trip is 200 miles. It can therefore be assumed that a source of transient helicopter operations exists up to 200 miles beyond the strict political limits of sponsoring agency. The helicopter activity within the "market" or "service" area may have significant impact on the operational patterns of helicopters and the demand for heliport facilities within the planning area. Market areas should be defined with regard to the specific local characteristics including helicopter operation and use, as well as cultural and economic considerations. For example, Figure 1 shows the region determined to be the market area in a specific heliport system plan. A 100 mile market area radius was selected due to the helicopter operational and population settlement patterns within that state. Determination of the market area should be relevant. Infrequent trips over long distances need not be included. The sponsoring agency, more than likely, has access to previously completed or on-going aviation system or master planning documents that will assist the planner in determining appropriate planning boundaries.

2.1.2 Purpose

The heliport system plan has two functions. The first is to describe and define all components of the existing system within which helicopters operate. The second is to determine the level of demand for helicopter landing facilities in order to evaluate the effectiveness of the current operational system and to recommend future system alternatives. Key elements of the system that should be investigated include:

- helicopter operational patterns
- number and location of landing facilities
- helicopter support systems
- urban patterns
- complimentary and competing transportation networks
- industries or businesses that using helicopters, e.g. offshore oil, small package delivery, corporate users, etc.

In stating the purpose for the plan and what is to be achieved, all aspects of helicopter usage that are relevant to the system dynamics and the depth to which these aspects will be analyzed should be identified. The purpose should clearly define whether the plan is intended to investigate and improve existing helicopter systems or to create a new urban helicopter transportation system. The helicopter function(s) to be served, whether corporate transportation, specific industry, public service, commercial transportation, or a combination, should also be stated.



100 MILE RADIUS - PHOENIX MARKET AREA

SOURCE: ARIZONA DEPARTMENT OF TRANSPORTATION

Figure 1 Example of Heliport System Plan Market Area

Within the framework of developing the purpose, it must be stressed that heliport system plans should be structured as on-going projects. Data bases and analytical processes should be formulated so that they can be easily updated on a regular basis, and when changes in transportation patterns and needs occur. Urban transportation is dynamic and a planning study needs to provide planners with an effective tool that readily accommodates change.

2.1.3 Other Planning Studies/Activities

Heliport system plans must be coordinated with all other pertinent aviation system plans that affect the operating characteristics and the overall analysis of the aviation environment in the planning area. These include any comprehensive regional or state system plans, local master plans, as well as and the goals and recommendations of the National Plan of Integrated Airport Systems (NPIAS) and the Rotorcraft Master Plan.

Urban or transportation planning projects scheduled within the same jurisdiction need to be incorporated into the overall planning effort.

2.1.4 History/Development of Helicopter Technology and Operations

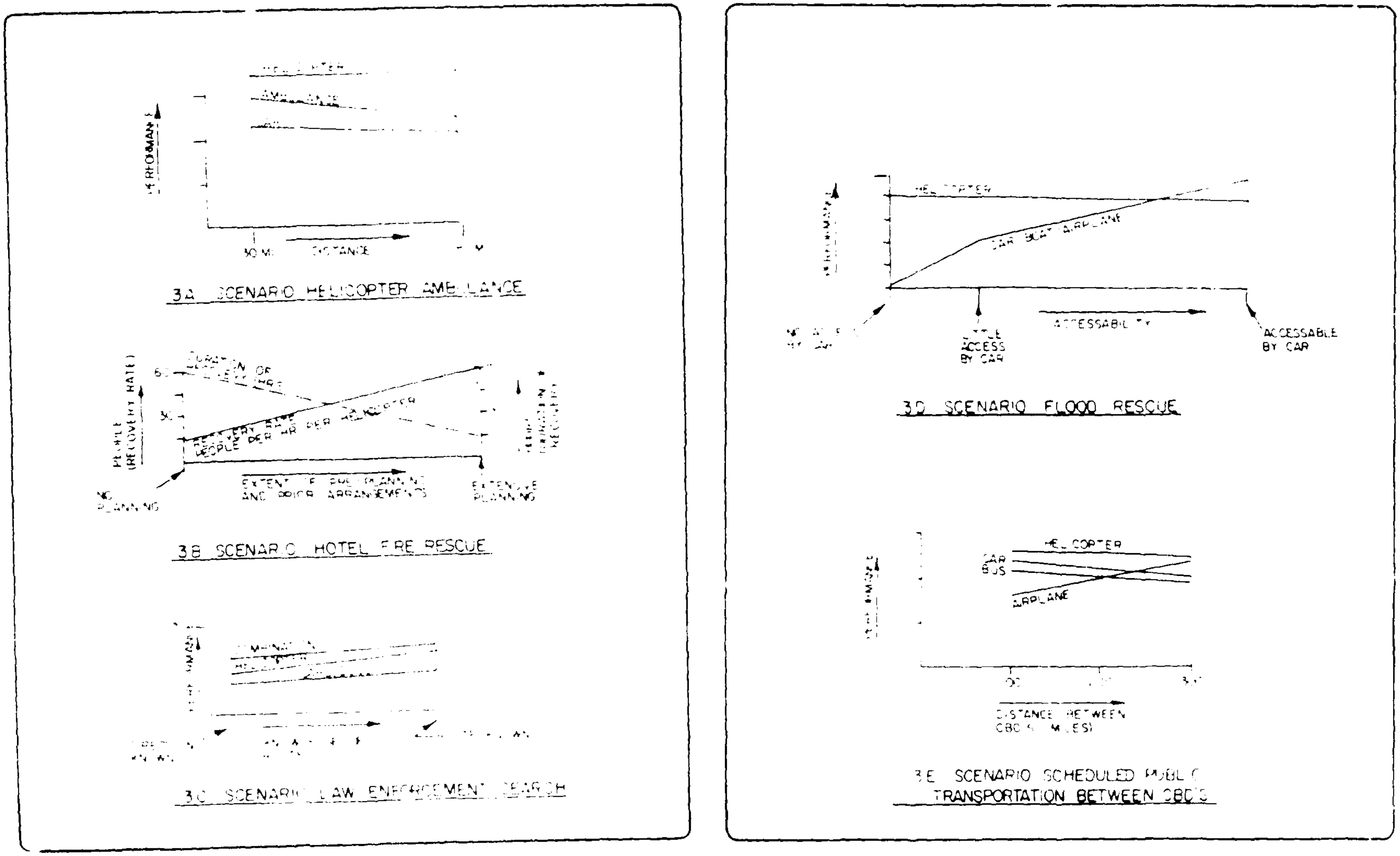
The capability of the helicopter as a transportation mode should be described to reinforce the purpose of the system plan. This can include a brief history of helicopter development and a description of its unique operational capabilities that explain the reasons for increased use in urban areas. Figure 2 shows a diagram that has been used in many heliport system plan as a basis for a discussion of the relative benefits of helicopter use in various transportation scenarios. It compares helicopter use to alternate modes of transportation performing the same task. This figure is a generic diagram and is useful in demonstrating to non-technical readers why there is increasing demand for helicopters and heliports. In addition, specific uses and benefits of the helicopter that are relevant to the specific planning area need to be defined.

Figures 2, and Figure 3, are also useful in explaining the relationship between appropriate competing transportation modes. This is particularly important in developing system dynamics and integration. Specifically, it should be pointed out that the helicopter is an alternative to ground transportation rather than to fixed-wing aircraft. This creates a perspective for the "uninitiated" regarding the increasing demand for urban helicopter use and for heliports. Figure 3, further points out the potential time savings of helicopter transportation compared to competing modes for city-center to city-center trips. Both Figures 2 and 3 promote an understanding of the role of the helicopter in urban areas.

2.1.5 Planning Horizons

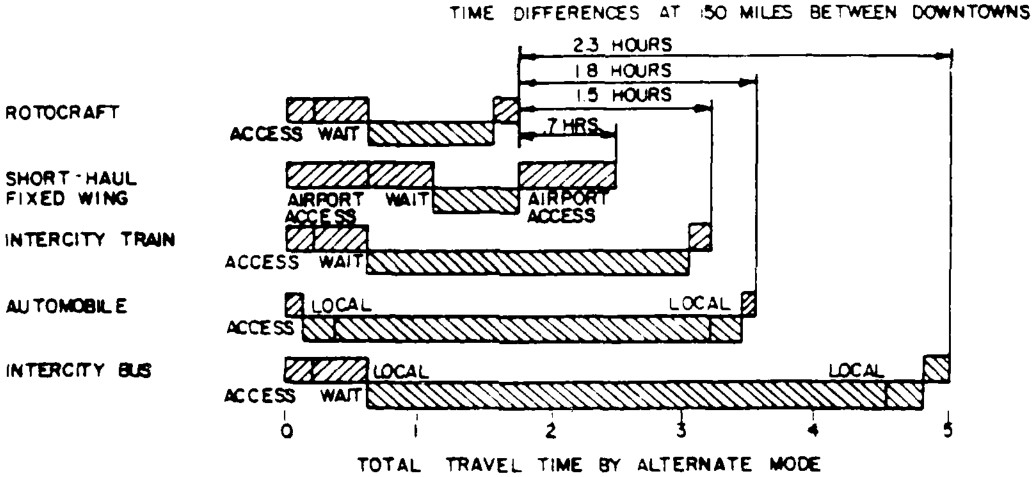
Planning horizons establish a frame of reference for determining system alternatives and allow incorporation of technological improvements in aviation and other transportation modes into the alternatives and recommendations.

The usual planning horizons used for aviation system plans are 5, 10 and 20 years. Perhaps for heliport planning, time frames of 2, 5, and 10 years are more appropriate due to the reluctance of cities to dedicate

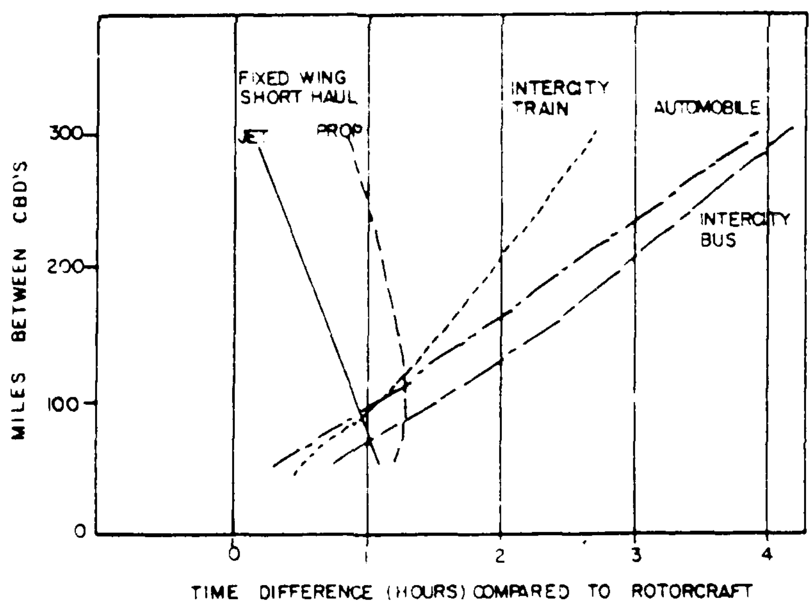


Source: NASA, Community Rotorcraft Transportation Benefits and Opportunities, NASA, CR166266, 1981.

Figure 2 Competitive Transportation Modes



COMPONENT PARTS OF A TRIP



Source: NASA, Community Rotorcraft Transportation Benefits and Opportunities, NASA GR166266, 1981.

Figure 3 Travel by Time Competitive Modes of Transportation

The usual planning horizons used for aviation system plans are 5, 10 and 20 years. For heliport planning, time frames of 2, 5, and 10 years may be more appropriate due to the reluctance of cities to initially commit high value parcels of urban land to untried heliports for extended periods. In any case, this section should clearly state the planning horizons to be used.

In developing recommendations within each planning horizon, the shorter the time frame, the greater the level of detail required.

2.1.6 Role of Sponsoring Agency

The role of the sponsoring agency and its structure need to be defined in relation to their influence on the development of aviation and the understanding of the implementation processes.

3.0 PLANNING GOALS

3.1 GENERAL

Goals create a framework for achieving the plan's purpose. They specify the individual requirements and the processes needed to achieve the purpose. Goals also serve as a frame of reference for monitoring and evaluating the work in progress.

3.2 CONSIDERATIONS

The purpose of the plan should be kept in mind when formulating goals. The planner needs to ask themselves the following:

- What is to be accomplished?
- How much detail is required?
- What are the specific needs and unique characteristics of the planning area?
- How can the plan be structure to provide the necessary data bases and support documentation for the system alternatives and recommendations?

An overriding goal is that the document should be presented in a clearly written and logical order. It must be understood by those authorities and public agencies who may, or may not, be familiar with the needs of aviation, yet who are responsible for the approval and implementation of the recommended system.

3.3 BASIC GOALS

3.3.1 Metropolitan/Regional Plans

Each heliport system plan has individual goals that need to be addressed for its unique situation. However, there are some basic goals that are common to all system plans. The following samples, adapted for heliports from "Planning the Metropolitan Airport System" (AC 150/5070-5), provide basic goals for metropolitan heliport plans:

- To place helicopter use in its proper perspective relative to a balanced regional multi-modal transportation system, and to provide a basis for coordinating heliport plans with other planning efforts-local, regional, and state-wide.
- To optimize the use of land and airspace resources that are inherently limited in large metropolitan areas.
- To use heliport transportation facilities to help guide the growth pattern of the metropolitan area and the state, in accordance with the comprehensive planning goals promulgated by the community.

- Preserve existing key public use heliport and airport facilities that are consistent with the overall goals of the long-range plan.

- Inform public and private aviation interests, as well as the general public, of the benefits and requirements of aviation, and create a general awareness of the need for a systematic approach to planning and for heliports in a metropolitan area.

3.3.2 State Plans

The following is a partial list of basic goals adapted for state heliport plans from "Planning the State Airport System" (AC 150/5050-3A):

- To provide orderly and timely development to meet the transportation needs of the planning area.

- To provide a basis for coordinating heliport planning with other regional planning.

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

- To ensure compatibility with standards and criteria of relevant agencies.

- To make possible long-range coordination of heliport development with air navigation, airspace and air traffic control procedures within the planning area.

- To provide a document that is useful to other planning agencies at all levels.

- To provide priorities for development and resource allocation.

3.4 FLEXIBILITY

It must also be remembered that effective goals should be flexible and reviewed continuously during the planning process. Continuous review keeps the project focused so that individual issues do not become so important that the overall purpose is lost. However, goals formulated at the beginning of a project should not be considered rigid. As the planning process develops, new priorities may become evident or policies uncovered that may change the individual situation. Goals should be considered flexible and changed as necessary.

4.0 DATA COLLECTION AND INVENTORY

4.1 DATA COLLECTION

Historically, detailed helicopter industry statistics have been limited. This has presented a problem for anyone wanting to evaluate trends in helicopter and heliport activity. Therefore, acquiring the information necessary to create a system description requires two processes: collecting existing resource material and developing surveys to obtain helicopter and heliport operations data.

4.1.1 Available Resources

Existing data for several of the inventory elements are available through publications and studies from the FAA, helicopter trade associations and journals. Existing data include: numbers of registered helicopters, location of existing heliports, various socio-economic data, heliport design standards, aviation forecasts, etc. Information systems may be accessed upon request and may contain both historical and/or updated data. A number of sources are identified in Appendix B, and a bibliography is found in Appendix C.

4.1.2 Helicopter Operator Survey

Operation and mission characteristics may vary significantly in different areas, making an accurate assessment of the number of local helicopters and other pertinent fleet data difficult to obtain. Collecting these data requires surveying the local helicopter community about the nature of their operations, their perceived facility needs, flight patterns, and the numbers and types of active helicopters, etc. Those parameters that are sensitive to regional characteristics and that are necessary for accurate fleet description are the foundations around which a survey is constructed. A sample survey and recommended techniques are found in Appendix D.

4.2 INVENTORY

The inventory is one of the most critical parts of a heliport system plan, because it provides the information and documentation necessary to create a profile of the existing heliport systems and operational characteristics. Additionally, the data collected here are the basis of all subsequent analyses of the plan. From this base data, the demand will be determined, the system alternatives developed, and the recommendations made. If the inventory is inaccurate or incomplete, then the conclusions and recommendations will be faulty.

4.2.1 Required Inventory Elements

The first task in data collection is to determine what data will be needed and how they will be used. In making this determination, it is important to recognize that there are two types of data elements. Certain data elements should always be included, not only to develop an accurate picture of the current aviation systems, but for consistency and comparability between plans from different locations. Other data elements must be tailored to the plan's geographic setting, its scope, and the purpose of the heliport system plan in question. For instance, state system plans ordinarily require less detail than do metropolitan plans. Also, plans in highly populated areas may require more demographic and socio-economic data than do plans in areas with lower populations.

Table 4.1 presents those elements that should be included in the inventory of heliport system plans. However, the level of detail and the analysis necessary depends on the requirements of the individual plan. The inventory elements are discussed in the next sections.

Based/Active Helicopters

It cannot be stressed enough that careful attention must be paid in the inventory of helicopters in the planning area. One difficulty associated in determining the exact number of helicopters in a planning area is the existence of conflicting data. This is illustrated by Figure 4, which shows a discrepancy between the number of helicopters registered by the FAA and those registered by the state. Such differences need to be reconciled when evaluating data.

Another difficulty is that the number of registered helicopters alone, although valid information for overall analysis, may not be a true indication of heliport demand. This is because helicopters are often registered in one place, but are operated in another. Only helicopters that are operational in a specific area impact the services provided and therefore represent real demand. Therefore, helicopters registered in a specific area cannot be considered the area's "based" aircraft in terms of their significance to heliport demand, as "based aircraft" (those airplanes that can be counted at a particular airport) are in airport runway use determination.

Conversely, local geographic and helicopter operational characteristics may make it necessary to identify helicopters that are active in the planning area, yet registered elsewhere. Figure 5, shows how Pennsylvania, because of its location in the Northeast Corridor, and its cultural and economic ties with neighboring states, had to determine the extent of helicopter activity operating from out-of-state into and through Pennsylvania on a regular basis, in order to determine accurate heliport demand. Often the only source for identifying the active helicopter fleet is an operator survey (see Section 4.1.2).

Once the number of active helicopters are identified, the fleet mix should be determined by differentiating the aircraft by the number and type of engines, and by aircraft weight. These data provides a profile of the types of helicopters that operate in the planning area and are important for heliport design considerations. Knowing the percentage of helicopters in the region with IFR capabilities is important in determining the types of facilities a heliport may require. Figure 6, is an example of a fleet mix distribution. It uses a helicopter classification system developed by the aviation planners. Standard helicopter classifications are now under consideration by the FAA and should be used when they become available.

TABLE 4.1 ELEMENTS FOR HELIPORT SYSTEM PLAN INVENTORY

BASED HELICOPTERS/ACTIVE HELICOPTERS

- Registered Helicopters
- Helicopters from Survey
- Helicopter Type (standardized categories)
- Location
- IFR Capabilities
- Military Helicopters

HELICOPTER ACTIVITY
(specific and/or market area)

- Number of Operations
  - Total
  - Missions (primary use)
  - Helicopter Type/Category
- Number of Hours Flown
  - Total
  - Mission (primary use)
  - Helicopter Type/Category
- Percent of IFR Operations
- Percent of Night Operations
- Number of Passengers
- Cargo/Amount and Type
- Origins and Destinations
- Average Waiting Time or Delay

EXISTING HELIPORT FACILITIES

- Categories
  - Private or Restricted Use
  - Public Use
  - On Airport
- Location
- Services Available
  - Fuel (available grades)
  - Parking and Tie-Downs
  - Hangar Storage
  - Lights
    - Type
    - Configuration
    - Control
  - NAVAIDS
  - Communications
  - Weather Services (including AWOS)
  - Special VFR
  - IFR Capabilities
    - Non-Precision Approach
    - Precision Approach
  - Terminal Building
    - Passenger Waiting Area
    - Baggage Handling Facilities
    - Ticket Counter
    - Pilots Lounge
    - Flight Planning Facilities
  - Maintenance
  - Connecting Transportation

EXISTING HELIPORT FACILITIES (Cont.)

