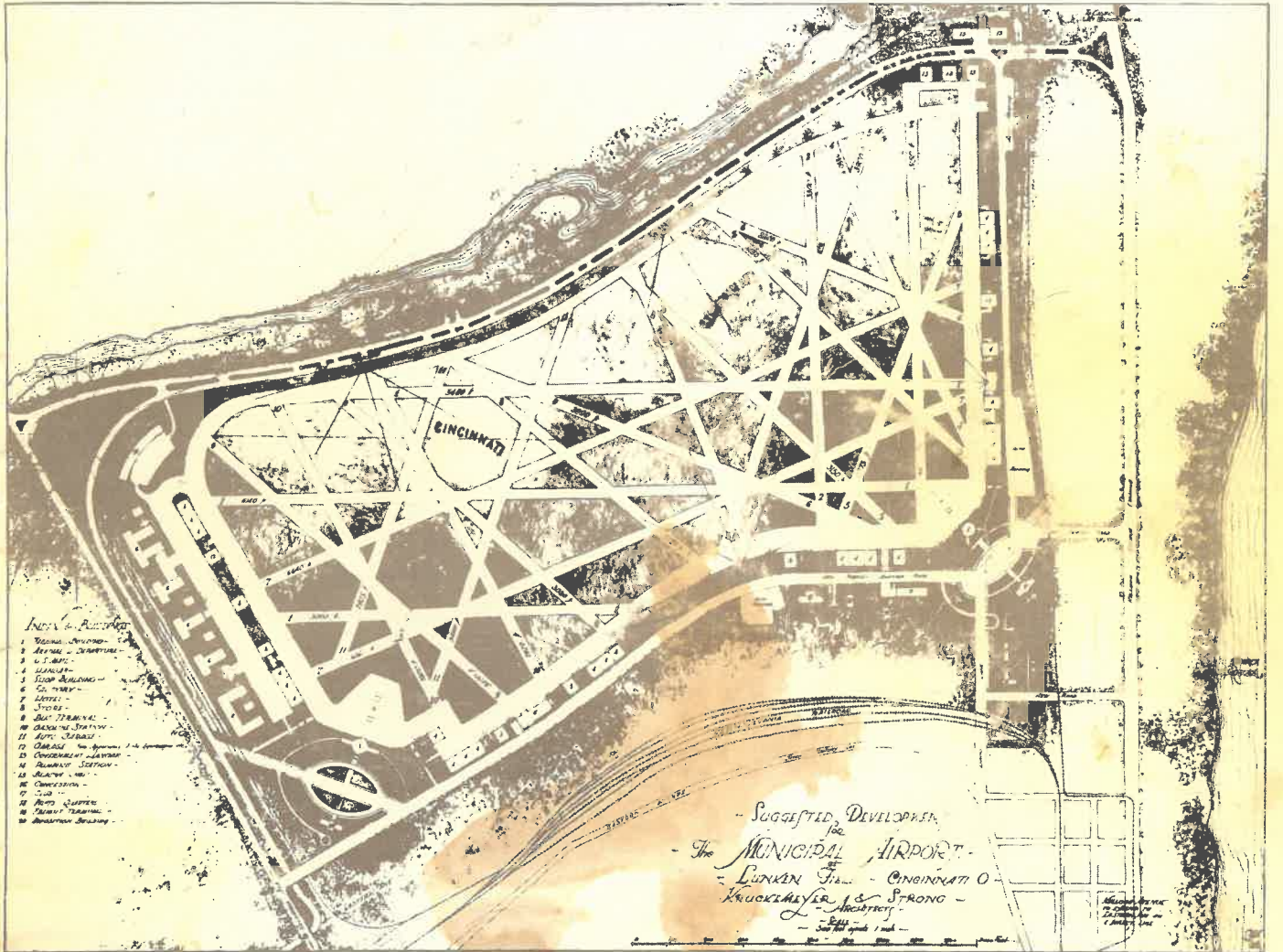


AIRPORT MASTER

PLAN STUDY

TECHNICAL REPORT



CINCINNATI - MUNICIPAL - AIRPORT LUNKEN - FIELD



City of Cincinnati, Ohio
Department of Public Utilities
Division of General Aviation

CINCINNATI MUNICIPAL AIRPORT
LUNKEN FIELD

MASTER PLAN UPDATE

Technical Report
March 1989

Aviation Planning Associates, Inc.
in association with
Wilson & Associates, Inc.
Airport Corporation of America

The preparation of this document was financed in part through a planning grant from the Federal Aviation Administration (FAA) as approved under the Airport and Airway Improvement Act of 1982. The contents of this report do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein, nor does it indicate that the proposed development is environmentally acceptable in accordance with applicable public laws.

On the Cover

Inspired by the 1927 solo Transatlantic flight by Charles Lindbergh, the Lehigh Portland Cement Company of Allentown, Pennsylvania, announced the world's first architectural competition for the design of "modern airports." When published in 1930, the award-winning designs received worldwide acclaim and seemed to promise fulfillment of Lindbergh's prophecy: "Large and well-equipped airports will place the United States at the top in aeronautical activity." The cover illustration is a rendering of the future airport design of Lunken Field as submitted to the Lehigh competition by Cincinnati architects Kruckemeyer & Strong.