  - Auto Parking
  - Rental Cars
  - Taxi Stand
  - Scheduled Flights (at airports)
- Touchdown Pad
  - Size
  - Number
  - Surface Composition
- Number of Operations
  - Day/Month/Annual
  - Night
  - IFR
- Passengers Enplaned
- Cargo Amount/Type

SOCIO-ECONOMIC INFORMATION

- Population Characteristics
  - Employment Strata and Ratios
  - Per Capita Income/Disposable Income
  - Growth Trends
  - Distribution
- Land Use and Distribution (local)
  - Industrial (light and heavy)
  - Urban
  - Residential
  - Agricultural
  - Rural
- Ground Transportation Systems
  - Roads
  - Metropolitan Transit Systems

HELIPORT PLANNING CRITERIA

- FAA Guidelines ("Heliport Design")
  - Approach/Departure Routes
    - Obstructions
    - Imaginary Surfaces
    - Prevailing Winds
  - Conceptual Layout
    - Ground Level
      - General Characteristics
      - Advantages/Disadvantages
    - Rooftop
      - General Characteristics
      - Advantages/Disadvantages
- State Standards
- Local Standards
- Land Use
  - Local Area Characteristics
    - Heliport Compatible
    - Heliport Non-Compatible
  - Regulatory Compliance
    - Permitted Use
    - Variance Required
    - Prohibited Use

PHOENIX HELIPORT NEEDS STUDY
REGISTERED HELICOPTERS - 1985
MARKET AREA COUNTIES

COUNTY	FAA	ADOT
Maricopa	128	126
Pinal	7	16
Gila	0	1
Pima	23	23
Yavapai	1	1
Yuma	17	13
LaPaz	2	3
Coconino	8	14
Navajo	0	0
Graham	0	0
Total	186	197

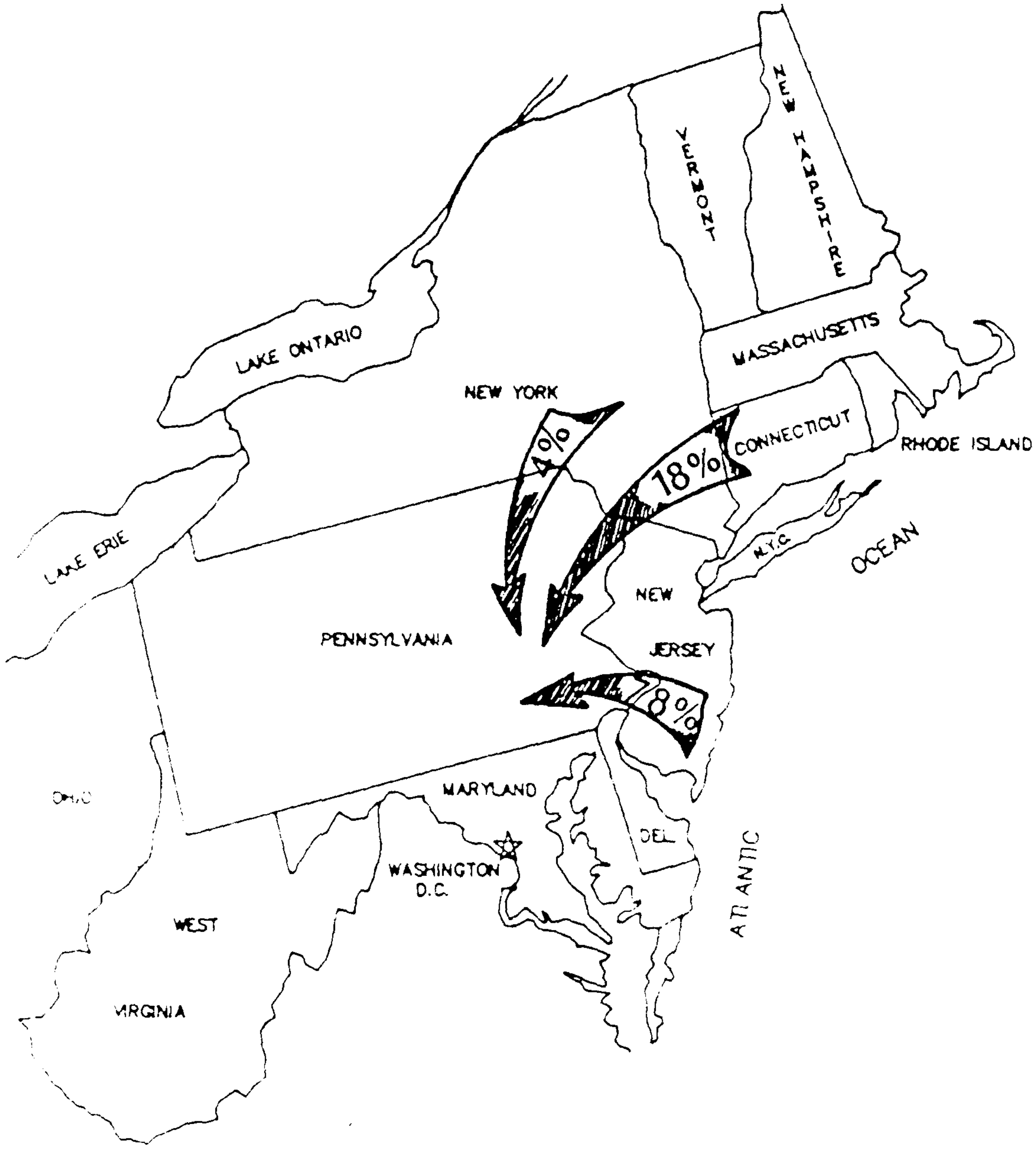
1/ Market Area - 100 mile radius of Phoenix, including Tucson and Flagstaff

Note: Above data does not include McDonnell Douglas Helicopters because they are not registered with either FAA or ADOT.

Sources: Federal Aviation Administration (FAA), and Arizona Department of Transportation (ADOT)

Source: Phoenix Heliport Needs Study, Hoyle, Tanner & Associates, 1985.

Figure 4 Table of Registered Helicopters - 1985, Market Area Counties



Note: Total Equals 100%

Data from Maryland and Delaware incomplete.

SOURCE: HTA, 1986

Figure 5. Out-of-State Helicopter Activity

HELICOPTER CLASSIFICATION	NUMBER	% OF TOTAL FLEET	NUMBER IFR EQUIPD.	% OF TOTAL FLEET
Piston	13	11	0	0
Light Single Turbine	78	67	4	3
Medium Single Turbine	7	6	5	4
Medium Twin Turbine	18	16	5	4
Heavy Twin Turbine	0	0	0	0
TOTAL	116	100%	14	[illegible]

HELICOPTER CLASSIFICATIONS

Piston	-	All piston engine helicopters.
Light Single Turbine	-	Single turbine engine helicopters to 6,000 lbs MGW.
Medium Single Turbine	-	Single turbine engine helicopters 6,000 - 15,000 lbs MGW.
Medium Twin Turbine	-	Medium twin turbine engine helicopters to 15,000 lbs MGW.
Heavy Twin Turbine	-	Twin turbine engine helicopters over 15,000 lbs MGW.

Source: Helicopter Operator Survey Results, HTA, 1985, Phoenix Heliport Needs Study, Arizona.

Figure 6 Table of Helicopter Fleet Mix

The location, or base, of the planning area's helicopters should be determined. This information is important to the analysis of operational patterns and for the site selection of potential heliports. This information is quickly understandable when presented in map form as was done for the "Louisiana State Heliport System Plan", shown in Figure 7.

Helicopter Activity

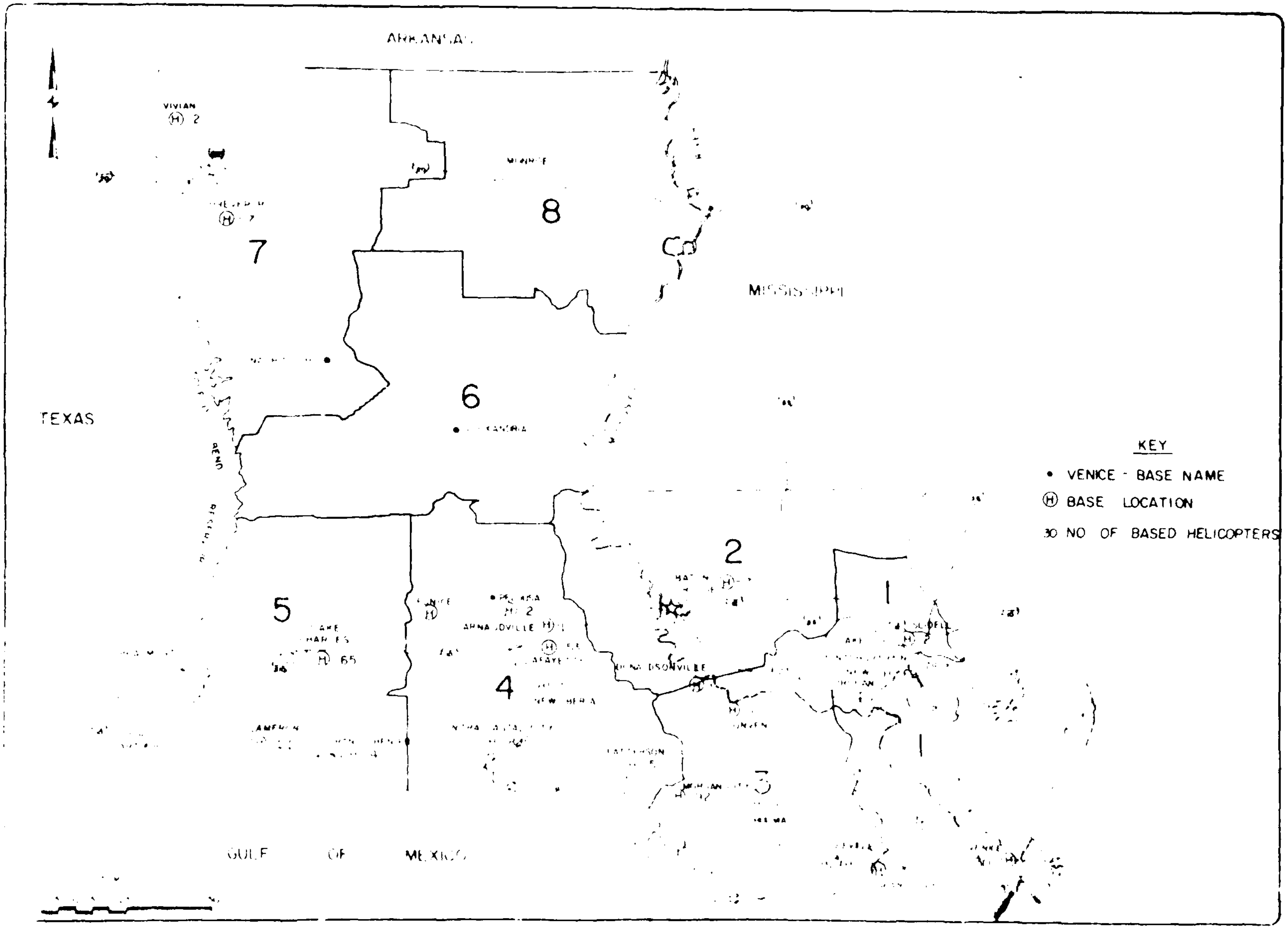
An analysis of local helicopter activity provides the majority of data required to determine the efficiency of the existing system and to develop the system alternatives. The evaluation of demand for a particular region also depends on an accurate assessment of helicopter activity. This assessment incorporates many descriptive elements. These elements interact with other information categories to form an overall picture of where and how helicopters operate. A complete listing of these elements is shown in Table 4.1.

The type of mission that helicopters perform in urban areas is extremely important in evaluating demand. Certain helicopter missions or uses, such as executive transport, create a higher demand for public use heliports than do such missions as high-rise construction work or aeromedical transport. The determination of helicopter use also aids in the identification of facility requirements for heliports.

The system plan should identify helicopter activity by the number of operations and by the number of hours flown. Both measurements are important for an accurate statistical evaluation of demand. Some uses of helicopters record a higher number of operations (one operation equals one takeoff or landing) than others, but each trip is of relatively short duration. Agricultural operations, for example, require many takeoffs and landings compared to the length of overall operational time. Other uses, such as executive transport, have a comparatively longer trip time, or stage length, with respect to the number of operations. Uses with high numbers of operations will appear to have more statistical importance than is actually the case, if the number of operations by mission is not tempered with the number of hours flown by mission. A graphic example of the necessity to evaluate both the number of operations and the number of hours flown for accurate demand analyses is shown in Figure 8, and summarized in Figure 9.

"Hours flown" is currently the only measure the FAA uses in recording helicopter activity, with FAA activity records often being the only source of historical statistics. Consequently, it is wise to determine the hours flown, as well as the number of operations, in the area under study so that the levels growth or decline of activity can be compared over time.

Other key data important in profiling the helicopter operational characteristics include; the origins and destinations of helicopter operations, the percentage of IFR operations, the percentage of night operations, the average number of passengers per operation, and the type and amount of cargo.



Source: Louisiana State Heliport System Plan.

Figure 7 Helicopter Bases & Based Helicopters.

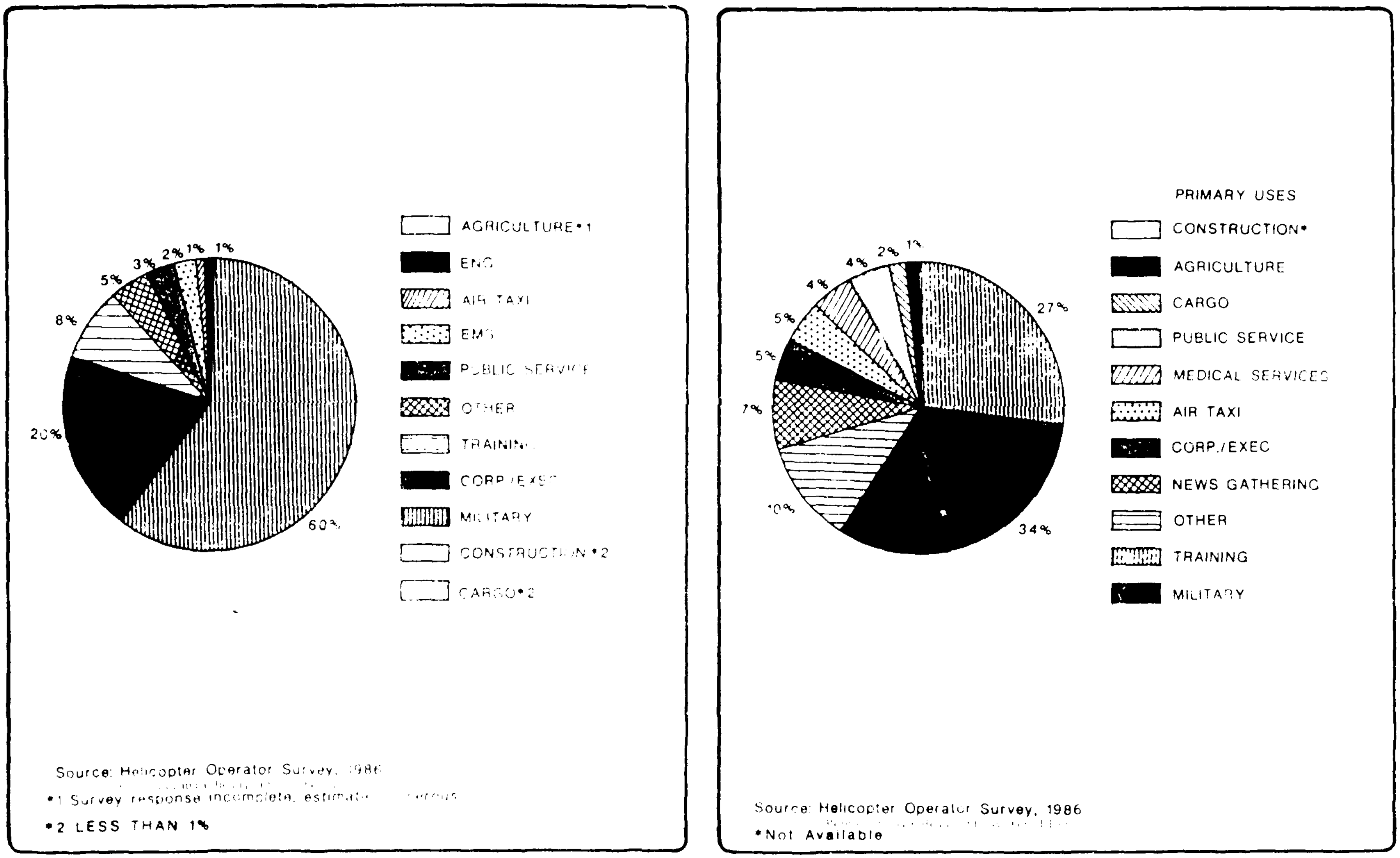


Figure 8. Primary Use by Percent of Operations and by Hours Flown

Helicopter Use Comparing Percentages
of Operations and Hours Flown

HELICOPTER USE	PERCENTAGE OF OPERATIONS	PERCENTAGE OF HOURS FLOWN
Electronic News Gathering (ENG)	1%	7%
Air Taxi	1%	5%
Air Ambulance Helicopters (EMS)	2%	4%
Public Service	3%	4%
Other	5%	10%
Training	8%	27%
Corporate/Executive	20%	5%
Military	60%	34%
Construction	less than 1%	N/A
Cargo	less than 1%	2%
Agriculture	N/A	N/A

Figure 9 Table Summary of Figure 8

The planning area's military helicopter activity is also important. The locations of military bases, training routes, etc., as well as the number of aircraft, need to be identified for airspace capacity considerations and overall patterns of operation.

Existing Heliport Facilities

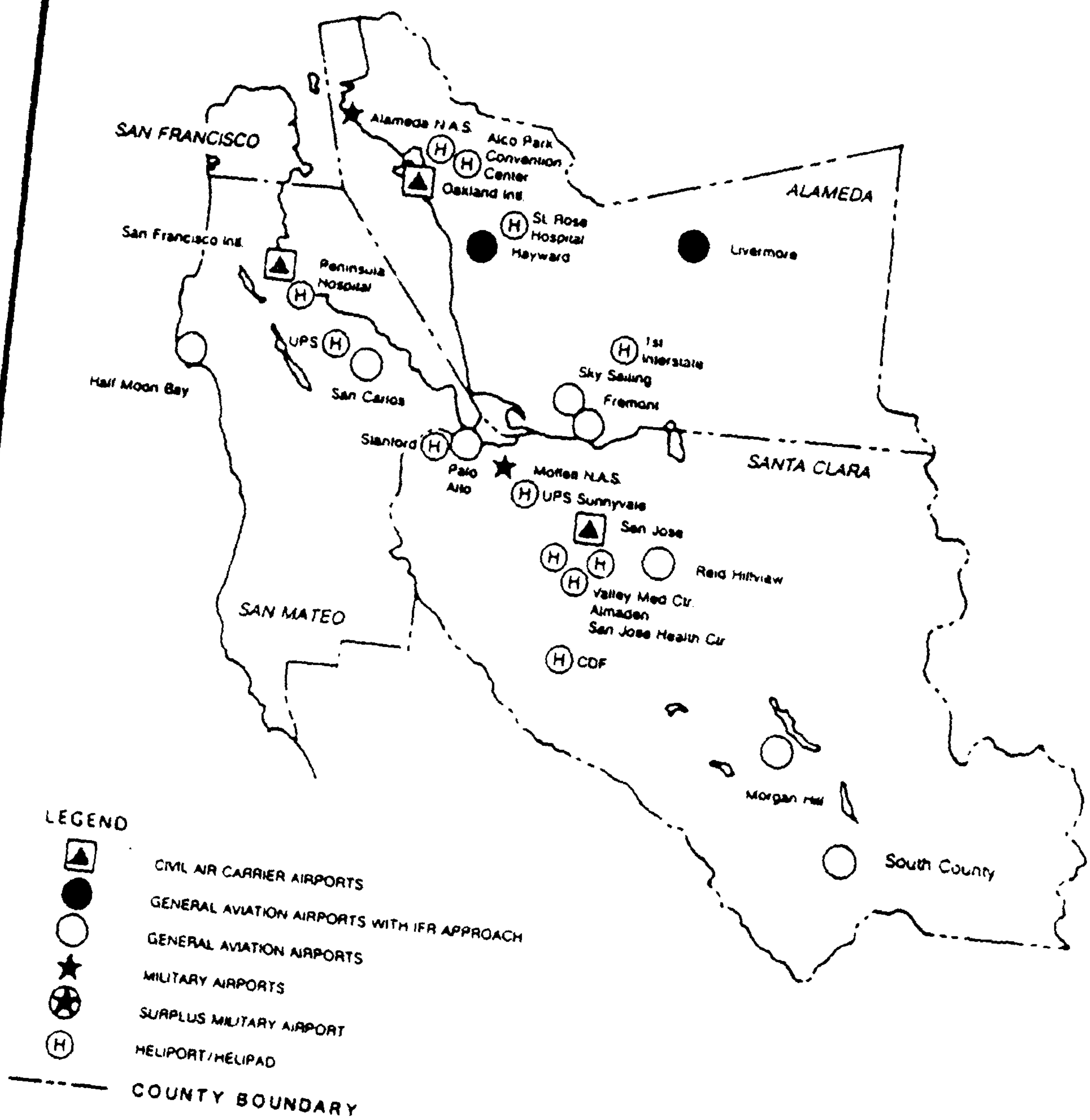
Like the helicopter inventory data, the number of heliports, their location and the nature of their use, must be identified to evaluate the capacity and deficiencies of the current system. An accurate operations assessment should include data on the mission of the helicopters using the heliport, the peak demand times, and the type and extent of services and facilities provided. Data derived from this element are the basis for the assessment of demand. They help identity the most logical site (prior to forecasting and environmental assessment) for a heliport(s), the design, optimum size, and the services required to accommodate current and future helicopter operations. Ultimately these data can be used for determining a conceptual route structure and expected passenger loads in an air service system.

The location of all existing heliports including private or restricted use, public use, and "on airport" heliports should be identified, as well as the region's airports and military bases. Figures 10 and 11, are examples of maps that show the locations of existing airports, heliports, and military bases.

Itemizing all aviation facilities assists in an accurate portrayal of the operational system. The nature of how helicopters are accommodated at airports may also indicate where staging areas and helicopter landing sites should be located on the field. A high level of passenger activity that connects to the airlines is evidence of a need for helicopter airline terminal or ramp access.

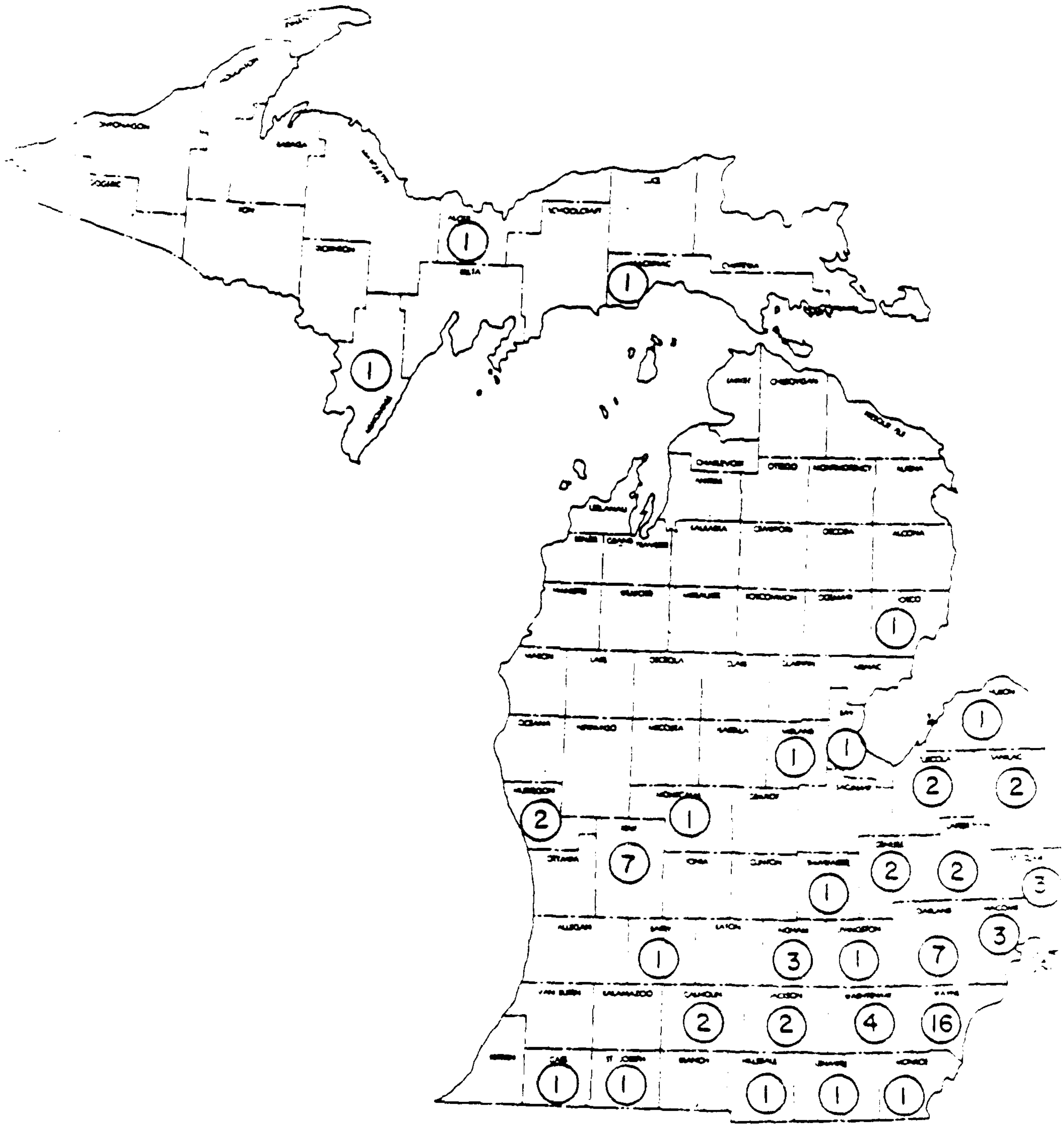
The number of operations should be expressed by daily, monthly and annual totals indicating peak activity periods or seasonal variations. Numbers of night operations and IFR operations, if any, or potential IFR operations are also important. These statistics are vital for determining existing demand, forecasting future and latent demand (the demand generated by those who now own or operate helicopters who would use a heliport if it were available), and for determining total system requirements. In conjunction with these numbers, it is necessary to know the number of passengers enplaned and the amount and/or type of cargo carried. Also, the locations and destinations of the helicopter fleet and the passenger origins/destinations, help define the capacity of the system and potential need for new facilities.

It can be assumed that those missions that are passenger intensive, particularly on-demand air taxi and corporate/executive transportation, will be the most frequent heliport users. It cannot be assumed that the mission distribution of the helicopters using public use heliports will reflect the same percentage as the mission distribution of the overall helicopter fleet. Therefore it is critical to identify the mission of the helicopters using the existing local heliport facilities. Figure 12 points out how different helicopter use and landing facility use can be,



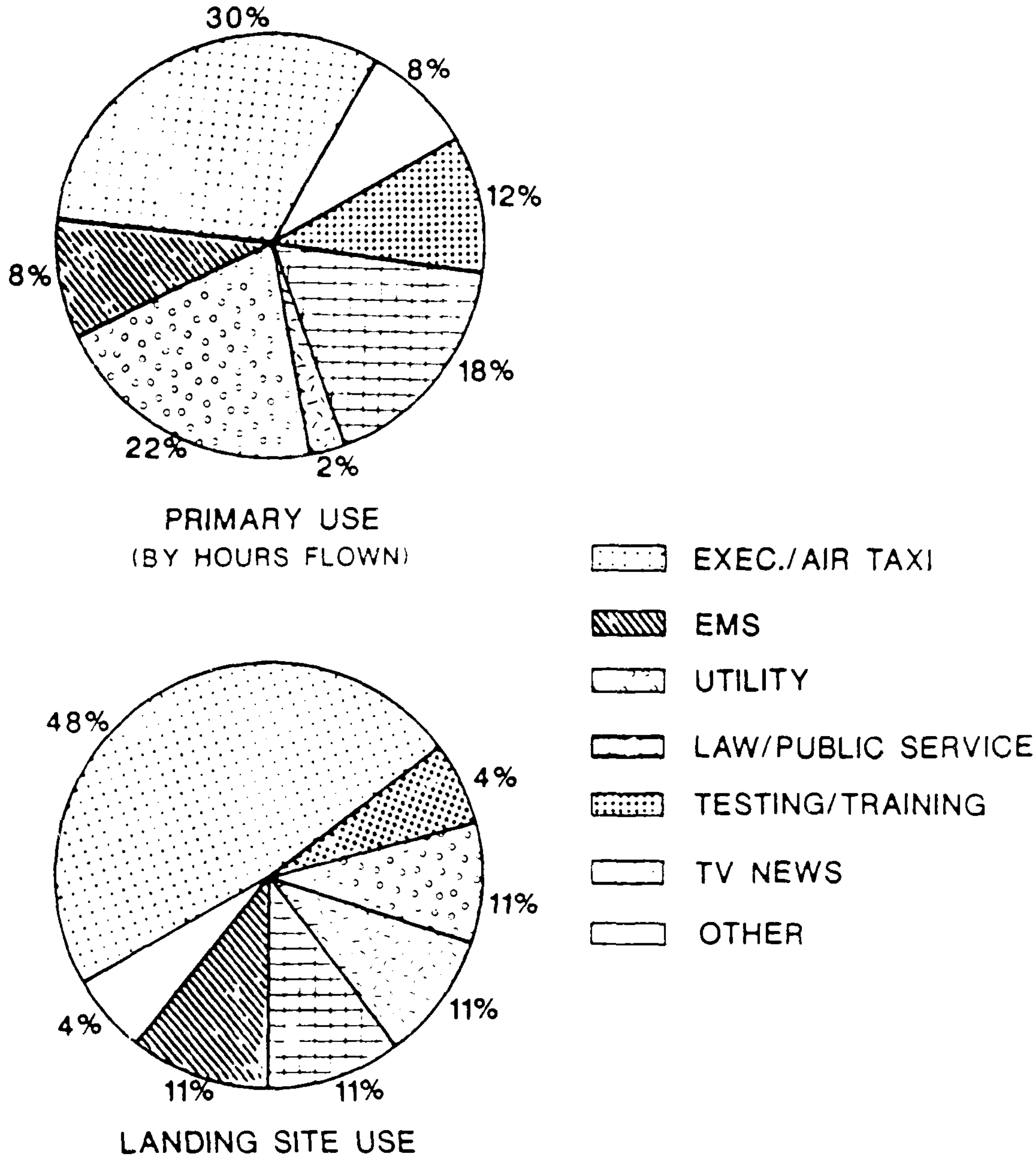
Source: Santa Clara County Heliport Study, HTA,

Figure 10 South Bay Airports & Heliports/Helistops



Source: State of Michigan, Statewide Heliport Study, Vol. 2, Technical Report, Edwards and Kelcey, Inc., 1985.

Figure 11 Statewide Heliports by County



SOURCE: HTA PHOENIX HELICOPTER OPERATOR SURVEY, 1985

Figure 12 Helicopter and Landing Site Use and that passenger intensive missions, such as corporate/executive and air taxi, create the most demand for public use heliports.

The need for facility services such as fuel, maintenance, passenger terminals, hangars etc., vary from region to region. It is therefore necessary to determine the minimum acceptable level of service an operator would use if a public use heliport were established. The data obtained will assist in establishing a variety of design options based on operational requirements that affect the ultimate layout and cost of the facility.

Other key data include the maximum radius of operations and the average stage length of a helicopter trip. This information helps determine the potential for inter and intra-city travel, the selection of optimum heliport sites, and provides a means for developing a metropolitan "network" of heliports.

Socio-Economic Information

Socio-economic information for the planning area is essential in understanding the social dynamics within which helicopters operate. This includes identifying the type and distribution of industries using helicopters, the economic health of those industries and of the economy in general. Although there is no proven statistical correlation between helicopter use and any particular industry, except perhaps the petroleum industry, helicopter use can be assumed to be generally associated with the economic strength and viability of the economy in a given area.

These basic concepts hold true for demographic profiles as well. Profiles of employment categories, income levels and patterns, as well as population growth trends, and urban and rural population distribution, are important in understanding the social context within which rotorcraft operate. Figure 13, is an example of demographic data from a heliport system plan, collected to investigate the economic health of a metropolitan region.

The success of urban heliports therefore is directly dependent on being sited where they can expect the greatest continued access to the largest number of people and businesses, whether in the central business district or in outlying urban activity cores. The expected employment growth by city block for Houston, Texas, from 1981 to 2000 is presented in Figures 14 and 15. This type of information is vital for heliport siting in metropolitan areas. For state system plans, overall population and industrial concentrations and their expected growth rates may be more applicable in identifying potential sites for heliports. Examples of population maps are shown in Figures 16 and 17. These data can be particularly significant if coupled with business and industrial patterns.

Although, socio-economic data are less directly related to helicopter activity than to fixed-wing activity, the collection and analysis of economic data indicative of the planning area provide validation for the type, number, and location of demand centers for current heliports, and a basis for locating future heliports.

POPULATION, INCOME & EFFECTIVE BUYING INCOME

County	Population	Income Per Capita	Median Household Income	Effective Buying Income
Santa Clara	1,390,900	13,365	33,780	18,589,273
Alameda	1,142,100	11,727	26,752	13,393,080
Contra Costa	705,500	13,627	33,061	9,613,547
San Francisco	670,800	13,077	23,922	8,771,867
San Mateo	606,900	14,237	32,702	8,640,697

Rank in Top United States 150 Largest Counties in Current Population, Income & Effective Buying Power.

County	Rank
Santa Clara	16
Alameda	21
Oakland	25
Sacramento	34
Contra Costa	49
San Mateo	67
Fresno	78
San Joaquin	122
Sonora	136
Monterey	145

Source: 1985 Rand McNally Commercial Atlas & Marketing Guide

Figure 13 Example of Typical Socio-Economic Data Table

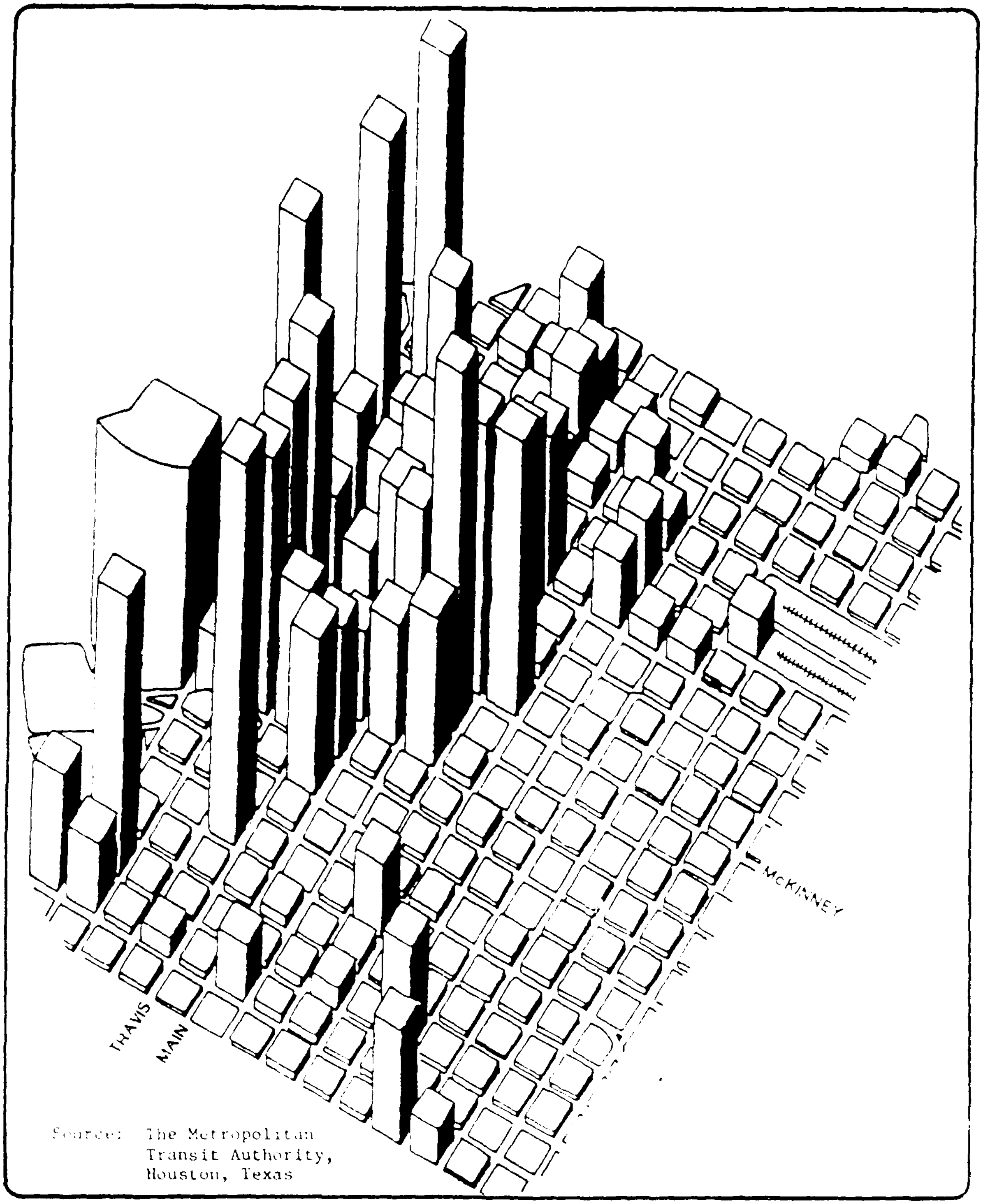
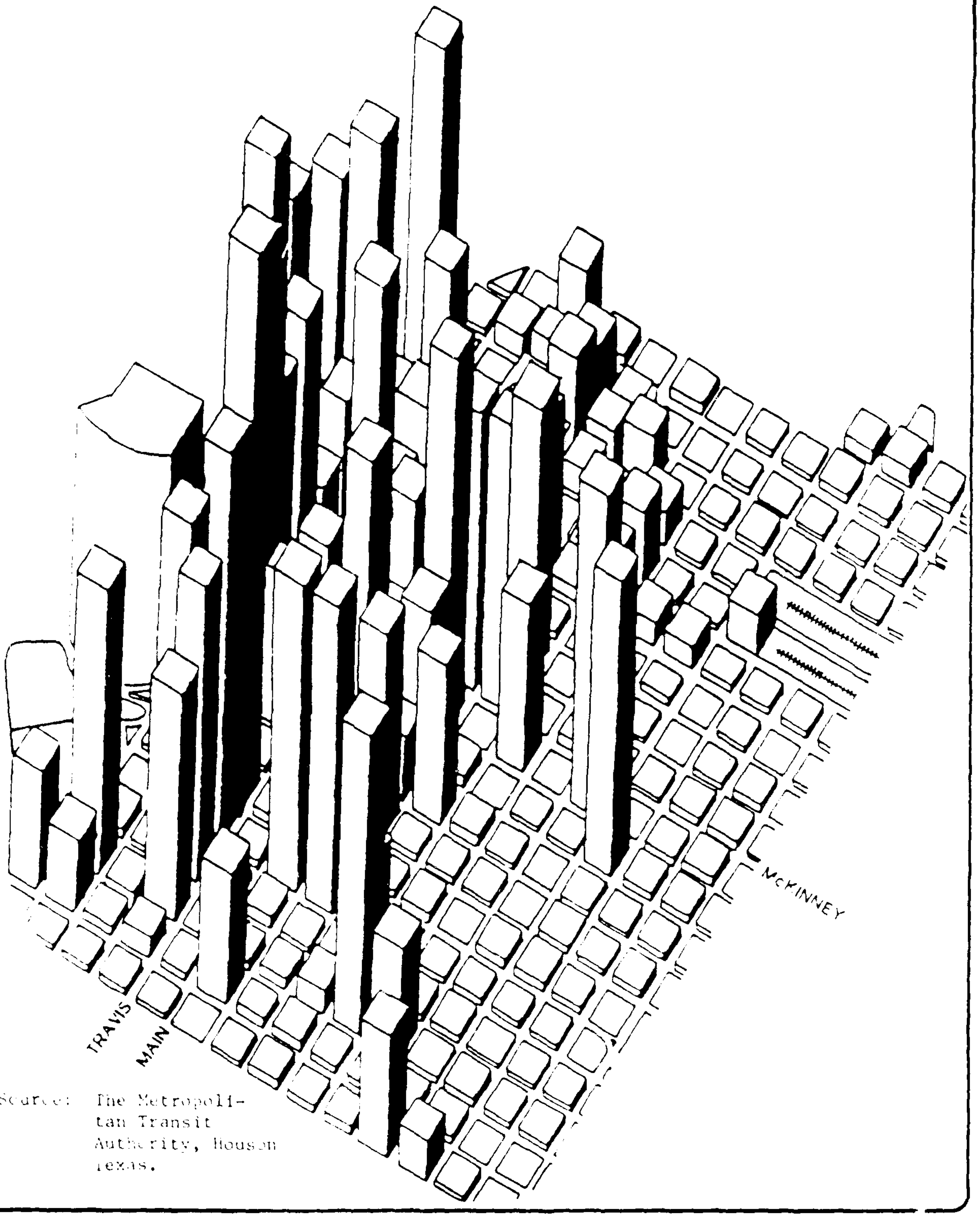
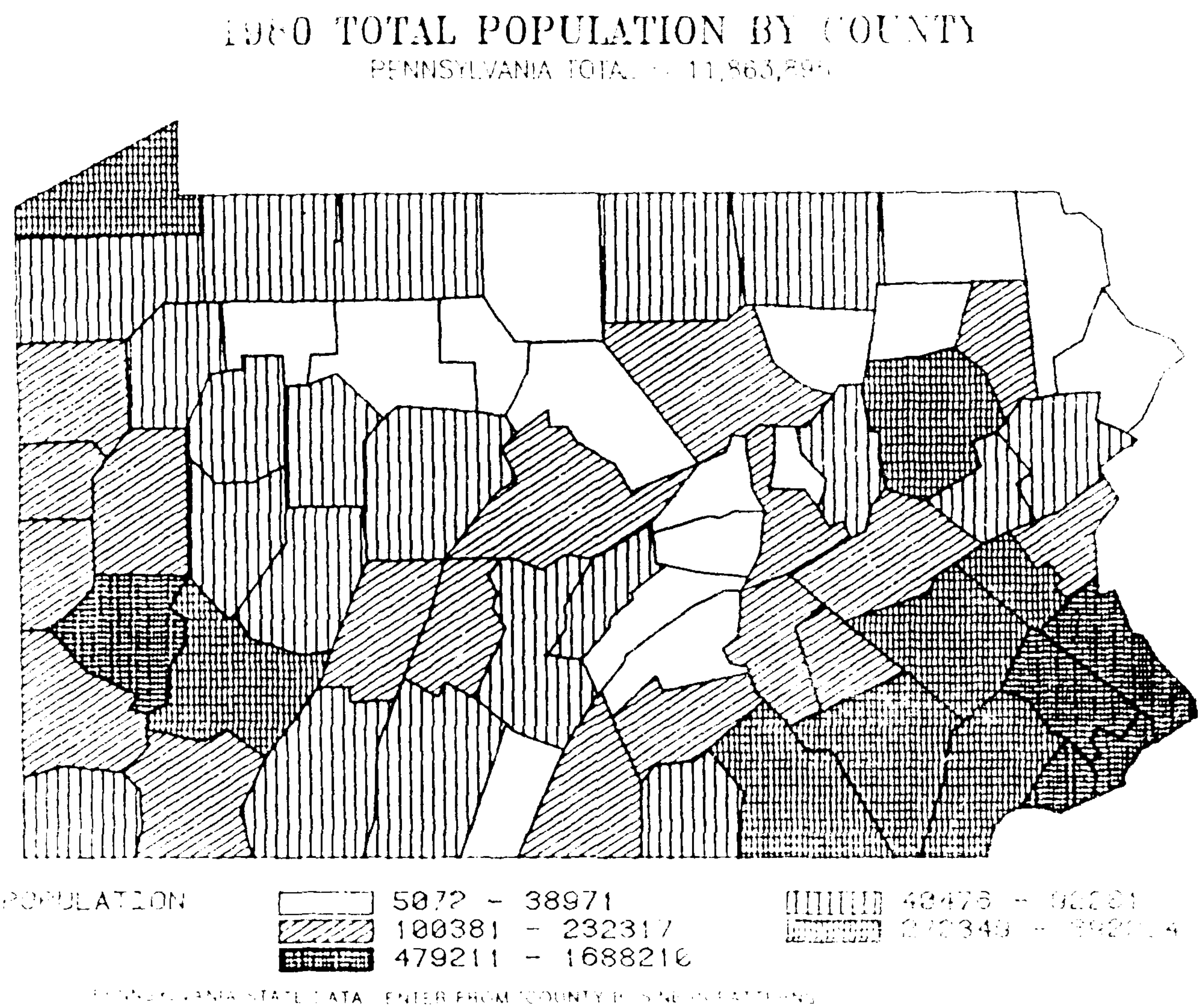


Figure 14 1981 Employment by Block

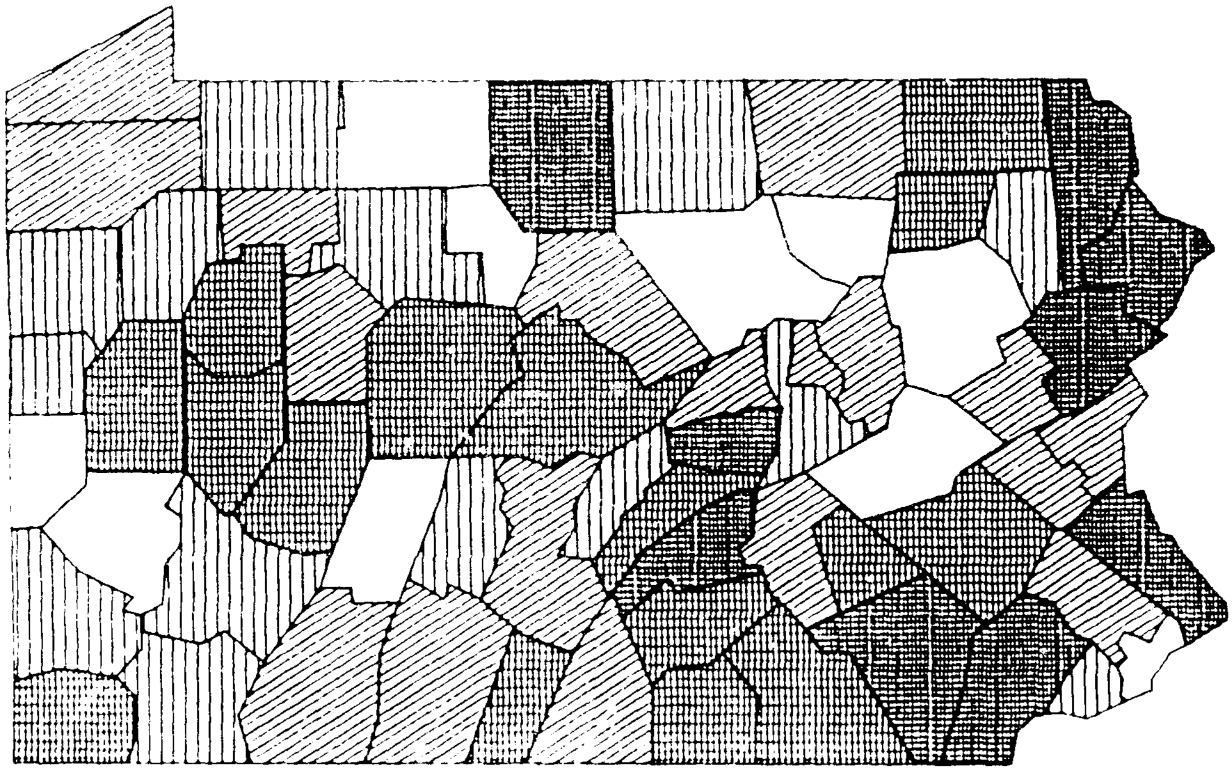


Source: The Metropolitan Transit Authority, Houston Texas.