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Overview

OVERVIEW

The Federal Aviation Administration (FAA) developed the airport master planning process to assist the nation's airports in the development of expansion plans to meet future aviation demands. The Master Plan Update for Cincinnati Municipal Airport-Lunken Field, initiated in May 1986 and completed in May 1988 (with FAA acceptance in February 1989), serves as a development guide for Lunken Field's short- (five to 10 years) and long-term (20 years) facility needs. The short-, intermediate-, and long-range time frames upon which this study is based provide a framework to ensure that the corporate and general aviation needs of the metropolitan Cincinnati area are identified and met well into the future.

1. GOALS AND OBJECTIVES

The overall objective of the master planning process is to provide general facility development guidelines that will satisfy aviation demand while remaining compatible with the environment, community development, and other modes of transportation. Specific objectives of the Lunken Field Master Plan Update are as follows:

- . Prepare a 20-year plan that is technically correct, environmentally acceptable, financially sound, and implementable.
- . Develop feasible airfield expansion alternatives that will better utilize airfield and landside facilities.
- . Coordinate the study with the ongoing Blue Ash Airport replacement project and the proposed runway development at Greater Cincinnati International Airport.
- . Establish a process that allows ample opportunity for public participation.

2. PRIOR PLANNING RECOMMENDATIONS

The Master Plan Update included a review of city, federal, state, and regional aviation plans and programs affecting Lunken Field. Relevant data were drawn from the following key documents:

- . Lunken Airport Master Plan, 1977
- . Greater Cincinnati Metropolitan Aviation System Plan, February 1978
- . Greater Cincinnati International Airport Master Plan, May 1984
- . OKI Regional Transportation Plan, August 1981
- . Ohio Aviation System Plan, 1975
- . North Cincinnati Airport Site Selection Study, August 1986

Physical plans depicting utilities, residential areas, highways, schools, hospitals, recreation areas, waterways, airspace obstructions, and other related plans were also reviewed.

3. SCOPE OF THE STUDY

The Master Plan Update was tailored to address the specific needs of Lunken Field. It also adheres to guidelines established by the Federal Aviation Administration. Important FAA master planning objectives incorporated within the study include:

- . Provide an effective graphic presentation of the existing and recommended ultimate development of the Airport and anticipated land uses on and adjacent to the Airport.
- . Assess the feasibility of the recommended development action by including a prioritized and phased schedule of recommended improvements.

- . Provide a concise and descriptive report which can be clearly understood by the community and agencies charged with approving, promoting, and funding the Airport improvement program.

To meet these objectives, while at the same time addressing the specific needs of Lunken Field, the study incorporated the following tasks:

- . An inventory of the Airport's existing facilities and services
- . Development of 20-year aviation demand projections
- . Analysis comparing projected aviation demand to the Airport's capacity and identification of facilities required to meet the demand
- . Identification and evaluation of development alternatives
- . Review of the potential environmental impacts associated with Airport development
- . Graphic depiction of recommended Airport development on an Airport Layout Plan
- . Evaluation of the economic feasibility and financing of the Airport development plan

4. STUDY COORDINATION

Master Plan Update analyses and findings were coordinated closely throughout the study with the Lunken Field Airport Users Committee, a group comprised of corporate and general aviation users and full- and limited-service fixed based operators (FBOs) at the Airport. The Technical Report incorporates comments and recommendations resulting from the committee members' technical review of study documentation.

5. STUDY DOCUMENTATION

The Master Plan Update is documented in this Technical Report and a Summary Report. The Technical Report is organized as follows:

- . Overview
- . Chapter I - Inventory of Existing Facilities
- . Chapter II - Aviation Demand Projections
- . Chapter III - Demand/Capacity and Facility Requirements
- . Chapter IV - Identification and Evaluation of Alternatives
- . Chapter V - Environmental Review
- . Chapter VI - Airport Plans
- . Chapter VII - Economic Feasibility and Financial Plans

The Summary Report provides a narrative overview of study findings and presents the staged airport development plan in graphic form.

I.

**Inventory of
Existing Facilities**

I. INVENTORY OF EXISTING FACILITIES

The initial step in the Master Plan Update process, as outlined in FAA Advisory Circular 150/5070-6A, "Airport Master Plans," was the collection of data pertinent to Lunken Field and the area it serves. The objective of this task was to provide background information required for subsequent phases of analysis.

The inventory covered a broad spectrum of information, including airside and landside facilities and their uses; surface transportation data; surrounding land uses; air traffic activity data; laws and ordinances; weather data; airspace structure; navigational aids; and socioeconomic factors. A large volume of data was collected and reviewed during the inventory effort. These data are introduced or summarized here and further described in the appropriate chapters of this report. For example, socioeconomic and demographic data are presented in Chapter II, Aviation Demand Projections. Similarly, the Airport's financial history is outlined in Chapter VII, Economic Feasibility and Financial Plans.