Figure 15 2000 Employment by Block


1980 TOTAL POPULATION BY COUNTY
PENNSYLVANIA TOTAL = 11,863,895
POPULATION
5072 - 38971
100381 - 232317
479211 - 1688210
40476 - 98201

COMMONWEALTH OF PENNSYLVANIA



Because heliports are located within the urban infrastructure a vital concern in analyzing future helicopter systems is the existing patterns of land use and zoning. It is therefore essential to identify land use distribution and zoning patterns to assure compatible siting of heliports and approach/departure routes. It is also important to know the expected future land use and development patterns that are scheduled for the metropolitan area within the time frame of the heliport plan, so that compatible land use is maintained.

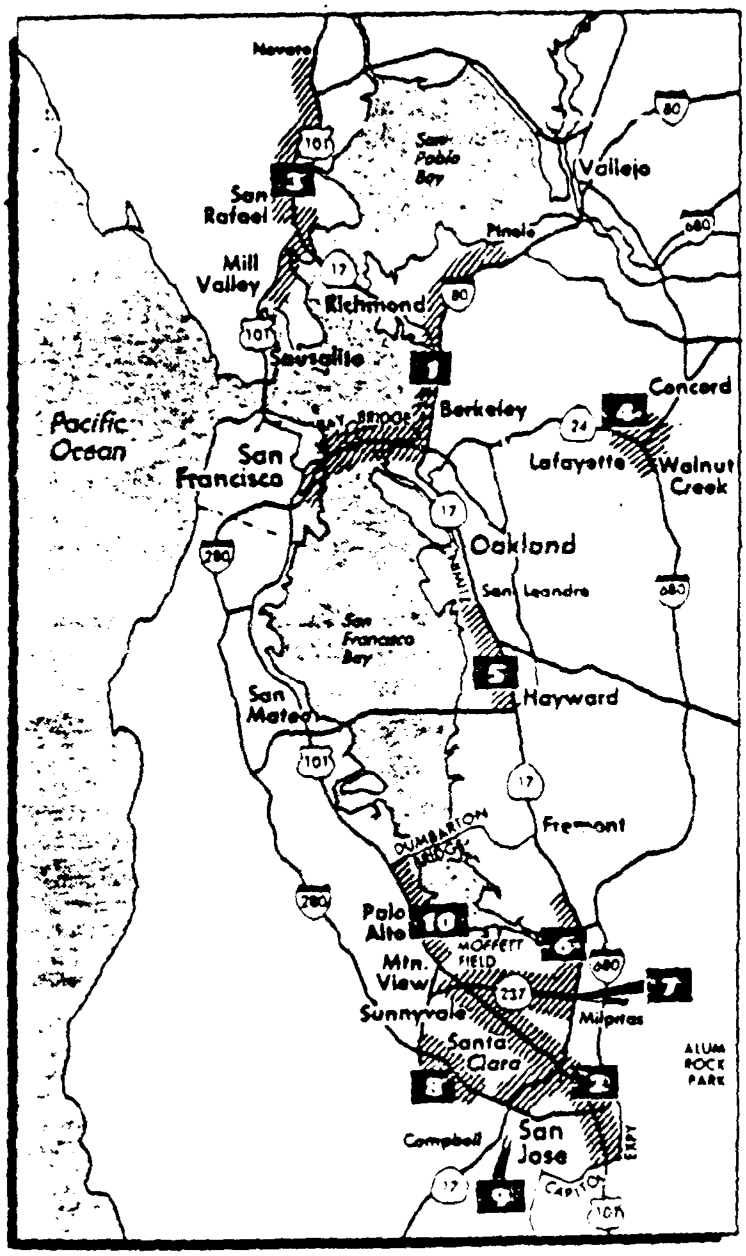
Furthermore, land use patterns and distribution can be used as a cross check with current helicopter operational patterns as good indicators of future trends in the overall transportation system.

Ground transportation systems data are essential for complete system alternative development. Figures 18 and 19, are examples of data collected that indicate the location and flow patterns of local ground transportation.

4.3 HELIPORT DESIGN/PLANNING CRITERIA

Heliport design criteria incorporate all the components that go into the construction of a heliport facility, including; certain notification requirements, total real estate requirements, nature and placement of proposed approach/departure routes, FAR Part 77 obstruction regulations, instrument approach requirements, critical helicopter (the largest helicopter expected to use the facility on a regular basis) requirements, imaginary surfaces, prevailing winds, marking, lighting, etc. This information can be found in the FAA Advisory Circular, "Heliport Design", FAA AC 150/5390-2, dated January 1988. Examples of generic heliport layout plans developed by a heliport planner using the previous 1977 guidelines, current at the time of design, are shown in Figures 20 and 21.

In addition to Federal regulatory and advisory requirements, the heliport planner must also have a thorough understanding of heliport siting criteria. These include helicopter operational capabilities, compatible land uses, environmental considerations, and state or local regulatory requirements.



1. I-80 & SF
2. US 101 between Fair Oaks Ave. in Sunnyvale & Capital Expway San Jose

North Bay

3. US 101 from Novato to San Rafael

East Bay

4. I-680 & Hwy 24 Junction in Contra Cost County
5. Nimitz Fwy between Marina Blvd. in San Leandro & Hayward Bridge
6. Hwy 17 between Durham Road & Hwy 237

South Bay

7. Hwy 237
8. I-280 between Hwy 85 & Saratoga Ave.
9. Hwy 17 between 101 & I-280 in San Jose. Santa Clara
10. US 101 between Moffett Field in Mt. View & Dunbarton Bridge

Source: San Francisco Chronicle April 23, 1984

Figure 18 Ten Worst Bay Area Bottlenecks

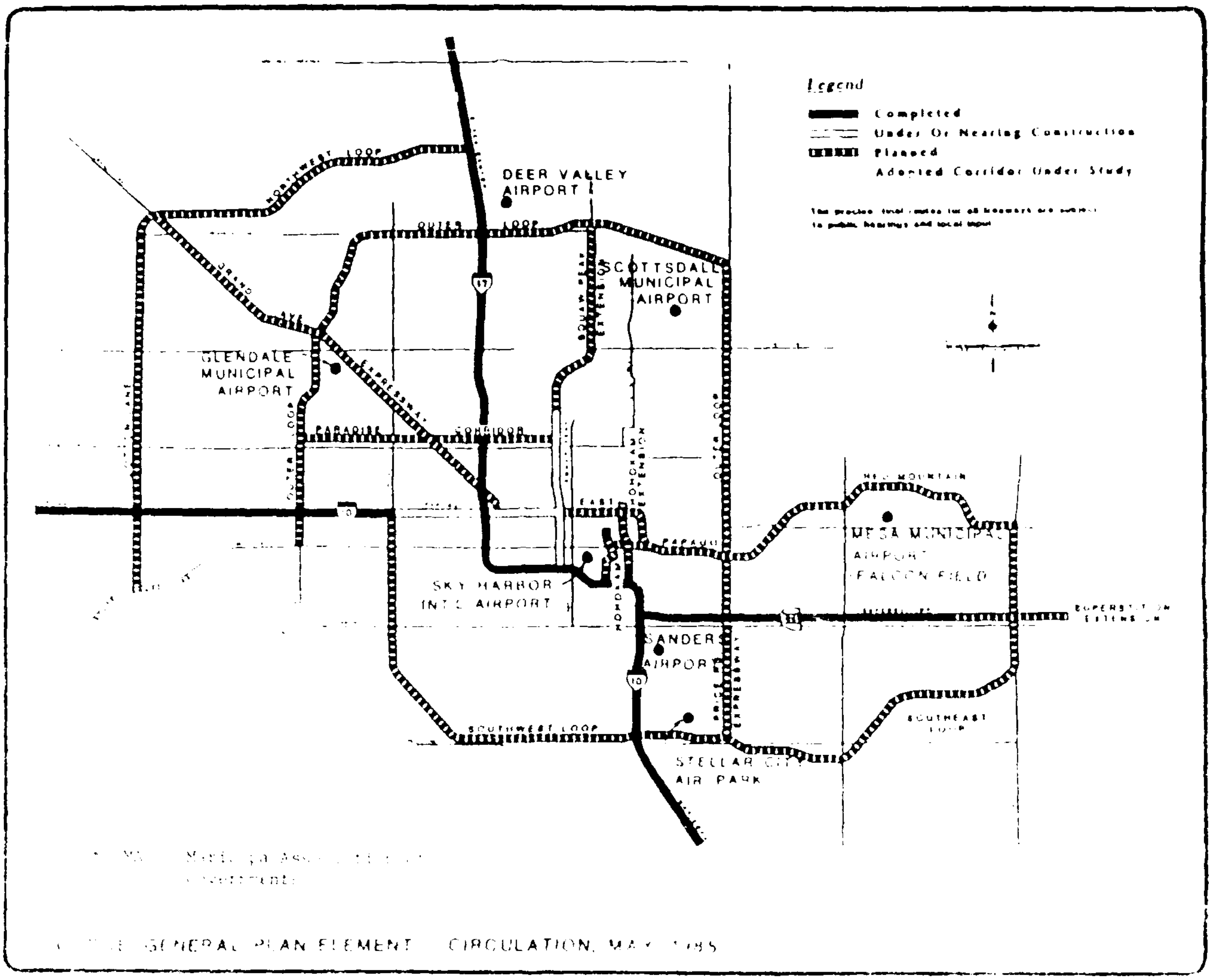
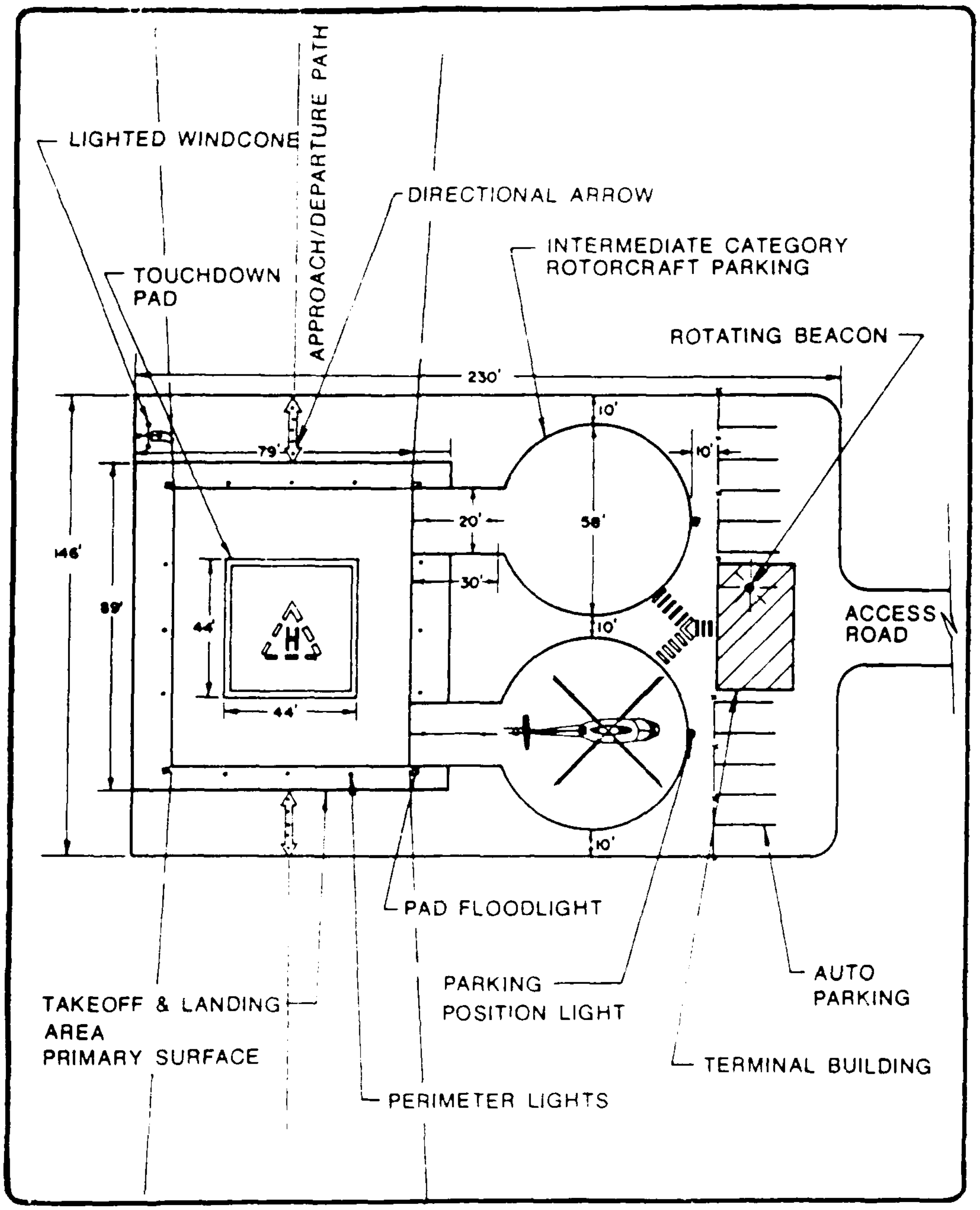
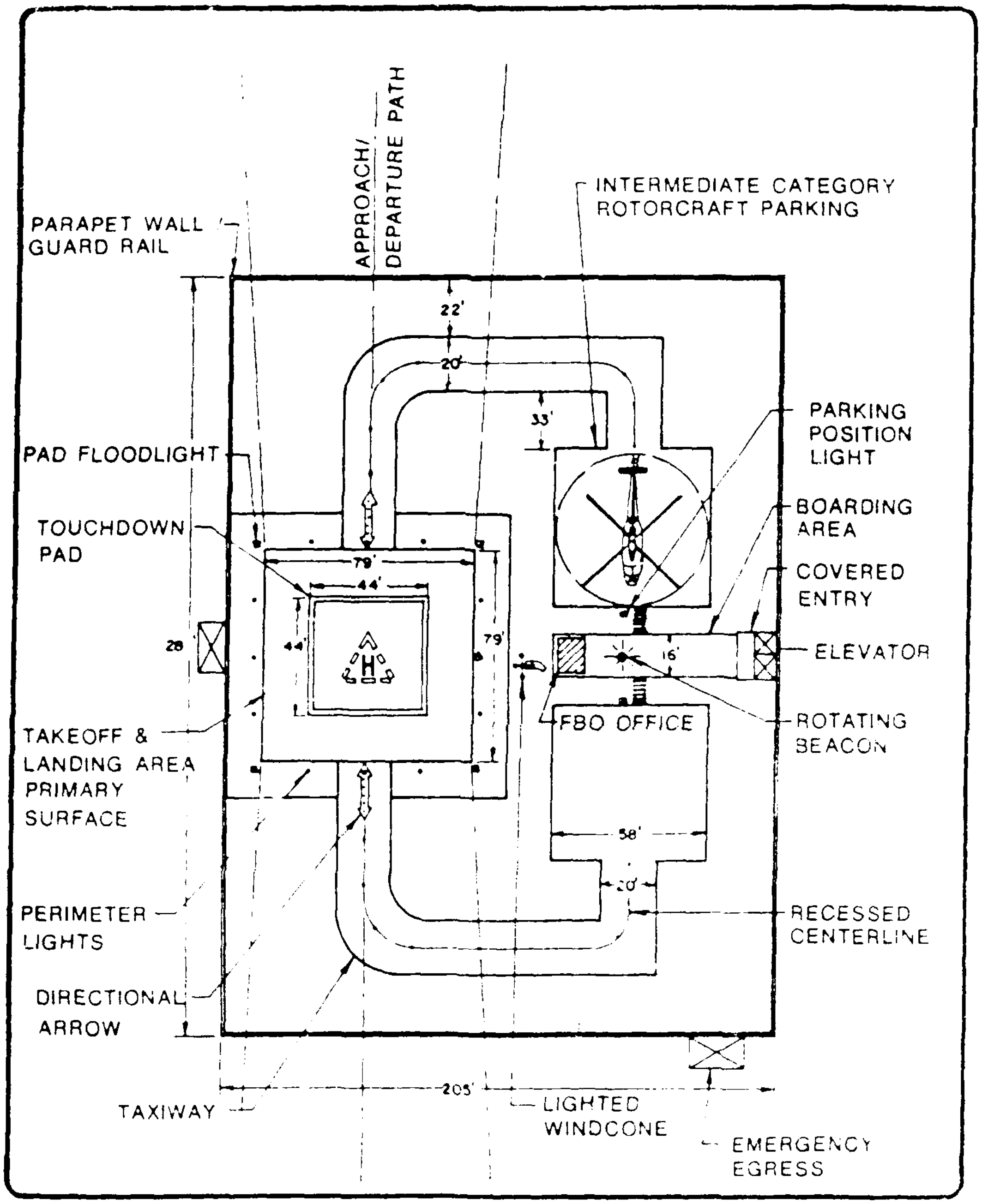


Figure 19 MAG* Freeway/Expressway Plan



Source: Hoyle, Tanner & Associates, 1983.

Figure 20 Typical Ground Level Heliport Layout



Source: Boyle, Tanner & Associates, 1983.

Figure 21 Typical Rooftop Heliport Layout

5.0 DESCRIPTION OF EXISTING SYSTEM

5.1 GENERAL

Once the inventory is complete, all the facets of the existing helicopter environment need to be described. Description of the overall characteristics of the existing system lays the groundwork for prioritizing the integration of the recommended helicopter system into the evolving urban environment and transportation network. The description should be an overview of the planning area's helicopter operational characteristics within the overall transportation infrastructure, as well as within the context of the social and economic environment viewed from the perspective of helicopter operations. Elements to be presented are shown in Table 5.1 and are discussed below.

Airspace, environmental assessment and regulatory review, which discussed in this section. However, the planner may wish to present these elements in separate sections if the planning area characteristics or the sponsoring agency requires more detail.

5.2 KEY ELEMENTS FOR SYSTEM DESCRIPTION

5.2.1 Role of Heliports and Airports

This section should be a detailed description of the types and roles of helicopter landing facilities, i.e., private or restricted-use heliports, public use heliports, and those on airports. It should list the types of missions (primary use) of the helicopters using the facility and the services available (fuel, maintenance, etc.).

5.2.2 Operational Characteristics

The typical operational characteristics of the active helicopter fleet within the planning area should be discussed. These include, the types and numbers of helicopters, the numbers of operations, the number of hours flown, the average trip length and time, the mission type distribution, and the percentage of IFR and night operations. The fleet mix and the "critical helicopter", the largest one expected to use the each heliport facility on a regular basis, should be specified.

As yet, there are no capacity determinations for heliport activity.

5.2.3 Airspace

The existing airspace elements that are in place within the infrastructure of the present operational system of heliports and airports should be described. This should include the types of airspace in the region and how helicopter operations are accommodated. It serves as a basis for later system plan recommendations. An example of the type of information needed as a description of existing conditions and as a basis for incorporating new heliport operations into the system, is shown in Figure 22. This figure presents the airspace classifications that influence aircraft operations in the Phoenix, Arizona, area.

It is also necessary to identify how airspace is used on a smaller scale in the vicinity of each existing and potential heliport. The VFR

TABLE 5.1 PLANNING CONCEPTS FOR DESCRIPTION OF EXISTING SYSTEM

ROLE OF HELIPORTS AND AIRPORTS

- Overall Aviation System
- Helicopter Operations
- Services Available (fuel, maintenance, etc.)

OPERATIONAL CHARACTERISTICS

- Types of Helicopters
  - Critical Helicopter
  - Fleet Mix
- Trip Length/Time
- Missions (primary uses)
- IFR
- Night

AIRSPACE *

- Pertinent Airspace Classifications
  - Operation Within Existing System
  - ATC Requirements
  - Letters of Agreement

ENVIRONMENTAL REVIEW *

- Noise
  - Community Perception
  - Methodology of Measurement
  - Impact
  - Mitigation
- Safety
  - Community Perception
  - Mitigation
- Other Relevant Impacts

REGULATORY REVIEW

- Federal
  - Agencies
  - Regulations
  - Guidelines (AC's, etc.)
  - Funding Sources
  - Development Assistance Sources and Agencies

REGULATORY REVIEW (Cont.)

- State Aeronautic Agency
  - Regulation
  - Assistance
  - Guidelines
  - Funding
- Local
  - Ordinances
    - Zoning
    - Noise
    - Safety
    - Fire
- Building Permits
- Attitudes/Political Climate

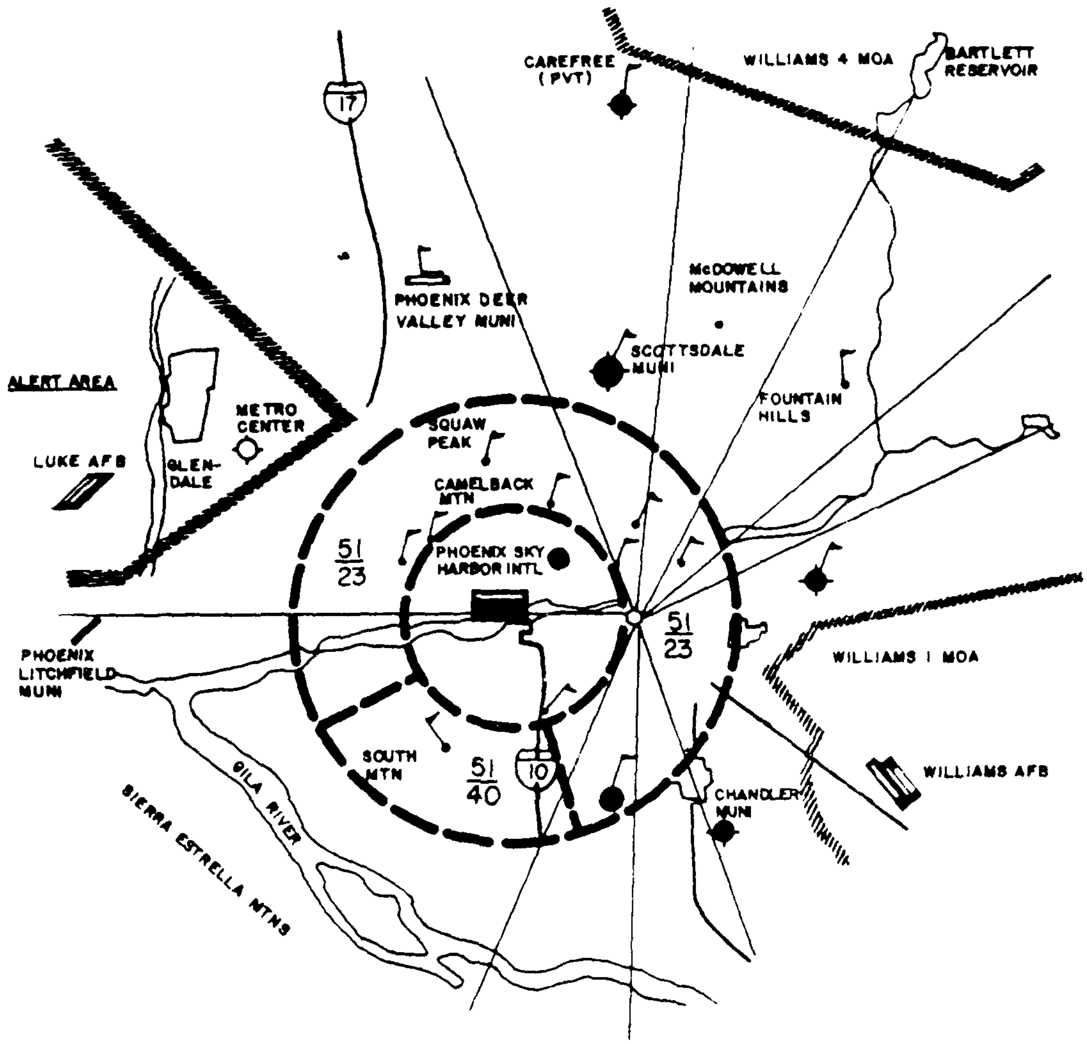
DEMAND ANALYSIS

- Specific Origins and Destinations
- Preferred Heliport Locations (survey)
- Estimated Operations to Preferred Site
- Latent Demand
- Profile of Demand Centers
  - Central Business District (CBD)
  - Industrial Parks
  - Employment/Business Activity Centers
  - Suburbs
  - Other

BENEFITS TO THE COMMUNITY

- Direct vs. Indirect
- Public Service
- Financial
- Economic Development Strategy

* Separate Section May Be Required



SOURCE: Federal Register/Vol. 50, No. 189/Monday, Sept. 30, 1985 Proposed Rules

Figure 22 Example of Some Airspace Considerations and IFR operational and navigational characteristics of the current airspace configuration need to be defined. The level of potential IFR operations has a direct bearing on heliport size and location.

Depending on the geographical area, the complexity of the airspace, and the scope of the plan, consideration may be given to dedicating an entire section in the system plan to airspace considerations.

5.2.4 Environmental Assessment

The environmental assessment should be considered as part of the siting criteria for potential heliports. The "Airport Environmental Handbook" FAA Order 5050.4A, provides guidance in determining potential environmental hazards.

Environmental considerations are of extreme importance with regard to heliports and helicopter operation due to a public perception that helicopters are noisy, intrusive and a safety risk. Therefore, these issues should be major environmental considerations in any system alternative and recommendation. Safety of the operation must be stressed to the public and siting criteria should be fully understood, by all those concerned. Whenever necessary, mitigation methods should be suggested.

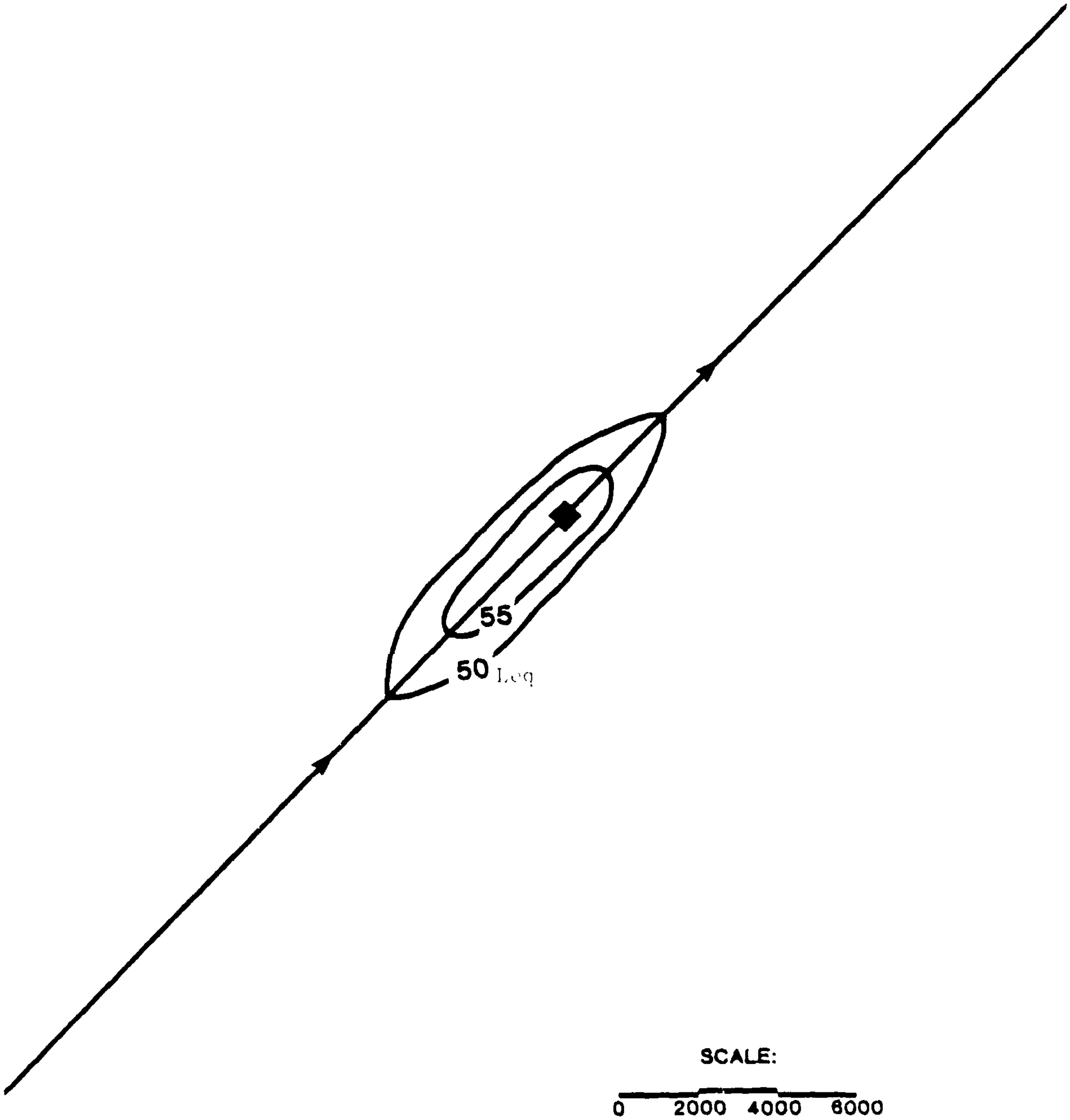
Noise analysis is of particular importance to any heliport plan. This is especially true in local or regional plans that have included siting of specific heliport locations in the scope of the plan. It is recommended that whenever possible, noise contours be developed for all potential heliport sites included in the final system recommendation. Figure 23, is an example of estimated noise contours for a potential heliport site.

Noise evaluation and analysis, although part of the overall environmental evaluation, should be developed as a separate section in planning regions that are known to have noise sensitive areas, particularly for local or metropolitan heliport system plans.

5.2.5 Regulatory Review

An important consideration in developing a heliport system plan is understanding the regulatory factors that affect heliport development at all levels of government.

The Federal Government through the FAA is the primary regulator of all airborne aviation activity. This is accomplished through laws, rules, standards and guidelines. Applicable Federal regulations should be thoroughly understood in developing the heliport aviation system plan. Appendix C lists the FAA Advisory Circulars (AC's) that provide Federal guidelines. The Federal Government is also a possible source of funding for public use heliport developers. Heliport planners and proponents are urged to contact, and work with, their local FAA Airport District Offices for of the most recent aviation regulatory, planning, and development data, and for funding information. The FAA has also designated Regional Heliport Development Coordinators for each region to support heliport development and activity (Appendix E).



Source: State of Michigan, Statewide Heliport Study, Vol. 2, Technical Report, Edwards and Kelsey, inc., 1985.

Figure 23 One Hour Equivalent Sound Level (Leq) for Peak Hour Helicopter Operations General Heliport*

* Consultant Heliport Classification.

All states have some type of aeronautical agency, but each regulates aviation activity to varying degrees. Some have state helicopter registration and heliport licensing requirements. Many states also have funding sources for airport or heliport construction. It is necessary to contact the appropriate state agency to determine the role the state plays in heliport development.

Local communities often do not have laws pertaining directly to aviation operations, but they do have building codes, permit requirements, construction guidelines, and zoning laws that affect heliport establishment. However, more and more communities are implementing heliport ordinances, either to designate compatible areas for heliports and proscribe laws regulating their use, or to prohibit heliports altogether. It is therefore critical to understand the local community's policies and attitudes towards heliports. For metropolitan and regional plans, the level of local acceptance is an important consideration, particularly for siting considerations, and needs to be handled in more detail. In state system plans, the planner may chose to survey all the major cities in the state, as determined by a threshold appropriate to local characteristics, to identify locations suitable for heliport development before making system plan recommendations.

Even if there are no defined laws on heliport development, it is essential to know the local attitudes and political climate of the area in which any heliport development is planned. Heliport development can be contingent on these attitudes.

5.3 DEMAND ANALYSIS

The overall demand for helicopter landing facilities is developed in this section because identification of demand centers and levels of demand helps describe the current and desired operational patterns within the area under study. It is also a key element for forecasting future activity and presenting system alternatives. Demand evaluation is achieved through analysis of the current number of operations at each facility and the pattern of origins and destinations, as well as the potential demand estimated at preferred sites that were identified from the operator survey. Latent demand should be an important consideration in this analysis (see Section 4.2.1, Existing Heliport Facilities).

The process for the identification of the location of the highest demand, or demand centers, for heliport facilities needs to be described as well as a brief summary of the nature or characteristics of those areas in which that demand is located. For instance, is the highest demand for heliports in the central business districts (CBDs), industrial parks, suburban activity centers, etc.?

5.4 BENEFITS TO THE COMMUNITY

An important consideration is the development of a general awareness of the value of the helicopter to the community. Helicopter benefits for the most part, are indirect and consequently must be presented in terms that are understandable and acceptable. A discussion of these benefits can be presented in terms of public service functions (including public safety and medical transport), financial considerations and economic development strategies. This effort is absolutely crucial to the success of heliport development on any scale.

6.0 FORECAST

6.1 GENERAL

In order to develop efficient alternatives and recommendations for future helicopter transportation systems, the expected levels of activity must be forecast. Forecasts need to be calculated for the total number of helicopters and for the profile of their activity within each of the designated planning horizons. Forecasts of future activity are used to support the development of future system recommendations. Operational forecasts should be developed within the reality of the socio-economic data collected in the inventory. It is essential to define the relationship between the economic trend factors declared significant to helicopter activity and the forecast of growth or decline of that activity.

6.1.1 Forecast Elements

Forecasts should include the number of active helicopters by type, number of operations, and number of hours flown. These need to be further broken down by mission, percentage of night and IFR operations, passenger enplanements, etc. Additionally, the expected increase or decrease of activity at existing helicopter landing facilities should be forecast by number of daily, annual and monthly operations, the percentage of night and IFR activity, if any, as well as the number of passengers enplaned. A list of all elements to be forecast are presented in Table 6.1.

TABLE 6.1 FORECAST ELEMENTS

DATA SOURCES

PLANNING HORIZONS

METHODOLOGIES

BASED/ACTIVE HELICOPTERS

- Number
- Type
- Missions (primary use)

OPERATIONS

- Total Number
  - Average Day
  - Average Month
  - Annual
- Missions (primary use)
- IFR
- Night
- Passengers

HOURS FLOWN

- Total Number
  - Average Day
  - Average Month
  - Annual
- Missions (primary use)
- IFR
- Night
- Passengers

HELIPORT OPERATIONS

- Total Number
  - Average Day
  - Average Month
  - Annual
- Night
- IFR
- Passenger Enplanements

6.1.2 Planning Horizons

The planning horizons, or time frame, for the system plan will have been determined by the sponsor's needs and established in the system plan requirements. A discussion of suggested horizons is found in Section 2.1.5. The horizons not only establish a frame of reference for planning analyses, but also reinforce the on-going nature of any heliport system plan. In developing forecasts within each planning horizon, the shorter the time frame, the more reliable the numbers will be.

6.2 METHODOLOGIES

One of the major deficiencies of existing heliport system plans is the forecasting techniques used. No forecast methodologies specifically geared to helicopter activity have been developed, which is partially due to the lack of historical statistics on helicopter and heliport operations. Consequently, forecasts of future heliport systems have often been inaccurate or ineffective. As more information becomes available, forecasting techniques specifically suited to heliports and helicopters can be developed. This will result in more reliable forecasting that will significantly improve the effectiveness of future system plans.

Traditional methods for developing aviation forecasts can be found in the FAA's Advisory Circulars "Planning the Metropolitan Airport System" (AC 150/5070-5), "Airport Master Plans" (AC 150/5070-6), and "Aviation Demand and Airport Facility Requirement Forecasts for Medium Air Transportation Hubs Through 1980", (January 1969). The methodology chosen for the forecast is data dependent. Planners should take special care to use the method most applicable to the regional and operational nature of the heliport system plan in question.

One method frequently used is trend line analysis. This method is dependent on historical trends. It assumes that the causes for certain developments will remain constant and that the effects will continue throughout the planning horizon. This method should be used with caution because of the lack of historical data on helicopter and heliport activity.

Another method is market share analysis. This method assumes that the share of the number of helicopters in a particular geographic region will remain constant over time in relation to the national total. The national totals are usually derived from the "FAA Aviation Forecasts" or the "FAA Statistical Handbook of Aviation" (see Appendix C).

Forecasts are the quantification of the volume of helicopter activity within the plan's boundaries. Activity should be first measured as unconstrained, with full facility development, and without considering any administrative, economic, or legal policy. As limiting factors are identified, the measurement should be revised accordingly and comparative forecasts developed. These should include a forecast for the "status quo", where no action is taken or system improvements made. If applicable, the high and low forecasts can be averaged to determine the "most likely" case.

Latent demand, is a vital element that also needs to be assessed in the forecasting process. Latent demand is the demand generated by those who cannot be identified through normal data collection methods. For example, operators from places not included in the planning region, but who would use a heliport if one were built, generate latent demand.

6.2.1 Socio-Economic Factors

Socio-economic factors are also important. Depending on the area characteristics and predominant helicopter mission, future helicopter activity levels can be linked to expected total, or sector specific, population growth, population density patterns, disposable income, employment category, etc. Forecasts should also be linked to the general economic health of the area and the specific industry(ies) supporting helicopter activity. The actual and potential effects of these factors need to be defined and incorporated into the final forecast.

6.2.2 Other Impacts

Other transportation technologies and related urban planning efforts should be considered for their possible impact on the aviation systems in the planning region. These include, but are not limited to, ground transportation systems, major urban developments, aviation communications systems, navigational aids, and new aviation technologies. Special attention should be paid to ground transportation systems that provide access to existing and future heliport facilities.

Future plans concerning local airports should be given special consideration. Recent aviation plans need to be identified and evaluated in terms of future impact on the entire aviation system and on heliports. Airports still are, and can be expected to remain, the primary support for service and landing facilities for helicopters.

7.0 SITE SELECTION AND SYSTEM ALTERNATIVES

7.1 SITE SELECTION PROCESS

The site selection process is critical in heliport system plans. The system alternatives and the final system recommendation are dependent on a judicious selection process. An overall guide to the elements that are necessary in site selection is given in Table 7.1. Specific requirements and processes for both state and metropolitan plans are described in the next two sections.

TABLE 7.1 SITE SELECTION PROCESS

ORIGINS AND DESTINATIONS

SITE SELECTION CRITERIA (planning area dependent)

- Aeronautical Considerations
- Operational Considerations
- Environmental Considerations
- Comm/Nav/Surveillance (CNS) Coverage
- Transportation Interfaces

EVALUATION MATRICES

- Identification of All Possible Sites
- Final Site Selection

7.1.1 State Plans

State plans need to identify specific cities, towns, or demand centers, where potential heliports are expected to be viable. These are determined through the evaluation and analysis of data collected in all the previous elements of the system plan. The evaluation should include, but is not limited to, the location of the area's helicopters and heliports, the location and economic viability of industries that use helicopters, and to the state's social and environmental factors. Key ground and air transportation systems and airports that are significant to helicopter operations should be considered.

The FAA's "Planning the State Airport System" (AC 150/5050-3A), prescribes items to be identified in developing alternatives for state plans. The following sample alternatives have been adapted for heliport system plans:

- Identify the future demands for helicopter transportation as a function of activity levels approximating the horizon target years.
- Identify the future forecasted supply of physical plant, including aircraft, airspace, navaids, and landing systems.
- Identify linkages to other transportation systems and environmental factors with respect to the influence of these factors on the demand for helicopter transportation.
- Identify the distribution and configuration of the best alternative statewide helicopter landing facilities including airport systems. Recognize presently proposed Federal, state, regional and local plans for developing existing and new aviation facilities, throughout the statewide system.

7.1.2 Metropolitan Plans

A metropolitan plan should initially identify all possible sites for potential heliports within the metropolitan area, then proceed to identify the most suitable site or sites for the final recommendation. Figure 24, is a map portraying all the sites initially selected as potential public heliport locations for the "Downtown Pittsburgh Heliport Site Location Study". (The "Downtown Pittsburgh Heliport Site Location Study" is still in draft form. All figures are preliminary and subject to change prior to approved by the FAA and the City of Pittsburgh Planning Department. Permission for use has been received from the Planning Department.) Standards used in these evaluations need to be clearly defined and the process of how sites were selected should be described. The description should include a list of the criteria used for the selection and why. The selection criteria must be based on helicopter operational capabilities, as well as local social, political, and environmental characteristics. Selection criteria used for the initial site identification can be more general in nature than the criteria used to identify the best final site or sites.

A tool that can be used for analysis and evaluation is the matrix. One site evaluation matrix can be applied to identify all potential sites using more general criteria. Then a second matrix can be used to prioritize the most suitable location(s) for the final system plan recommendation. Examples of selection criteria used to determine the final site for a specific heliport system plan, are shown in Figure 25.

The FAA document "Planning the Metropolitan Airport System" (AC 150/5070-5), prescribes items to be identified in developing alternatives. These have been adapted for metropolitan or regional heliport system plans and are presented below:

Prepared for: Department of City Planning, Pittsburgh, Pennsylvania, by Aviation Planning Associates, Inc., 1987.

Note: Information portrayed here is preliminary, subject to change with approval by the FAA and Pittsburgh [illegible] of Planning. Permission for use [illegible] from City of Pittsburgh Department of Planning.

Figure [illegible]. Preliminary Heliport Site Locations

PHOENIX HELIPORT NEEDS STUDY
HELIPORT SITE EVALUATION MATRIX-RATING OF POTENTIAL SITES

Evaluation Criteria

A) Space/Size/Site Availability
B) Proximity to Origin and Destination
C) Flight Tracks/Approach/Departure Paths
D) Site Acquisition/Leasing Costs
E) Existing/Proposed On-Site Land Use/Site Preparation
F) Adjacent Land Uses/Noise Sensitivity

Site	A	B	C	D	E	F	TOTAL	RANK
1.	1	5	4	1	2	3	16	9
2.	4	3	4	3	4	3	21	5
3.	3	4	4	3	2	4	20	6
4.	2	4	2	3	3	4	18	7
5.	1	4	4	2	3	4	18	7
6.	4	4	4	4	4	4	24	2
7.	3	5	2	1	3	3	17	8
8.	2	4	3	3	1	3	16	9
9.	4	3	5	3	3	4	22	4
10.	5	4	5	5	4	4	27	1
11.	4	4	4	3	5	3	23	3

Rating Scale: 1 (lowest); 3 (neutral); 5 (highest)

Source: Hoyle, Tanner and Associates, Inc., 1986

Figure 25 Example of Site Selection Evaluation Matrix Table

- Description of the coordination and consistency with the area wide comprehensive surface and air transportation plans.

- The approximate dollar cost of aviation oriented development for each planning horizon, including land acquisition costs.

- The approximate social cost in terms of land acquisition, environmental impact, including noise exposure and ecological impairment.

- User costs of helicopter transportation both in time and dollars.

- A rating of how well the airspace will be utilized and the efficiency of air traffic handling.

- Quantitative assessment of political and citizen acceptability.

7.2 ALTERNATIVES

This task presents, within the scope and purpose of the system plan, all the reasonable system alternatives for establishing an effective helicopter transportation system. These alternatives are based on the careful analysis and evaluation of all the previous elements of the heliport system plan. The alternatives presented should range from the ramifications of maintaining the status quo, to the optimum system possible for accommodating future demand within the context of identified operational requirements. The impact of different sites identified in the site selection process may be considered in different alternatives. All elements of a comprehensive system, heretofore evaluated, should be included. Alternatives should be geared to the accepted forecast within the planning horizons.

Furthermore, specific implications of each of the alternatives on existing airspace, land use, ground access, and environment aspects, should be discussed in detail, using the existing system as a baseline. Flight tracks, noise contours, and detailed safety procedures, should be considered where applicable. Possible impact on the system of future technological improvements within the duration of the planning horizons should also be addressed.

Potential implementation costs also need to be considered. Costs can be presented as broad estimates for generic heliports for state system plans, as presented in Figure 26. For metropolitan plans that require designation of specific sites, a more detailed cost estimate would be necessary. Examples of costs estimates for individual heliport construction are shown in Figure 27. In this figure, Option 1 shows the cost of a turf and pavement heliport, while Option 2, are the costs for an all pavement heliport.

Basic Heliport*	. Range	$5,000 -	$ 10,000
	. **Use as a Cost Estimate**		10,000
General Heliport*	. Hospital, large scale, suburban		500,000
	. Corporate, large scale, urban		2,000,000
	. **Thus** - Urban Area Heliports-		
	Cost Estimate		1,000,000
	- Suburban Area Heliports-		
	Cost Estimate		750,000
Transport Heliport*	. New Orleans		3,440,000
	. Indianapolis		3,110,000
	. New York		3,610,000
	. Small Urban Areas	100,000 -	1,000,000
	. **Thus** - Large Urban Area Heliport		
	Cost Estimate		3,400,000
	- Small Urban Area Heliport		
	Cost Estimate		1,500,000

Note: Costs are highly variable, since land costs are so high in Urban Areas.