Data were gathered through field interviews, telephone calls, and analysis of existing reports and studies. The remainder of this chapter summarizes the inventory data:

- . General Airport Description and Location
- . Airport Facilities
- . Airspace
- . Meteorological Data
- . Ground Access
- . Airport Operations Summary
- . Fuel Summary
- . Socioeconomic Data

1. GENERAL AIRPORT DESCRIPTION AND LOCATION

This section contains a brief summary of inventory data to provide a general description of the Airport and the area it serves.

(1) History

In 1928, Mr. Edmund H. Lunken, a Cincinnati industrialist, purchased 204 acres of land which he donated to the City of Cincinnati under a perpetual lease agreement for construction of a municipal airport. The City supplemented this gift with an additional 800 acres and constructed Lunken Field four and one-half miles east of downtown Cincinnati.

Since it began operation in 1929, Lunken has served virtually every segment of aviation. It was the original home of American Airlines and until the flood of 1937 was the site of the Aeronca manufacturing plant. 1947 was a turning point in the Airport's history, as its role shifted from that of an air carrier facility to a general aviation facility.

On May 21 and 22, 1938, Lunken Terminal was dedicated to serve American and Marquette Airlines. The terminal was designed by Cincinnati architects Kruckemeyer and Strong, and completed as a joint Works Progress Administration (WPA) and City project at a cost of \$172,452. At the time of dedication there were only three City hangars on the field, one aeronautical factory, two U. S. Army hangars, and one U. S. Army administration building with three dwellings. In addition to the two commercial carriers, two local operators used the field and hangars under lease.

In 1947, scheduled airline service was transferred to Greater Cincinnati Airport. This marked the beginning of Lunken's current role as a general aviation reliever airport. Lunken quickly became a nationally recognized general aviation airport because of its excellent facilities and proximity to the downtown Cincinnati business district.

(2) Services

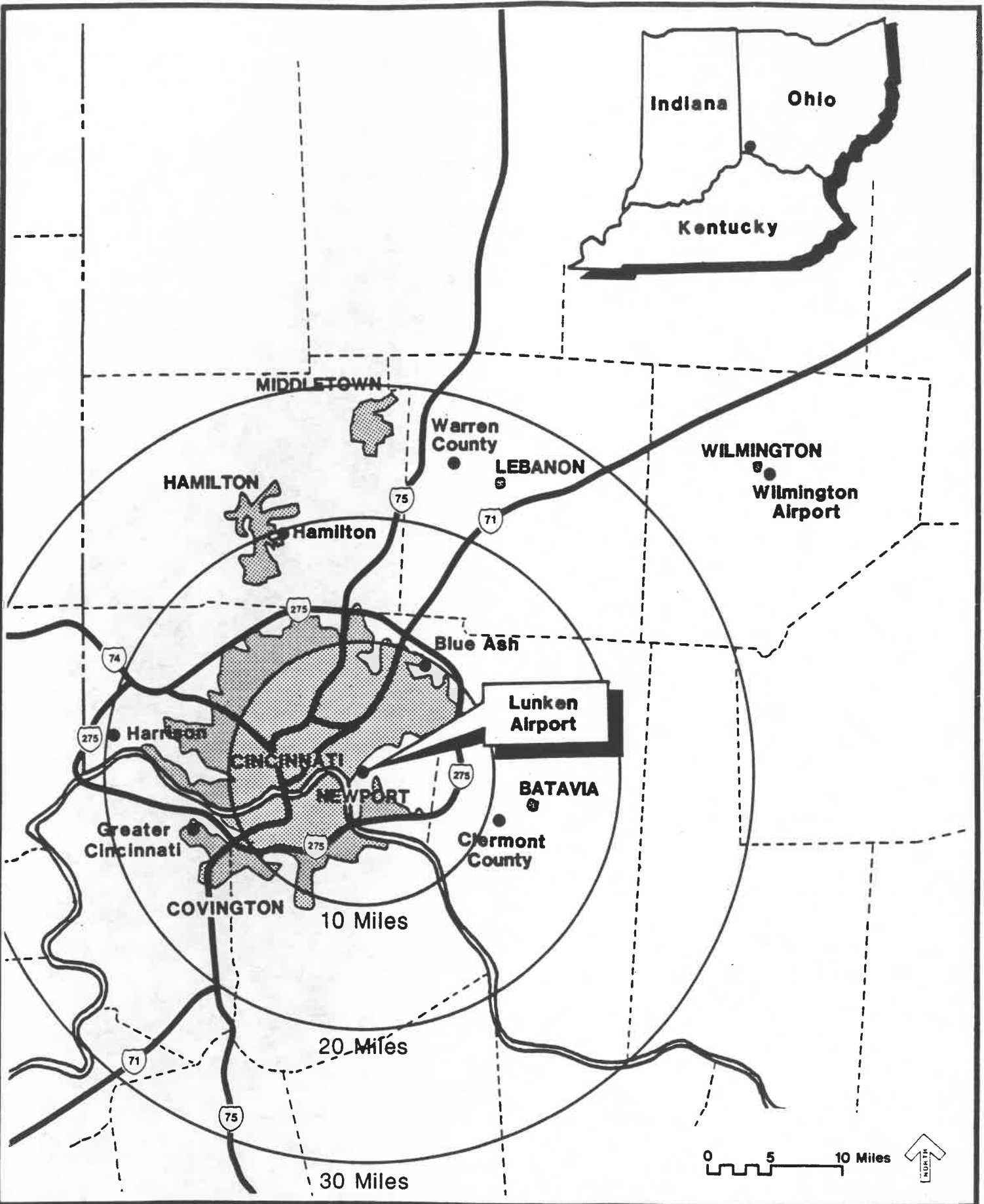
The following services are provided at Lunken Field:

- . Aircraft storage (conventional and T-hangar)
- . Aircraft tie-down
- . Fuel and oil sales
- . Airframe, powerplant, and avionics maintenance and repair
- . Air charter service
- . Aircraft rental
- . Aircraft sales
- . Flight instruction

In addition, Lunken Field is the base for several large corporate flight departments and a total of 241 general aviation aircraft, ranging from small single-engine piston aircraft to large multiengine business jets.

(3) Location

As shown in Exhibit I-1, the Airport is located roughly four and one-half miles east of the downtown Cincinnati Central Business District (CBD), within southern Hamilton County, Ohio.



Lunken Field
Airport Master Plan

AIRPORT VICINITY

EXHIBIT
I-1

Within 20 nautical miles of the Airport, there are five public-use airports (Blue Ash, Greater Cincinnati International, Hamilton-Fairfield, Clermont County, and Harrison) and several private airfields. A more detailed description of these surrounding facilities is included in the airspace analysis section of this chapter. Additionally, Blue Ash Airport is currently being studied for possible relocation within the region. The potential effects of this relocation are also discussed in later sections of this report.

(4) Airport Role

With two parallel 2/20 runways and one 6/24 crosswind runway, the Airport serves exclusively general aviation aircraft. Generally, the larger corporate aircraft utilize Runway 2R/20L, while the smaller aircraft operate on all three runways.

Although the number of annual operations at Lunken Field has grown over the past three consecutive years, 1985 activity levels were only 95 percent of the 1980 level and 74 percent of the 1977 peak of 225,574 operations. This pattern closely follows the decline of general aviation activity experienced across the country due primarily to the high costs of fuel and liability insurance to the general aviation community.

2. AIRPORT FACILITIES

Facilities data were collected through physical inspection of the Airport, discussions with Airport staff, aerial photography, field interviews with area planners and Airport tenants, and a review of Airport drawings and related studies. A

review of the facilities data is presented under the following headings:

- . Airfield Facilities
- . Landside Facilities
 - Primary Tenants
 - Fixed Base Operators
 - Terminal Building
 - Maintenance and Crash, Fire and Rescue

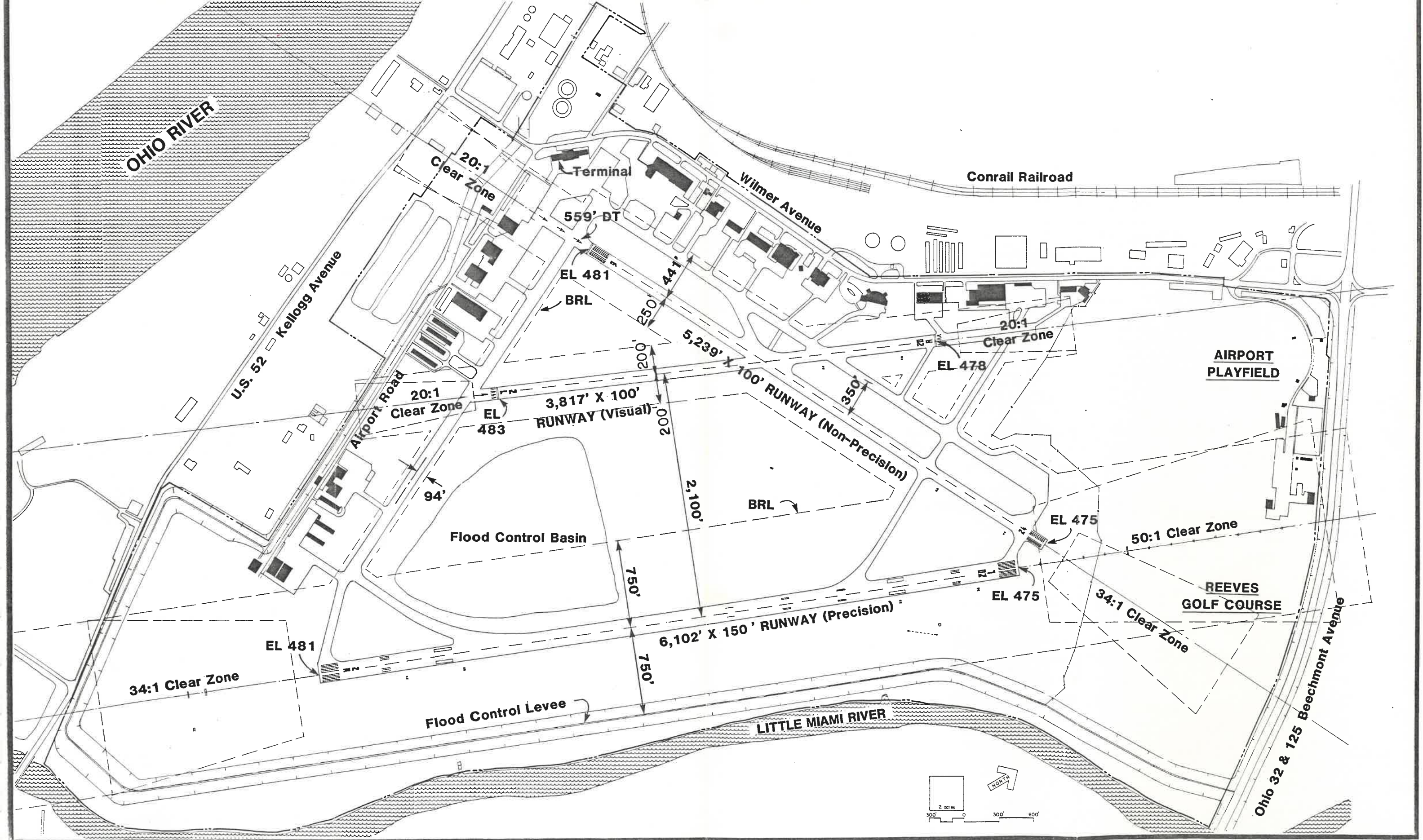
The material discussed in this section is graphically identified on the Existing Airport Layout Plan, Exhibit I-2.