Source: Interviews, FAA

* Consultant Heliport Classification

Source: State of Michigan, Statewide Heliport System, Edwards & Kelcey, Inc., 1985.

Figure 26 Example of Average Heliport Costs Table

ITEM NO.	DESIGNATION	QUANTITY UNIT	QUANTITY AMOUNT	UNIT COST	TOTAL
	Common Excavation	[illegible]	[illegible]	[illegible]	[illegible]
	Crushed Gravel	CY	352	[illegible]	[illegible]
	PCC Pavement	SY	[illegible]	[illegible]	[illegible]
	Bituminous Concrete Pavement	[illegible]	[illegible]	[illegible]	[illegible]
	Turf	[illegible]	[illegible]	[illegible]	[illegible]
	Pavement Marking	SF	[illegible]	[illegible]	[illegible]
	Drainage	[illegible]	[illegible]	[illegible]	[illegible]
	Chain Link Fence	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible] Lights	EA	[illegible]	[illegible]	[illegible]
	Perimeter Lights	EA	[illegible]	[illegible]	[illegible]
	Pad Flood Lights	EA	[illegible]	[illegible]	[illegible]
	[illegible] Lights	EA	4	[illegible]	[illegible]
	[illegible]	EA	[illegible]	[illegible]	[illegible]
	Rotating Beacon	EA	[illegible]	[illegible]	[illegible]
	Regulator	EA	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Estimated [illegible]				[illegible]
	[illegible]				[illegible]
	Estimated [illegible]				[illegible]

ENGINEERS

ESTIMATE OF COST

ITEM NO.	DESIGNATION	QUANTITY UNIT	QUANTITY AMOUNT	UNIT COST	TOTAL
	[illegible] Excavation	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible] Gravel	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible] Pavement	SY	[illegible]	[illegible]	[illegible]
	[illegible] Concrete Pavement	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	SY	[illegible]	[illegible]	[illegible]
	Pavement Marking	SF	[illegible]	[illegible]	[illegible]
	Drainage	LS	[illegible]	[illegible]	[illegible]
	[illegible] Fence	LF	[illegible]	[illegible]	[illegible]
	[illegible] Lights	EA	[illegible]	[illegible]	[illegible]
	Perimeter Lights	EA	[illegible]	[illegible]	[illegible]
	Pad Flood Lights	EA	[illegible]	1,500	[illegible]
	[illegible] Lights	EA	4	[illegible]	[illegible]
	Lighted Wind Cone	EA	[illegible]	[illegible]	[illegible]
	Rotating Beacon	EA	[illegible]	[illegible]	[illegible]
	Regulator	EA	[illegible]	[illegible]	[illegible]
	[illegible]	EA	[illegible]	[illegible]	[illegible]
	[illegible]	LF	[illegible]	[illegible]	[illegible]
	[illegible]	LF	[illegible]	[illegible]	[illegible]
	[illegible]	LS	[illegible]	[illegible]	[illegible]
	Terminal [illegible]	SF	[illegible]	[illegible]	[illegible]
	Estimated [illegible]				[illegible]
	Engineering [illegible]				[illegible]
	Estimated Project Cost				[illegible]

Source: Pheonix Heliport Needs Study, HTA, 1986.

Figure 27 Examples of Individual Heliport Costs

8.0 RECOMMENDED SYSTEM PLAN

8.1 GENERAL

The recommended system plan formalizes the selected heliport system alternative into the final recommendation. In selecting the final recommendation the planner should consider the full range of possibilities previously presented and select the one that is best suited to the operational, economic, and political nature of the planning area. The components of the final recommendation, and processes necessary for its implementation, should be discussed in detail.

The recommendation must consider the integration of the existing transportation network including airports, existing heliports, and ground transportation. The roles of the various participating governmental entities should be delineated, particularly that of the sponsoring agency. Implementation processes must be outlined with consideration given to demand, facilities required, and economic criteria, all phased within the planning horizons. Specific elements for developing a recommended system plan are shown in Table 8.1.

8.1.1 Recommended Facilities

The number, location and type of helicopter landing facilities identified by the final site selection process for the recommended alternative should be itemized. Figure 28 is an example of an itemized list of recommended heliport development. Each facility should be further described by type, i.e., public use, restricted use, private use, on airport, etc., and the recommended services required for each location specified. Recommended heliport designs may be presented for each of the final sites selected as illustrated in Figure 29. The suggested layout plan for a selected heliport location is shown in Figure 30.

8.1.2 System Integration

Using the profile of the existing system as a baseline, specific implementation processes for each component of the recommended system should be discussed in detail. Flight tracks, airspace, noise contours, and detailed safety procedures, should be considered where applicable. Figure 31, is an example of planned systems integration including land use, access routes, and noise contours. Figure 32, portrays an airspace plan including the approach/departure routes for a selected site. Any expected impact on the system by future technological improvements within the duration of the planning horizons should be addressed.

8.1.3 Implementation

A description of the implementation process requires that all diverse components necessary to support helicopter operations in an urban transportation network be itemized and prioritized for each phase of development. An example of a five year implementation plan done for a

TABLE 8.1 ELEMENTS OF A RECOMMENDED SYSTEM PLAN

RECOMMENDED FACILITIES

- Number
- Location
- Size
  - Critical Helicopter
  - Number/Size Touchdown Pad
- Facility/Category
  - Public Use Heliport
  - Private Use Heliport
  - On Airport Heliport
- Services Required
  - Fuel
    - Grades
    - Amount
  - Parking and Tie-Downs
  - Hangar Storage
  - Lights
    - Type
    - Configuration
    - Control
  - NAVAIDS
  - Communications
  - Weather Services (including AWOS)
  - Special VFR
  - IFR Capabilities
    - Non-Precision
    - Precision
- Terminal Building
    - Passenger Amenities
    - Pilots Lounge
    - Flight Planning Facilities
  - Maintenance
  - Connecting Transportation
    - Auto Parking
    - Rental Cars
    - Taxi Stand

SYSTEM INTEGRATION

- Integration with Existing Transportation Network
  - Airports
  - Existing Heliports
  - Ground Transportation
- Airspace Impact
- Environmental Impact
- Possible Impact of New VTOL/VSTOL Technology on System

IMPLEMENTATION

- Priority of Development
- Costs
  - Construction
  - Management
- Funding
- Sources of Revenue
- Role of Government Entities
  - Federal
  - State
  - Local
- Recommended Regulatory Changes
- Height Limiting or Land Use Ordinance

BENEFITS TO COMMUNITY OF NEW SYSTEM

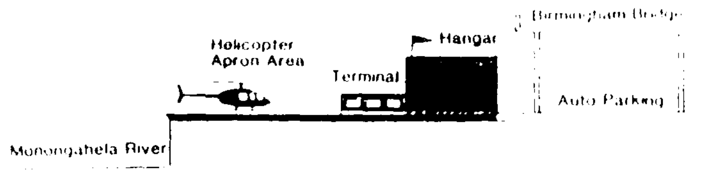
- Direct vs. Indirect
- Public Service
- Financial
- Economic Development Strategy

It is recommended that heliport or heliport system feasibility studies and master plans be performed for the following regions:

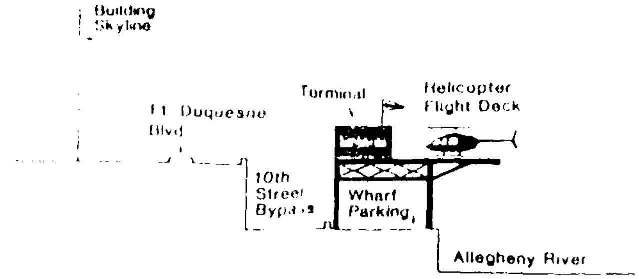
Demand Center Region		Proposed Heliport Role	Eligible for NPIAS
1.	Grand Rapids Region	Transport	Yes
2.	Capital District Region (Greater Lansing)	General	Yes
3.	Kalamazoo-Battle Creek Region	General	Yes
4.	Jackson Region	General	Yes
5.	Detroit City	Transport	Yes
6.	Northwest Wayne County	General	Yes
7.	Detroit Metro Airport	Transport	Yes
8.	Central Washtenaw County	General	Yes
9.	Central and Southern Oakland County	General	Yes
10.	Southern Macomb County	General	Yes
11.	Flint-Saginaw Region	[illegible]	[illegible]

Source: State of Michigan, State [illegible]
Edwards and Kelcey, Inc., 19[illegible]

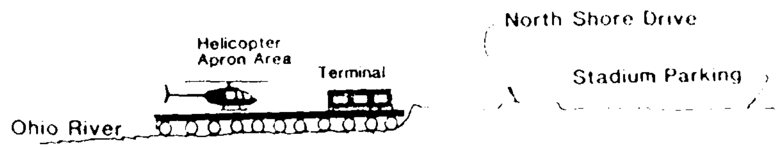
Figure 28 An Example of Table [illegible]
and Roles



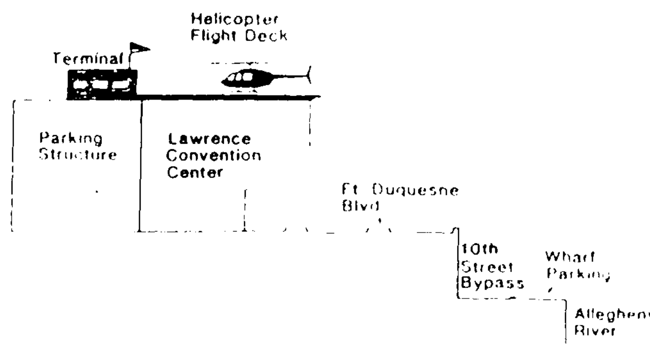
(1) J & L TECH CENTER — FULL SERVICE grade level heliport adjacent to the Birmingham Bridge



(10) ALLEGHENY RIVER WHARF — CANTILEVER Steel Structure above wharf parking lot extending out over the Allegheny River.



(9) Three Rivers Stadium Site — Floating Heliport Concept

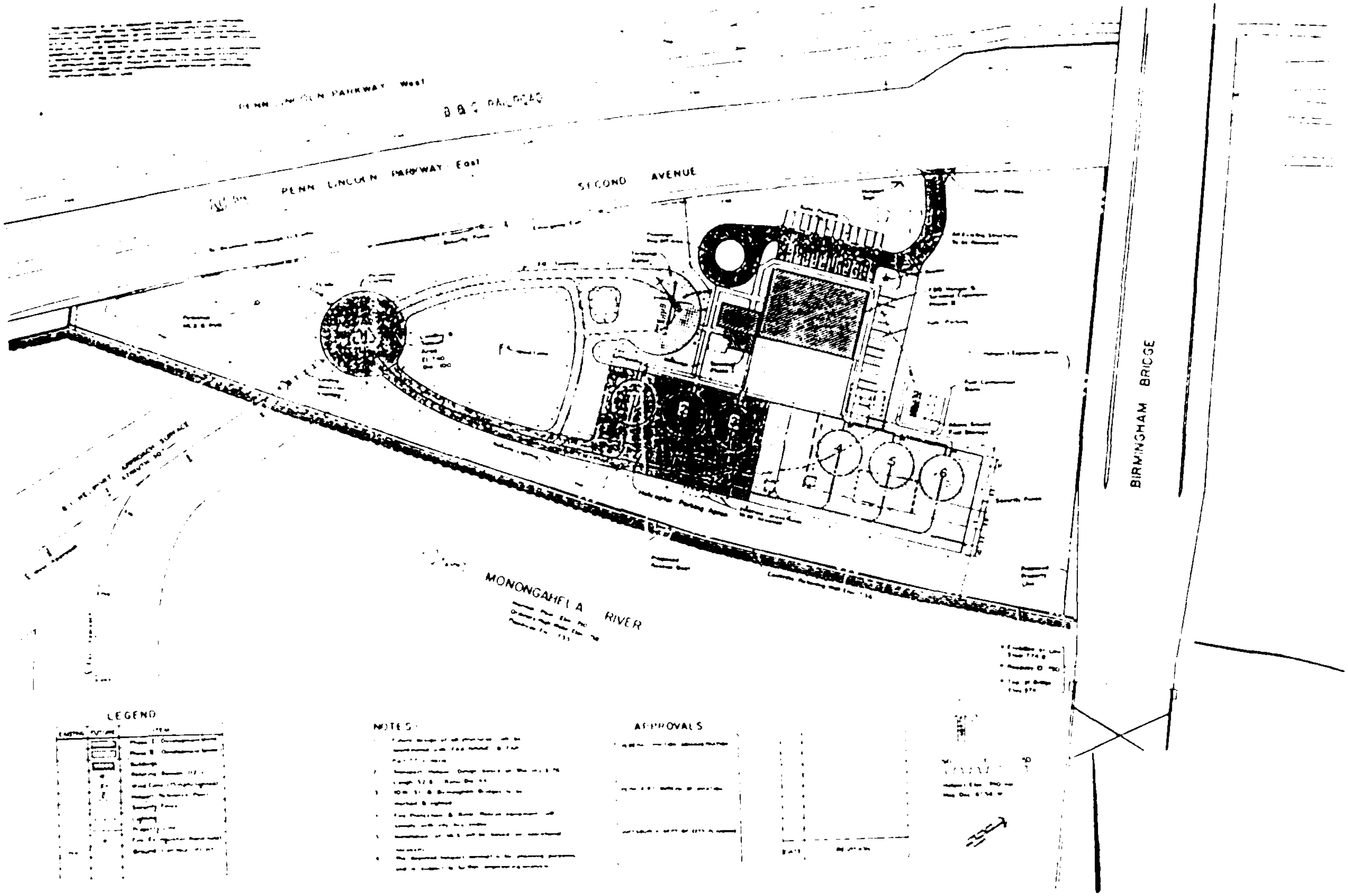


(12) CONVENTION CENTER — Elevated heliport utilizing the Convention Center parking garage

Prepared for: Department of City Planning, Pittsburgh, Pennsylvania, by Aviation Planning Associates, Inc., 19[illegible].

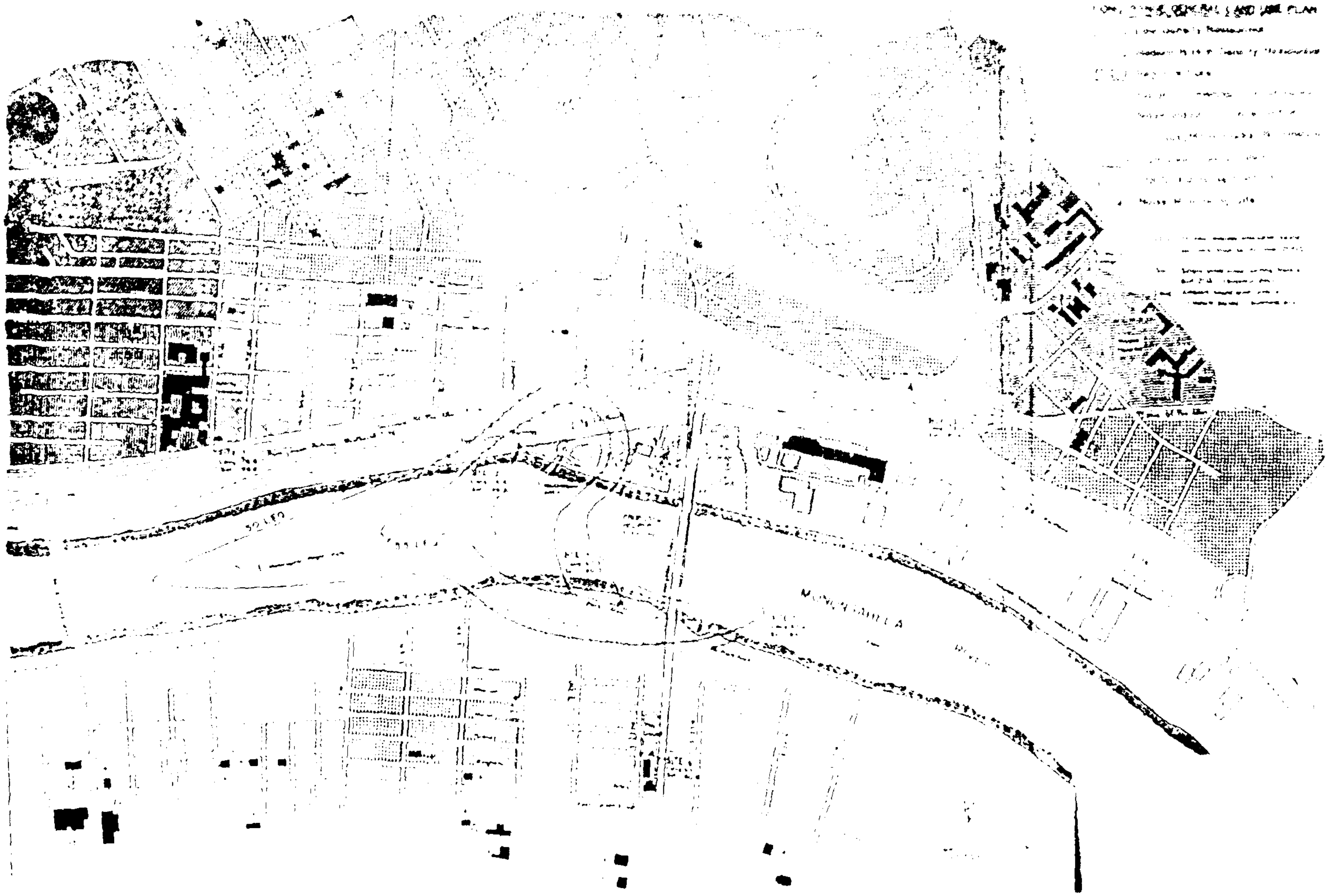
Note: Information portrayed here is preliminary, subject to change with approval by the FAA and Pittsburgh Department of Planning. Permission for use received from City of Pittsburgh Department of Planning.

Figure 29 Heliport Design Concepts

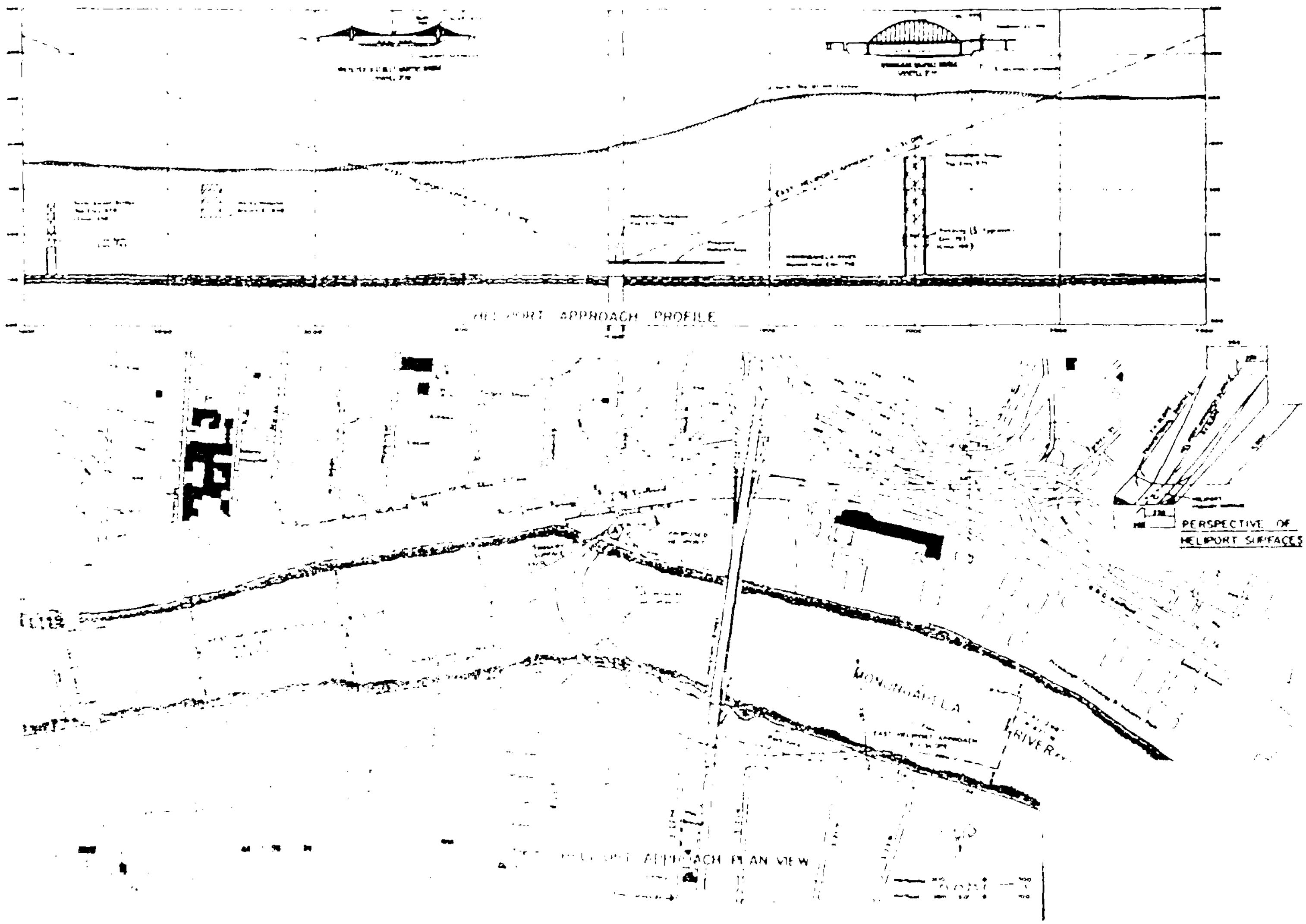


Prepared for: Department of City Planning, Pittsburgh, Pennsylvania, by Aviation Planning Associates, Inc., 1983.
Note: Information portrayed here is preliminary, subject to change with approval by the FAA and Pittsburgh Department of Planning. Permission for use received from City of Pittsburgh Department of Planning.

Figure 30. Heliport Layout Plan



Land Use Plan



[illegible] Pittsburgh, Pennsylvania, by Aviation Planning Associates, Inc., [illegible] approval [illegible] the FAA and [illegible] City of Pittsburgh Department of Planning.