(1) Airfield Facilities

The Airport's 1,140 acres of land include three runways, two parallel 2/20 runways and one intersecting 6/24 crosswind runway. Runway 20L has a precision instrument landing system (ILS) and accommodates most of the Airport's jet traffic. The parallel runways have a lateral separation of 2,100 feet, allowing simultaneous independent operations during Visual Flight Rule (VFR) conditions.

Three primary taxiways support the Airport's runway system. Currently, aircraft often must cross runways between the tenant areas and the furthest runway, creating complications for ground and air controllers at the Airport.

A variety of navigational and approach aids are available at Lunken to assist in locating and landing on the Airport at night and in poor weather conditions. Such facilities include instrument landing systems, approach lighting systems, airport beacon, visual approach slope indicators (VASI) and runway lights. A summary of the various facilities available at the Airport as of July 1986 is included in Exhibit I-3. Additional detailed runway and

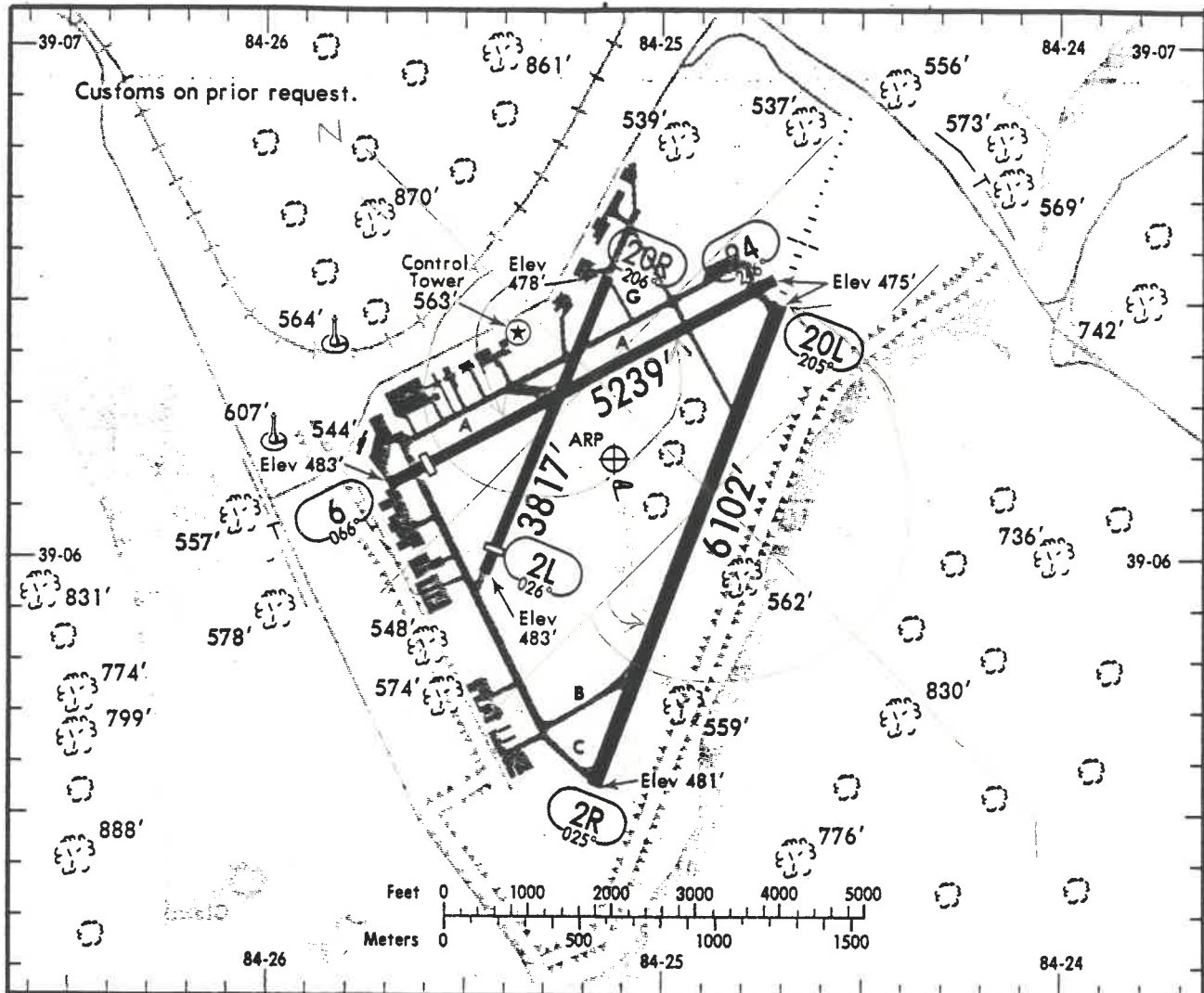


CINCINNATI, OHIO

CINCINNATI MUN-LUNKEN

N39 06.2 W084 25.1 068.4°/14.3 From CVG 117.3

Elev 483' Var 04°W



ADDITIONAL RUNWAY INFORMATION

RWY					USABLE LENGTHS			WIDTH
	HIRL	REIL	VASI-R	grooved	Threshold	Glide Slope	TAKE-OFF	
2R				grooved				150'
20L	HIRL	① MALSR	VASI-L	grooved	RVR	5352'		
2L	MIRL							100'
20R	MIRL	VASI-L (angle 4.0°)						
6	MIRL			grooved	4690'			100'
24	MIRL	VASI-R		grooved				



Lunken Field
Airport Master Plan

AIRPORT DATA

EXHIBIT
I-3

taxiway information is included in Table I-1.

(2) Landside Facilities

Landside facilities at Lunken Field include all areas not otherwise included in the airside runway and taxiway system. Typically, these areas include private tenants, commercial tenants (FBOs), airport facilities, and vacant areas.

1. Primary Tenants

The Airport property exclusive of the airside runway and taxiway system is currently occupied by 21 leaseholds, totaling approximately 49 acres. These areas are depicted and summarized on Exhibit I-4.

The following table summarizes these 21 leaseholds into functional areas:

<u>Functional Area</u>	<u>Land Area (Acres)</u>	<u>Building Area (Sq. Ft.)</u>
Corporate	21.3	160,320
Airport Support 1/	9.7	47,600
Commercial Operations 2/	17.6	212,909

2. Fixed Base Operators

There are currently three fixed base operators (FBOs) at Lunken Field. As shown on Exhibit I-4, they occupy 10.8 acres of land and 79,309 square feet of building area.

3. Terminal Building

The Airport's multiuse terminal is located at the westernmost boundary of the Airport property and is utilized by several organizations with differing functions. Exhibit I-5 shows the terminal layout and

1/ Includes airport maintenance, Crash, Fire and Rescue, FAA Air Traffic Control Tower (ATCT), and multiuse terminal building.

2/ Includes persons or corporations which provide aviation products or services to the aviation public.