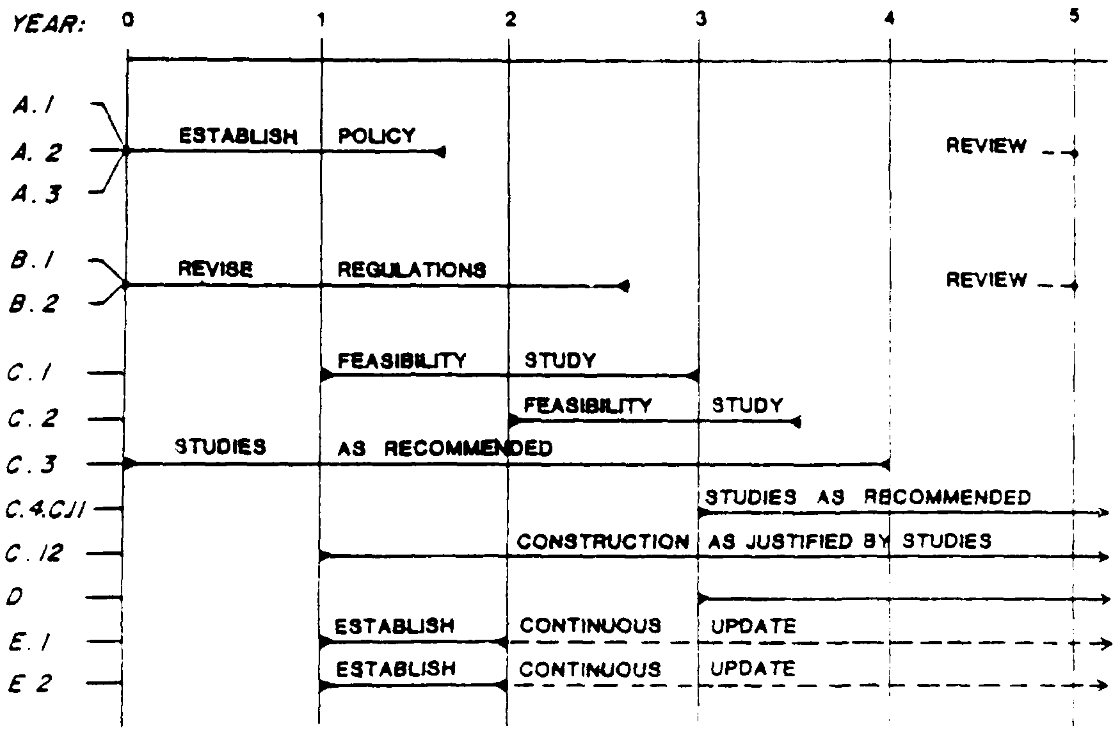
[illegible]

specific location is shown in Figure 33. The process should include implementing requirements, the role of the various government agencies at each stage of development, and any recommended regulatory changes that would promote and protect the heliport as part of the overall transportation system. Height limiting and/or land use ordinances may be required.

Implementation should also address specific costs to the level of detail specified in the statement of purpose. This could include cost of site acquisition, development and implementation, and if applicable, construction and heliport management costs. Also pertinent are Federal, state, and local funding sources, as well as the revenue producing capabilities of the facilities to be established. Figure 34 is an example of the estimated cost of planning and constructing a system of recommended heliports. (The dollar figures shown are representative of the Michigan heliport plan. Planning and construction costs vary significantly with geographic location and heliport design. Planning done through government agencies can cost significantly less than through private consultants.)

4.2 BENEFITS TO COMMUNITY OF A NEW SYSTEM

The benefits to the community that result from the implementation of the system plan recommendations is a necessary part of the discussion. The ramifications of the overall efficiency of the integrated transportation network, as well as its contribution to public service, current financial concerns, and future business development should be presented.



See Text for Description of Tasks

Source: State of Michigan, Statewide Heliport Study, [illegible] 1, 2, [illegible] Edwards and Kelcey, Inc., [illegible].

Figure 33 Example of a Five-Year Implementation Plan

	Heliport Site	Role	Costs: Planning	Costs: Construction
1.	Grand Rapids Region	Transport	$100,000	$1,500,000
2.	Capital District Region (Greater Lansing)	General	45,000	1,000,000
3.	Kalamazoo-Battle Creek Region	General	45,000	750,000
4.	Jackson Region	General	45,000	1,000,000
5.	Detroit City	Transport	100,000	3,400,000
6.	Northwest Wayne County	General	45,000	750,000
7.	Detroit Metro Airport	Transport	100,000	1,500,000
8.	Central Washtenaw County	General	45,000	750,000
9.	Central and Southern Oakland County	General	45,000	750,000
10.	Southern Macomb County	General	45,000	750,000
11.	Flint-Saginaw Region	General	45,000	1,000,000
		Total Helicopter Costs	$660,000	$13,150,000
		Total Planning and Construction		13,381,000
		Estimate for Data Collection/Enhancement		50,000
		Total System Cost		**$13,431,000**
		Estimated State/Local Share		**$ 1,343,100**

Source: State of Michigan, Statewide Heliport Study, Vol. 2, Technical Report, Edwards and Kelcey, Inc., 1985.

Figure 34 Example Estimated System Cost Table

9.0 CONCLUSION

9.1 GENERAL

This document provides guidelines for the improved efficiency and effectiveness of heliport system plans. It outlines necessary elements for the assessment of demand for heliports on both the metropolitan and state level. It recommends a logical organizational sequence to promote orderly investigative and analytical processes.

It is recognized that each individual plan will vary in scope and in level of detail. However, using these data collection elements to the level of detail that the individual study and sponsor require, and adopting the suggested organizational structure, facilitates the equitable comparison between heliport system plans, independent of their location and scope. Consistency of data, structure, and process, will result in a more accurate assessment of demand and a more effective prioritization of funding.

It is further suggested that it is useful for heliport planners to look at previously completed heliport system plans, from a variety of regional locations, to see how these plans addressed the planning elements. They may find that specific elements were handled in ways applicable to their situation, or discover flaws in the data or the analyses that can be augmented when developing their own plan. A list of heliport system plans both completed, and in progress is provided Appendix F.

9.1.1 Continuing Process

It has been emphasized throughout this document, that to be most effective, a heliport system plan must be an on-going document. Although it is ultimately the responsibility of the sponsor to keep the plan up to date, the planner must collect, develop, and present the data in such a way to encourage routine updating as changes in activity and technology warrant.

9.1.2 New Directions

A new direction in aviation is the tilt-rotor, an aircraft that possesses both the operating characteristics of a helicopter and a fixed-wing airplane. This vertical takeoff and landing (VTOL) aircraft has the potential to relieve congestion in areas of high density aviation traffic, such as the Northeast Corridor between Boston and Washington, D.C. The tilt-rotor can also provide air commuter and cargo operation to places of low population density, where regular air service may be infrequent or non-existent due to limited or non-existent airport facilities. Its vertical takeoff and landing ability can save time and money for passengers by operating *directly* between larger city-center heliports or vertiports. This eliminates the time needed for ground transportation to the airport, which in many urban areas, has become a major part of the short business trip. It is believed that tilt-rotor service could capture up to 61% of the short-haul business traffic in the northeast. The applicability of the tilt-rotor has been investigated in two recent studies, the "VTOL Intercity Feasibility Study", for the Port Authority of New York and New Jersey, and the "Civil Tilt-Rotor Missions and Applications: A Research Study", for the FAA, the National Aeronautics and Space Administration (NASA), and the Department of Defense (DoD).

Implementation of tilt-rotor service is forecast to begin within the high air traffic density areas, initially within a 300 mile radius of New York City. The service would be geared to the average business commuter, not just to the high level executive. It is expected to carry 5 to 8 million passengers annually by the year 2000. At first, service would be between city-centers, with suburban locations added as demand increases. The need for seven vertiports was identified within the New York-New Jersey metropolitan area. Demand for another 13 vertiports in Manhattan, Brooklyn, northern New York suburbs and Boston suburbs was also identified. Vertiports would be operated more along the lines of airports, with more passenger amenities and security requirements, than are normally provided at today's heliports.

Planners should be aware of the future of the tilt-rotor when undertaking heliport system plans. In areas where there is a potential for tilt-rotor service, it is suggested that sponsor of a heliport plan consider the feasibility of tilt-rotor operation within the planning area.

9.2 PUBLIC SUPPORT

As helicopters are used more frequently for urban transportation and the demand for both public and private heliports increases, public support becomes essential in developing and maintaining heliport operations. In the second document of this series "Four Urban Heliport Case Studies" (DOT/FAA/PM-87/32), (DOT/FAA/PP-88/2), the support of local government was discovered to be one of the most important factors in heliport success or failure. Public officials, even though they may have no objection to heliports individually, are servants of the public and must therefore reflect the public tone. Strategies for soliciting public support and involving local officials is a necessary part of any heliport development.

One solution to this challenge is to promote an understanding of the role of the heliport in the community. To do this, the public and the officials must be made aware of the positive role that the heliport plays in the community. Heliport owners, operators and users need to define what the activities of the heliport are, who is using it, and especially how their local community benefits. Most people understand the value of public service uses of heliports such as police, fire, and aero medical transfer. But the value of air taxi operations, corporate/executive transportation, traffic reporting, and the many other important missions supported by the heliport need to be clearly defined. This can be accomplished by establishing the link between the contribution of the heliport and its users to the economic and social well being of the local community.

Public support can more easily be won if the heliport operators and users understand why the public has reservations about helicopter use. It was recently established by an American Helicopter Society survey of those persons and organizations known to have been negative about urban helicopter use, that the primary reason for their concern was the intrusive aspect of helicopter operations. The helicopter brings aviation operations literally right into the neighborhoods. And, unlike any other form of transportation, including the airplane, helicopter movements are not predictable. The general public has no way of knowing where a helicopter will go or what it will do next. The very reason that helicopter use is increasing, because it is the most flexible form of transportation, is also the main reasons why the public is apprehensive about it. It is up to the users to assure the public concerning the capabilities of the helicopter, that it is operating safely and that its missions are important to the overall good of the community.

The helicopter industry has begun to address some of the public sensitive issues through such programs as "Fly Neighborly", which has been successful in alerting helicopter operators to be respectful of noise sensitive areas and other public concerns. The helicopter industry also has a responsibility to develop and promote the benefits of helicopter and heliport use on a regional and national scale. A national program, updated every three years, would serve as background support for any local effort.

Gaining public support may be the most critical aspect of heliport development. New strategies must continually be generated on both a local and a national scale, as the situation demands.

APPENDIX A

OUTLINE OF ELEMENTS FOR TYPICAL HELIPORT SYSTEM PLAN

APPENDIX A

OUTLINE OF ELEMENTS FOR TYPICAL HELIPORT SYSTEM PLAN

The following is a title list for the major sections of a typical heliport system plan. Detailed elements of each section are then further delineated:

- Heliport System Plan Requirements
- Planning Goals
- Data Collection & Inventory
- Description of the Existing System
- Forecast
- Site Selection & System Alternatives
- Recommended System Plan

Detailed section elements:

I. Requirements

A. Planning Area
   1. Specific Geographical Boundaries
   2. Market Area

B. Purpose

C. Other Aviation Planning Documents
   1. National (i.e., NPIAS, etc.)
   2. State
   3. Local

D. Brief History/Development of Helicopter Technology & Operations
   1. Importance to Demand
   2. Standard Categories of Helicopter Missions (primary use)
   3. Capability of Helicopter as Transportation Mode
   4. Intermodal Relationships
   5. Alternative To Ground Transportation

E. Planning Horizons

F. Role of Sponsoring Agency

II. Planning Goals

(SEE SECTION 3.0)

III. Inventory

A. Based Helicopters/Active Helicopters
   1. Registered Helicopters
   2. Helicopters from Survey
   2. Helicopter Type (standardized categories)
   3. Location
   4. IFR Capabilities
   5. Military Helicopters

B. Helicopter Activity (specific and/or market area)
   1. Number of Operations
      a. Total
      b. Missions (primary use)
      c. Helicopter Type/Category
   2. Number of Hours Flown
      a. Total
      b. Missions (primary use)
      c. Helicopter Type/Category
   3. Percent of IFR Operations
   4. Percent of Night Operations
   5. Number of Passengers
   6. Cargo/Amount & Type
   7. Origins & Destinations
   8. Average Waiting Time or Delay

C. Existing Heliport Facilities
   1. Categories
      a. Private or Restricted Use
      b. Public Use
      c. On Airport
   2. Locations
   3. Services Available
      a. Fuel (available grades)
      b. Parking & Tie-Downs
      c. Hangar Storage
      d. Lights
         1) Type
         2) Configuration
         3) Control
      e. NAVAIDS
      f. Communications
      g. Weather Services (including AWOS)
      h. Special VFR
      i. IFR Capabilities
         1) Non-Precision Approach
         2) Precision Approach
      j. Terminal Building
         1) Passenger Waiting Area
         2) Baggage Handling Facilities
         3) Ticket Counter
         4) Pilots Lounge
         5) Flight Planning Facilities

(this section continued on next page)

k. Maintenance
l. Connecting Transportation
  1) Auto Parking
  2) Rental Cars
  3) Taxi Stand
  4) Scheduled Flights (at airports)
m. Touchdown Pad
  1) Size
  2) Number
  3) Surface Composition
n. Number of Operations
  1) Day/Month/Annual
  2) Night
  3) IFR
o. Passengers Enplaned
p. Cargo Amount/Type

D. Socio-Economic Information (non-aviation related data)
 1. Population Characteristics
  a. Employment Strata & Ratios
  b. Per Capita Income/Disposable Income
  c. Growth Trends
  d. Distribution
 2. Land Use & Distribution (local)
  a. Industrial (light & heavy)
  b. Urban
  c. Residential
  d. Agricultural
  e. Rural
 3. Ground Transportation Systems
  a. Roads
  b. Metropolitan Transit Systems

E. Heliport Planning Criteria
 1. FAA Guidelines - "Heliport Design" (FAA AC 150/5390-2)
  a. Approach Departure Routes
   1) Obstructions
   2) Imaginary Surfaces
   3) Prevailing Wind
  b. Conceptual Layout
   1) Ground Level
    a) General Characteristics
    b) Advantages/Disadvantages
   2) Rooftop
    a) General Characteristics
    b) Advantages/Disadvantages
   3) State Standards
   4) Local Standards
 2. Land Use
  a. Local Area Characteristics
   1) Heliport Compatible
   2) Heliport Non-Compatible
  b. Regulatory Compliance
   1) Permitted Use
   2) Variance Required
   3) Prohibited Use

IV. Description of the Existing System

A. Role of Heliports & Airports
   1. Overall Aviation System
   2. Helicopter Operations
   3. Services Available (fuel, maintenance, etc.)

B. Operational Characteristics (inventory summary)
   1. Types of Helicopters
      a. Critical Helicopter
      b. Fleet Mix
   2. Trip Length/Time
   3. Missions (primary use)
   4. IFR
   5. Night

C. Airspace *
   1. Pertinent Airspace Classifications
   2. Helicopter Operation Within Existing System
      a. ATC Requirement
      b. Letters of Agreement

D. Environment *
   1. Noise
      a. Community Perception
      b. Methodology of Measurements
      c. Impact
      d. Mitigation
   2. Safety
      a. Community Perception
      b. Mitigation
   3. Other Relevant Impacts

E. Regulatory Review
   1. Federal
      a. Agencies
      b. Regulations
      c. Guidelines (Advisory Circulars, etc.)
      d. Funding Sources
      e. Development Assistance Sources/Agencies
   2. State Aeronautics Agency
      a. Regulation
      b. Assistance
      c. Guidelines
      d. Funding
   3. Local
      a. Ordinances
         1. Zoning
         2. Noise
         3. Safety
         4. Fire
      b. Building Permits
      c. Attitudes/Political Climate

(this section continued on next page)

* May be necessary to develop as separate section depending on planning area characteristics and/or sponsor requirements.

F. Demand Analysis
1. Specific Origins & Destinations
2. Preferred Heliport Locations (from survey results)
3. Estimated Number of Operations to Preferred Site
4. Latent Demand
5. Profile of Demand Centers
a. Central Business District (CBD)
b. Industrial Parks
c. Employment/Business Activity Centers
d. Suburbs
e. Other

H. Benefits to the Community
1. Direct vs. Indirect
2. Public Service
3. Financial
4. Economic Development Strategy

V. Forecasts

A. Data Sources

B. Planning Horizons

C. Methodologies

D. Based/Active Helicopters (in appropriate geographic area)
1. Number
2. Type
3. Missions (primary use)

E. Operations
1. Total Numbers
a. Average Day
b. Average Month
c. Annual
2. Missions (primary use)
3. IFR
4. Night
5. Passengers

F. Hours Flown
1. Total Number
a. Average Day
b. Peak Month
c. Annual
2. Missions (primary use)
3. IFR
4. Night
5. Passengers

G. Heliport Operations
1. Total Number
a. Average Day
b. Average Month
c. Annual
2. Night Operations
3. IFR Operations
4. Passenger Enplanements

VI. Site Selection Process

A. Origins & Destinations

B. Site Selection Criteria (planning area dependent)
   1. Aeronautical Considerations
   2. Operational Considerations
   3. Environmental Considerations
   4. Comm/Nav/Surveillance (CNS) Coverage
   5. Transportation Interfaces

C. Evaluation Matrices
   1. Identification of All Possible Sites
   2. Final Site Selection

VII. Recommended System Plan

A. Recommended Facilities
   1. Number
   2. Location
   3. Size
      a. Critical Helicopter
      b. Number/Size Touchdown Pad
   4. Facility Category
      a. Public Use Heliport
      b. Private Use Heliport
      c. On Airport Heliport
   5. Services Required
      a. Fuel
         1) Grades
         2) Amounts
      b. Parking & Tie-Downs
      c. Hangar Storage
      d. Lights
         1) Type
         2) Configuration
         3) Control
      e. NAVAIDS
      f. Communications
      g. Weather Services (including AWOS)
      h. Special VFR
      i. IFR Capabilities
         2) Non-Precision
         3) Precision
      j. Terminal Building
         1) Passenger Amenities
         2) Pilots Lounge
         3) Flight Planning Facilities
      k. Maintenance
      l. Connecting Transportation
         1) Auto Parking
         2) Rental Cars
         3) Taxi Stand

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B. System Integration
   1. Integration With [illegible] Transportation [illegible]
      a. Airports
      b. Existing Heliports
      c. Ground Transportation
   2. Airspace Impact
   3. Environmental Impact
   4. Possible Impact of New [illegible]

C. Implementation
   1. Priority of Development
   2. Costs
      a. Construction
      b. [illegible]
   3. [illegible]
   4. [illegible]
   5. [illegible]
      a. [illegible]
      b. State
      c. [illegible]
   6. [illegible]
   7. [illegible]

[illegible]
   1. [illegible]
   2. [illegible]
   3. [illegible]
   4. [illegible]

APPENDIX B

ADDRESSES OF AVAILABLE [illegible]

APPENDIX B

ADDRESSES OF AVAILABLE DATA SOURCES

1. "Aircraft Registration Master File"
   Federal Aviation Administration (FAA)
   P.O. Box 25082
   Oklahoma City, OK 73125

2. "FAA Statistical Master File"
   Aircraft Registration Master File
   P.O. Box 25082
   Oklahoma City, OK 73125

3. "General Aviation Activity and Avionics Survey"
   Aviation Forecast Branch
   800 Independence Avenue, S.W.
   Washington, D.C.
   (202) [illegible]
   or
   Superintendent of Documents
   Government Printing Office
   Washington, D.C. [illegible]
   [illegible]

4. [illegible]
   [illegible]
   [illegible] 14th St., N.W., Suite [illegible]
   [illegible]
   [illegible]

5. [illegible]
   [illegible]
   [illegible] St., N.W., Suite [illegible]
   Washington, D.C. [illegible]
   [illegible]

6. "Helicopter Annual" (Published Annually)
   Helicopter Association International (HAI)
   [illegible] Duke Street
   Alexandria, VA [illegible]
   [illegible]

7. "Helicopter [illegible], Bell Helicopter Forecasting Study",
   Vol. 6, 198[illegible]
   [illegible] Research Associates, Inc., for
   Applied Systems Institute Inc.
   [illegible] Independence Avenue, S.W.
   Washington, D.C. [illegible]
   ([illegible]) 267-[illegible]

8. National Flight Data Center [illegible] AA
Continuous update based on [illegible], Airport Master [illegible]
800 Independence Avenue, S.W.
Washington, D.C.
(202) 2[illegible]7-3[illegible]8[illegible]

9. National Transportation Safety Board (NTSB)
Bureau of Accident Investigation
800 Independence Avenue, S.W.
Washington, D.C. [illegible]

10. National Oceanic [illegible] Atmospheric Administration Sectional and World Aeronautical Charts
or
Jeppesen-Sanderson [illegible] (copyrighted Charts)
(Available at Fixed Base Operations (FBO) at [illegible] air[illegible])

11. National [illegible] Center
Federal Building
[illegible], [illegible] [illegible]

12. "Ceiling Visibility [illegible] Study & [illegible] Factors", June 19[illegible]
National [illegible] Center [illegible] Department of Transportation
Federal Aviation Administration
DOT-FAA-[illegible]

13. Climatic Atlas [illegible] Local Area

14. "A Study of Attrition [illegible] the Domestic General Aviation Fleet"
FAA [illegible]
National Technical Information Service [illegible]
[illegible] Road [illegible]
Springfield, VA [illegible]

15. [illegible], BEA (Bureau of Economic Analysis) Regional [illegible]
Economic Activity In the United States:
Vol. I Methodology, Concepts & State Data
Vol. II Economic Areas
Vol. III Standard Metropolitan Statistical Areas"
U.S. Department of Commerce Bureau of Economic Analysis, July [illegible]

16. "Aerospace Facts & Figures" (Published Annually)
Aerospace Industries Association of America (AIA)
[illegible] "Eye" Street, N.W.
Washington, D.C. 200[illegible]
(202) [illegible]

17. Metropolitan, Regional and State Planning Agencies

18. Local Chambers of Commerce

APPENDIX C

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APPENDIX C

BIBLIOGRAPHY

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2. FAA, Rotorcraft Master Plan, FAA-P-8100.1, AWS-100959, (latest edition).

3. FAA, Planning the State Airport System, Advisory Circular 150/5050-3B

4. FAA, Planning the Metropolitan Airport System, Advisory Circular 150/5070-5.

5. FAA, Airworthiness Standards: Normal Category Rotorcraft, Federal Aviation Regulation Part 27.

6. FAA, Airworthiness Standards: Transport Category Rotorcraft, Federal Aviation Regulation Part 29.

7. FAA, Part 73 - Special Use Airspace, Federal Aviation Regulation Part 73.

8. FAA, Objects Affecting Navigable Airspace, Federal Aviation Regulation Part 77.

9. FAA, General Operating and Flight Rules, Federal Aviation Regulation Part 91.

10. FAA, Air Taxi Operators and Commercial Operators of Small Aircraft, Federal Aviation Regulation Part 135.

11. FAA, Certification and Operations: Land Airports Serving Certain Air Carriers, Federal Aviation Regulation Part 139.

12. FAA, United States Standard for Terminal Instrument Procedures (TERPS), FAA Order 8260.3B, 1976, (latest edition).

13. FAA, Policies and Procedures for Considering Environmental Impacts, Order 1050.1D, (latest edition).

14. FAA Order 5050.4A, Airport Environmental Handbook.

15. FAA, Heliport Design, AC 150/5390-2, 1988.

16. FAA, Utility Airports - Air Access to National Transportation, Advisory Circular 150/5300-4B.

[illegible]. FAA, Airport Design Standards - Transport Airports, Advisory Circular 150/5300-1[illegible], (latest edition).