TABLE I-1

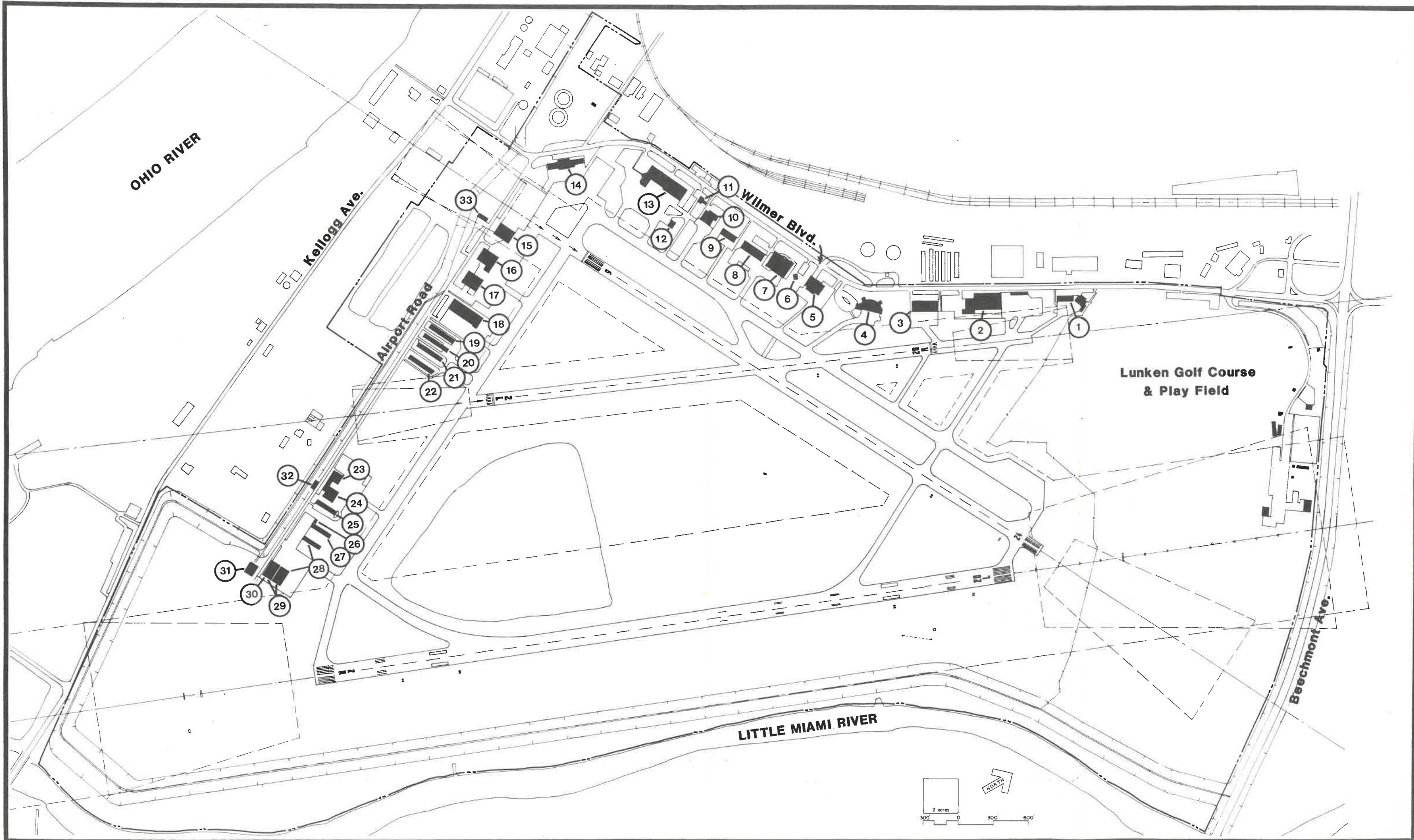
Lunken Field Master Plan Update

EXISTING RUNWAY AND
TAXIWAY DATA

RUNWAY DATA	Runway					
	2R	20L	2L	20R	6	24
Length	6,102'		3,817'		5,239'	
Displaced Threshold	-	-	-	-	549	-
Width	150'		100'		100'	
Surface Material	Concrete		Asphalt		Asphalt	
Condition	Fair		Good		Good	
Bearing Capacity (000 lbs)						
Single Wheel	40		11		11	
Dual Wheel	50		-		20	
Dual Tandem	95		-		55	
Lighting	HIRL		MIRL		MIRL	
Marking	Precision; Backcourse LOC		Visual		Nonprecision	
Approach Type *	NP	P	V	V	V	NP
Approach NAVAIDS	REIL VASI-4	ILS MALSR VASI-4	VASI-4	VASI-4	-	NDB, VASI-4

* Approach Type: NP = nonprecision; P = precision; V = visual.

Source: FAA Airport Master Record Form 5010 (1986).