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2[illegible]. Introduction to the Airport Improvement Program, FAA Office of Airport Planning and Programming, (latest edition).

[illegible]. Air Quality Procedures for Civilian Airports and Air Force Bases, FAA Report FAA-[illegible], (latest edition).

2[illegible]. National Fire Protection Agency (NFPA) [illegible]; Aircraft Rescue and Fire Fighting Services at Airports, (latest edition).

[illegible]. National Fire Protection Agency [illegible]; [illegible] Heliport Construction and Protection, (latest edition).

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[illegible]. [illegible] Heliport Case Study, [illegible], [illegible] March [illegible].

[illegible]. Heliport System Planning Guidelines, [illegible], DOT FAA [illegible], April 198[illegible].

[illegible] [illegible] OPERATIONAL CHARACTERISTICS [illegible]

1. FAA, Basic Helicopter Handbook, 19[illegible], AC61-13B.

[illegible]. [illegible] Cunningham, Understanding Helicopters, Business and Commercial Aviation, May 198[illegible], pp. [illegible]-7[illegible].

3. Up Over and Below, AIA Brochure, Aerospace Industries Association, January 1973.

[illegible]. Steve Wartenberg, Solving the Vertical Flight Puzzle: The Early History of the Helicopter, Vertical Flight, edited by Walter [illegible] & Donald S. Lopez, Smithsonian Institution Press, Washington, D.C., 198[illegible].

[illegible]. Fly Neighborly Guide, HAI, Heliports and Airways Committee, [illegible], (latest edition).

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3. Planning for Rotorcraft and Commuter Aviation, NASA [illegible] Research Center Draft Report, July 1981.

4. Wiley, John R., Airport Administration, [illegible] Transportation, 1981.

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6. General Aviation Pilot and Aircraft Activity Survey, Report No. FAA-MS-83-1, Federal Aviation Administration, December 1983.

7. Helicopter Facts, produced by the Appalachian Helicopter Pilots Assoc. and the Ohio Helicopter Pilots Assoc., 198[illegible].

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[illegible]

[illegible]

[illegible]

[illegible]

APPENDIX [illegible]

S[illegible]

This appendix contains the recommended question[illegible] operator survey by the sponsoring agency/party. Questions were constructed around those data that can only be acquired through direct survey techniques.

Use of this questionnaire will assure consistency in the data obtained. It will also insure that all the key parameters which collectively yield an industry profile are solicited.

Information Categories

The questions in the [illegible] which, when put together, will assist in the determination [illegible] heliport. These categories [illegible]

Helicopter Census Data: [illegible] helicopters [illegible]

Heliport Data: [illegible]

Mission [illegible]: [illegible]

Operations: [illegible]

[illegible] Weather, [illegible]

Facilities/Services: Facility requirements [illegible], [illegible], passenger terminals, hangars, etc. vary from region to region. It is therefore, necessary to determine the minimum acceptable facility(ies) an operator would use if a public use heliport were established. The data obtained will assist in establishing a variety of design and operational requirements that affect the ultimate layout and cost of the facility.

Airport Operations: An analysis of the nature of airport operations is necessary to determine the helicopters' dependence on the airport, whether strictly for base operations and services or for carriage of passengers. These data establish the role of the airport in the metropolitan helicopter transportation infrastructure.

Industrial Base: Identifying the types of industries in the area employing helicopter services will provide some of the economic indicators that can be used as independent variables in forecasting growth.

Competing Transportation Modes: The nature of the relationship of the heliport to competing transportation modes adds to the economic impact of the facility when combined with the passenger load factors and activity at a particular site.

Response Format

The format of the survey requires primarily a "check the box" or "yes/no" response from the operator. On occasion, a question will request a calculation or qualitative answer that will be analyzed along with the balance of the data received. This reduces inaccuracies caused by errors from memory recall, incomplete knowledge or calculations that degrade the survey results.

DETERMINING THE STUDY AREA

The study area should be agreed upon by the planning agency at the time the preliminary objectives of the study are established, as well as the service area determined by the helicopter operational characteristics, the geographic locations, and the social structure. The aviation planning documents from other studies in the region assist in providing the definition of the geographic boundaries and also provide detailed descriptions of the aviation infrastructure and flying environment of the study area. Aircraft and airport data are summarized and forecast for several planning horizons. Although historically helicopters have not been specifically addressed in these plans, some agencies are now updating the forecasts and focusing on the needs of the helicopter industry.

DISTRIBUTION

Mailing:

After determining the geographical area [illegible] the sponsoring agency/party must determine to whom [illegible] should be circulated. The most accessible source [illegible] will be the owners and operators of the helicopters. [illegible] frequently serve a separate role. Owners may not actually [illegible] vehicle but contract their use and maintenance to commercial operators, corporations or government agencies. [illegible] reveal little more than the base of operations. Their response would be conjectural and inappropriate for statistical use. [illegible] will be able to define each operation and provide [illegible] requirements as they relate to heliports.

Lists of owners and operators [illegible]. Unfortunately, due to the historical nature [illegible] errors in the available data [illegible] information. The Table D-1 [illegible] are available in Appendix D).

[illegible]

[illegible]	[illegible]	[illegible]
Helicopter Association [illegible]	[illegible] operations, [illegible]	[illegible]
National Association of State Aviation Officials	[illegible]	[illegible]
[illegible] Aviation [illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible] Industrial [illegible]	[illegible]	[illegible]

[illegible] list must [illegible]. Therefore, [illegible] for reference [illegible].

The survey should be addressed [illegible] operations manager personally if the name is available, or else to the title. This increases the probability that the questionnaire will be placed in the hands of an individual directly involved [illegible] rail operations.

RESPONSE TIME

A cover letter should be used to introduce the questionnaire [illegible] purpose, the agency or party conducting the survey, and the time allowed to answer the questions and return the form. The letter should be [illegible] and stipulate a date by which the response should be mailed in order to be included in the tabulation and analyses of data. If funds allow, a self-addressed return envelope should be included with the questionnaire.

Sufficient time should also be allowed between the response deadline and the time that the data transcription and tabulation process is scheduled to end. Seven to fourteen days from the deadline should be allowed for receiving responses that are to be included in the [illegible].

AD-A199 081 HELIPORT SYSTEM PLANNING GUIDELINES(U) SYSTEMS CONTROL TECHNOLOGY INC ARLINGTON VA D PEISEN APR 88 5542-6A4 DOT/FAA/PM-87/33 DTFA01-87-C-00014 2/2

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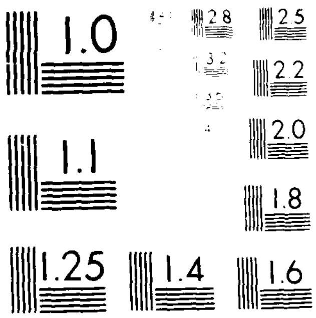
1.0
2.8
2.5
3.2
2.2
3.6
2.0
1.1
1.8
1.25
1.4
1.6

SAMPLE HELICOPTER OPERATOR SURVEY QUESTIONNAIRE

Dear Owner/Operator:

This questionnaire is designed to provide the information necessary to analyze helicopter activity. Your response will help in determining whether there is a need for a public use heliport(s) within your area and if so, the location(s). The data collected from this survey will be kept confidential. The results will be released only in aggregate form to ensure anonymity. A self-addressed return envelope has been provided for your convenience. Your cooperation is greatly appreciated.

NAME: ____________________ TITLE: ____________________

ADDRESS: ____________________ COMPANY: ____________________

CITY/STATE: ____________________ TELEPHONE: ____________________

Which of the following applies to you?

Helicopter Owner ______ Both Owner/Operator ______

Helicopter Operator ______

If you do not operate the helicopter, do you lease the helicopter(s) to:

Commercial Operator ______

Government Agency ______

Hospital ______

Corporation ______

Where is your helicopter(s) based? ____________________

NOTE: If you do not own/operate helicopter(s), do not complete the questionnaire, but please fill-in your name and company and return it to us in the envelope provided.

A. HELICOPTER CENSUS DATA

1. Please indicate below the number of helicopters you own or operate under the categories listed:

SEP (single engine piston); SET (single engine turbine); MET (multi-engine turbine)

	SEP	SET	MET	Number IFR Equipped
1-3 PASSENGERS	______	______	______	______
4-6 PASSENGERS	______	______	______	______
7-12 PASSENGERS	______	______	______	______
More than 12	______	______	______	______

B. HELIPORT DATA

2. Where is your current base of operations located?

Airport _____ Public Heliport _____
Private Heliport _____ Other (describe) _____

3. How close (in statute miles) from the nearest airport is your base of operations located?

Miles _____ Airport ______________________________

4. How close (in statue miles) is your base located from the closest city center (e.g., 5sm - Frederick, MD)?

Miles _____ Airport ______________________________

5. What are the three (3) destinations (in order of frequency) to which you most frequently fly (example, 6 miles to Lewisville City Center) and the number of trips flown per month?

	Distance (SM)	Name of City Center	Number of Trips per Month 1-5	6-10	11-20	21+ (please state)
a.	__________	__________	___	___	___	___
b.	__________	__________	___	___	___	___
c.	__________	__________	___	___	___	___

6. List in order of preference three (3) areas where you feel a public use heliport should be situated (example, 6 miles to Ft. Worth city center) and the number of times you would land there each month.

	Distance (SM)	Name of City Center	Number of Trips per Month 1-5	6-10	11-20	41+ (please state)
a.	__________	__________	___	___	___	___
b.	__________	__________	___	___	___	___
c.	__________	__________	___	___	___	___

7. Please list up to three (3) sites where you have been requested to fly and indicate the number of requests for each within the past year.

	Site	Distance from City Center	City Name	Number of Trips Requested per/Yr
a.				
b.				
c.				

C. MISSION COMPOSITION

8. How many of your helicopters are involved in each of the mission types?

	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV-Rad	Gov't	Off-shore	Ex-plor	EMS
[illegible]												
[illegible]												
[illegible]												

9. What is the average number of hours flown per month per helicopter by mission?

[illegible]	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV-Rad	Gov't	Off-shore	Ex-plor	EMS
[illegible]												
[illegible]												
[illegible]												
[illegible]												
[illegible]												

10. What is the average number of operations per month, per helicopter, by mission?

Hrs/ Mo	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV- Rad	Gov't	Off- shore	Ex- plor	EMS
0-15												
16-25												
[illegible]												
[illegible]												
[illegible]												

11. If a public use heliport were built, would you expect an increase in monthly usage for any of the following missions. Indicate the monthly flying hour increase for each mission.

Hrs Mo	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV- Rad	Gov't	Off- shore	Ex- plor	EMS
[illegible]												
1-5												
6-10												
11-20												
21-40												
41+												

D. OPERATIONS

12. What is your average stage length by mission? (Please check under appropriate category.)

Statute Miles	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV- Rad	Gov't	Off- shore	Ex- plor	EMS
0-30												
31-60												
61-100												
101-150												
151-250												
251+												

13. What is your average trip time by mission? (Place check under appropriate category.)

Hours/ Minutes	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV-Rad	Gov't	Off-shore	Ex-plor	EMS
0-00:30												
:31-:45												
:46-1:00												
1:01-1:30												
1:31-2:00												
2:01+												

14. What is the average number of hours flown per month, per helicopter, for ALL missions? (Check appropriate category.)

Hours	0-20	21-40	41-75	76-100	100+
SEP					
SET					
MET					

15. Please indicate the percentage of operations conducted at each time of day for your mission(s).

Time	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV-Rad	Gov't	Off-shore	Ex-plor	EMS
0600-0900												
0901-1200												
1201-1400												
1401-1700												
1701-1900												
1901-2200												
2201-0600												

16. How much time do you require for parking at a transient base?

Hours:	None	1	2	3	4	5+	Overnight

17. What percent of your total annual flight time is conducted under IFR (Instrument Flight Rules)?

Percentage:	None	1-3	4-6	7-9	10-12	13-15	16+
	___	___	___	___	___	___	___

18. What percent of your annual hours are cancelled or aborted due to IFR conditions?

Percentage:	None	1-3	4-6	7-9	10-12	13-15	16+
	___	___	___	___	___	___	___

19. What is you maximum radius of operations for all missions?

Statute Miles

0-30	31-60	61-100	101-150	151-250	251+
___	___	___	___	___	___

20. What is the average number of passengers carried for the following missions and helicopter categories?

	Air Taxi	Corp Exec	Pub Svc	Sched Cmutr	Bnk/ Crgo	Util	Pilot Train	TV-Rad	Gov't	Off-shore	[illegible]	[illegible]
SEP												
SET												
MET												

21. What percent of your total annual flying hours are flown at night?

Percentage

None	1-3	4-6	7-9	10-12	13-15	16+	(Please Specify)
___	___	___	___	___	___	___	___

22. What lighting is available at the site where you conduct most of your night operations (check one or more)? Please check minimum lighting do you feel is necessary for conducting safe night landings.

	Available	Minimum
Peripheral Lighting	___	___
Key-by-Mike	___	___
Flood Lights	___	___
Rotating Beacon	___	___
Lighted Wind Indicator	___	___
Taxi Lights	___	___

Other (specify) ______________________________

E. WEATHER/NAVAIDS

23. Would you prefer an on site automated weather observation system or area remote weather observations (within 5sm) adequate for non-precision approaches? (please check one)

AWOS ______ Remote Weather Adequate ______

24. Number in order of preference which NAVAID would you prefer to use for the following flight regimes?

	VOR	DME	LORAN	MLS	NDB	
Enroute Navigation to Site: (1-5 1= highest preference)	___	___	___	___	___	

	VASI	ILS	MLS	VOR	DME	NDB
Approach Guidance: (1-6 1= highest preference)	___	___	___	___	___	___

F. FACILITIES/SERVICES

25. Please check the services available at the site where you conduct most of your operations, and indicate if that site is an airport or a heliport. Also please check the minimum acceptable facilities you would use on a regular basis at a public use heliport (one or more)?

	Airport / Heliport	Available	Minimum
Covered Waiting Area	___	___	___
Refueling	___	___	___
Low Lead	___	___	___
Jet	___	___	___
Terminal Building	___	___	___
Pilot lounge	___	___	___
Passenger waiting area	___	___	___
Parking	___	___	___
Power in/out	___	___	___
Tow in/out	___	___	___
Hangar storage	___	___	___
Overnight	___	___	___
Maintenance Hangar	___	___	___
Major	___	___	___
Minor	___	___	___
On/Off Loading	___	___	___
Ramp Area	___	___	___
Cargo Baggage	___	___	___
Handling Facilities	___	___	___

26. Please indicate the nature and range of costs you generally pay for each of the following services or fees.

Landing fee	____	Parking	
		Hourly	____
Monthly Storage		Overnight	
Outdoor	____	Transient	____
Hangar	____		

27. If a public use heliport were constructed would you:

	Yes	No
a. Move your base of operations to the new facility	____	____
b. Close any of your private heliports	____	____
c. Establish new private heliport(s)	____	____

G. AIRPORT OPERATIONS

28. In order of necessity, (1-5), what are the basic reasons why you conduct operations at an airport?

Only Legal Place to Land	____	Base of Operations	____
Fuel	____	Maintenance	____
Passenger Pick-up/Drop off	____		

29. What is the average number of landings you make per month per helicopter at airports?

Frequency of Landings:	0-20	21-40	41-60	61-80	80+
	____	____	____	____	____

30. What is the average number of passengers per flight which are dropped off or picked up at the airport?

Number of Passengers

0	1-2	3-4	5-6	7-8	9-10	11-12	13+
____	____	____	____	____	____	____	____

31. What percent of these passengers are making connections to other aviation modes? (please check appropriate number)

	0-10	11-20	21-40	41-60	61-80	81-100
Airline Connections	____	____	____	____	____	____
General Aviation Organization	____	____	____	____	____	____
Other	____	____	____	____	____	____

H. INDUSTRIAL BASE

32. In what type of business are you, your employer, or primary customer engaged?

	Employer	Customer
High Technology	______	______
Manufacturing	______	______
Commercial Property Development	______	______
Real Estate	______	______
Auto/Retail Sales	______	______
Banking/Securities	______	______
Insurance	______	______
Construction	______	______
Mineral Exploration	______	______
Logging	______	______
Recreation	______	______
EMS	______	______

I. TRANSPORTATION MODES

33. If there were a city center heliport, what alternate forms of transportation would your passengers require once they were discharged?

Taxi	______	Limousine	______
Courtesy car	______	Bus	______
Rental car	______	Mass transit	______

ACRONYMS

AIP - Airport Improvement Program
DME - Distance Measuring Equipment
FAA - Federal Aviation Administration
GS - Glide Slope
IFR - Instrument Flight Rules
ILS - Instrument Landing System
IMC - Instrument Meteorological Conditions
Loran - Long Range Aid to Navigation
MEP - Multi-Engine Piston
MET - Multi-Engine Turbine
MLS - Microwave Landing System
NDB - Non-Directional Beacon
NPIAS - National Program of Integrated Airport Systems
RMP - Rotorcraft Master Plan
SEP - Single-Engine Piston
SET - Single-Engine Turbine
VASI - Visual Approach Slope Indicator
VFR - Visual Flight Rules
VMC - Visual Meteorological Conditions
VOR - Very High Frequency Omnidirectional Radio Range

APPENDIX [illegible]

REGIONAL HELIPORT DEVELOPMENT COORDINATORS

APPENDIX E

[illegible] HELIPORT DEVELOPMENT COORDINATORS

[illegible] designated Regional Heliport Development Coordinators [illegible] service [illegible] mission responsibilities [illegible] the helicopter [illegible] development. Coordinators are listed below.

[illegible] NEW ENGLAND [illegible]
Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut
Coordinator - [illegible] Harris [illegible]
[illegible] New England Executive Park
[illegible]

[illegible]
[illegible], New [illegible], [illegible], Delaware, [illegible], [illegible],
[illegible], West [illegible]
[illegible]

[illegible]
[illegible]

[illegible]
[illegible], Minnesota, [illegible]
[illegible]

[illegible]
[illegible], Texas, [illegible], New Mexico, Louisiana
Coordinator - [illegible] (817) [illegible]
[illegible]
[illegible], TX [illegible]

FAA NORTHWEST MOUNTAIN REGION
(Washington, Oregon, Idaho, Colorado, Wyoming, Utah)
Coordinator - Cecil Wagner (ANM-10) (206) 431-2611
17900 Pacific Highway South
C-68966
Seattle, WA 98168

FAA CENTRAL REGION
(Kansas, Missouri, Iowa, Nebraska)
Coordinator - Roland Elder (ACE-611) (816) 426-6921
601 East 12th Street
Kansas City, MO 64106

FAA WESTERN PACIFIC REGION
(California, Arizona, Nevada, Hawaii, Trust Territory of the Pacific Islands, American Samoa, Guam, and Commonwealth of Northern Marianas Islands)
Coordinator - Thomas A. Conley (AWP-11.3) (213) 297-1621
15000 Aviation Boulevard
Lawndale, CA 90261

FAA ALASKAN REGION
(Alaska)
Coordinator - Floyd Pattison (ALL-610) (907) 271-5440
701 C Street, Box 14
Anchorage, AL 99513 ADDRESS
TELEPHONE NUMBER

APPENDIX F

HELIPORT SYSTEM PLANS

APPENDIX F

HELIPORT SYSTEM PLANS

The following list attempts to present all heliport system plans, master plans, and site selection plans, completed or in progress, in the United States. However, it may not be complete. The list was derived from input by the FAA Regional Offices and through professional contacts, since not every plan is federally funded. Heliport plans that are funded locally may not be widely known. Completion status is presented as "best information available". For organizational purposes, data are presented by FAA Region.

Location	Status
WESTERN PACIFIC REGION	
Southern California Association of Governments (SCAG)	Completed
San Diego Association of Governments (SANDAG)	Completed
Santa Clara County, California	Completed
Phoenix, Arizona	Completed
Maricopa County Association of Governments (MAG)	In Progress
Tempe, Arizona	In Progress
Mesa, Arizona	Completed
Tolleson, Arizona	Completed
Chandler, Arizona	In Progress
Glendale, Arizona	In Progress
Hawaii (statewide)	In Progress
CENTRAL REGION	
St. Louis, Missouri	In Progress
Kansas (Mid-America Regional Council)	In Progress
Kansas City	In Progress
NEW ENGLAND REGION	
Massachusetts (statewide)	In Progress
Boston, Massachusetts	In Progress
Connecticut (statewide) *	In Progress
SOUTHERN REGION	
Florida (statewide) *	Completed
Dade County, Florida	Completed
Fort Lauderdale, Florida	In Progress

* Indicates that the heliport plan was part of an overall aviation system plan.

EASTERN REGION

Upstate New York. . . . . In Progress
Downstate New York. . . . . In Progress
East 34th Street, New York City . . . . In Progress
Flushing, New York. . . . . In Progress
New Jersey (statewide). . . . . In Progress
Camden, New Jersey. . . . . In Progress
Trenton, New Jersey . . . . In Progress
Pennsylvania (statewide). . . . . In Progress
Philadelphia, Pennsylvania. In Progress
Pittsburgh, Pennsylvania. . . . . In Progress
Southwestern Penn. Regional Planning Commission (SPRPC) . . . Completed
Harrisburg, Pennsylvania. . . . . In Progress
Delaware Valley Regional Planning Commission (DVRPC). . . . . Completed
Wilmington, Delaware. . . . . In Progress
West Virginia (statewide) . . . . In Progress
Baltimore, Maryland . . . . In Progress
Washington D.C. . . . . Completed

SOUTHWESTERN REGION

Louisiana (statewide) . . . . Completed
Dallas/Ft. Worth (North Texas Council of Governments) . . . . Completed
Houston, Texas. . . . . Completed
Garland, Texas. . . . . Completed
Oklahoma City, (site study only). . . . . In Progress

GREAT LAKES REGION

Illinois (statewide) *. . . . . In Progress
Minnesota (statewide) * . . . . In Progress
Minneapolis/St. Paul. . . . . In Progress
Wisconsin (statewide) * . . . . Completed
Ohio (statewide) *. . . . . Completed
Columbus, Ohio. . . . . Completed
Michigan (statewide). . . . . Completed
Grand Rapids, Michigan. . . . . In Progress

NORTHWEST MOUNTAIN REGION

Washington (statewide). . . . . In Progress
Oregon (statewide). . . . . In Progress
Denver, Colorado (regional) . . . . Completed
Salt Lake City, Utah (regional) . . . . In Progress

* Indicates that the heliport plan was part of an overall aviation system plan.