FACILITY NO.	PRIMARY TENANT	LEASE AREA (ACRES)	BUILDING AREA (SQ. FEET)	APRON AREA		FUEL STORAGE		AUTO PARKING (SPACES)	BASED AIRCRAFT				AREA FUNCTION
				PAVED (SQ. YDS)	TURF (SQ. YDS)	AVGAS (GALS.)	JET-A (GALS.)		S.E.	T.E.	JET.	H.	
1	Condor (32)	1.2	13,900	6,800	--	12,000	12,000	17	1	2	3	--	Corporate
2	Procter & Gamble (4)	5.0	53,200	3,300	--	2,000	54,000	111	--	--	6	--	Corporate
3	Kroger Company (33)	2.6	24,000	2,000	--	--	60,000	80	--	2	4	--	Corporate
4	Great American Insurance Company (30)	3.4	16,000	--	--	--	50,000	60	--	1	4	--	Corporate
5	City of Cincinnati Fire Station -	2.3	16,000	--	--	--	--	25	--	--	--	--	CFR
6	Federal Aviation Administration -	0.8	3,600	1,600	--	--	--	20	--	--	--	--	Air Traffic Control
7	Cincinnati United Contractors (27)	2.2	20,000	5,300	--	--	30,000	8	--	1	3	1	Corporate
8	Federated Department Stores (28)	2.3	19,500	1,000	--	--	60,000	30	1	--	4	--	Corporate
9	Kinvernon Corp. (29)	1.7	9,000	2,200	--	--	30,000	10	--	1	1	--	Corporate
10	Eagle-Picher Industries (31)	2.1	11,120	--	6,000	--	36,000	32	--	1	3	--	Corporate
11	Ohio Aviation -	1.4	2,500	1,100	--	--	--	25	7	--	--	--	Flight Training
12	Ohio Aviation (14)	0.9	2,400	16,000	--	--	--	--	3	--	--	3	Aircraft Storage
13	Ohio Aviation (5)	4.8	30,409	13,800	--	--	20,000	130	--	19	4	--	Full Service FBO
14	City of Cincinnati Terminal -	7.4	20,000	3,300	2,200	--	--	150	1	--	--	--	Multi/Use Terminal
15	Avionics, Inc. (3)	BLDG	15,000	3,300	--	--	--	38	7	4	--	--	A/C Maintenance/Stor.
16	Ohio Aviation (2)	BLDG	15,000	3,300	--	10,000	--	20	5	6	1	--	A/C Maintenance Stor.
17	T.W. Smith Engine Co. (1)	BLDG	15,000	6,600	--	--	--	20	6	2	--	--	A/C Maintenance/Stor.
18	American Air Services (12)	2.6	30,000	--	--	--	5,000	70	--	11	4	--	Corporate/Charter
19	Mairer Aviation (26)	--	9,600	1,700	6,600	--	--	--	6	2	--	--	A/C Storage
20	Mairer Aviation (24)	3.1	9,600	--	--	18,000	10,000	6	19	--	--	--	A/C Storage/Fuel
21	Mairer Aviation (11)	--	9,600	--	--	--	--	--	6	2	--	--	A/C Storage
22	Mairer Aviation (10)	--	9,600	6,600	--	--	--	--	6	2	--	--	A/C Storage
23	Aero Marine -	3.7	11,000	4,000	--	20,000	20,000	18	--	2	4	--	Full Service FBO
24	Aero Marine (21)	--	10,000	--	2,000	--	--	5	--	7	--	--	A/C Storage
25	Aero Marine (22)	--	8,000	3,900	--	--	--	--	6	3	--	--	A/C Storage
26	Air Flight Service -	1.1	400	--	--	--	--	30	12	--	--	--	Office
27	Air Flight Service (50)	--	5,400	--	--	--	--	--	6	--	--	--	A/C Storage
28	Air Flight Service (51)	--	5,400	4,000	--	--	--	--	11	--	--	--	A/C Storage
29	Hangar No. 6 (6)	BLDG	12,000	2,000	--	--	--	6	13	--	--	--	A/C Storage/Maint.
30	Midwest Airways (7)	BLDG	12,000	--	--	--	--	6	11	1	--	--	A/C Storage/Maint.
31	Airport Maintenance (18)	BLDG	7,500	--	--	--	--	14	--	--	--	--	Airfield Maint.
32	Airport Maintenance (19)	BLDG	1,900	--	--	--	--	--	--	--	--	--	Storage
33	Airport Maintenance -	BLDG	2,200	--	--	--	--	--	--	--	--	--	Airfield Maint.
TOTALS		49	440,829	91,800	16,800	62,000	387,000	931	127	69	41	4	

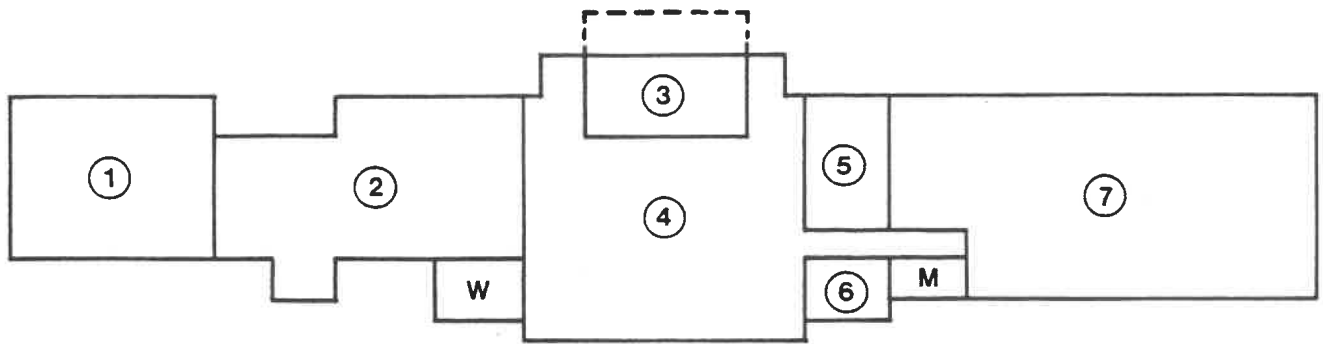
() Hangar Number

TOTAL APRON AREA
108,600

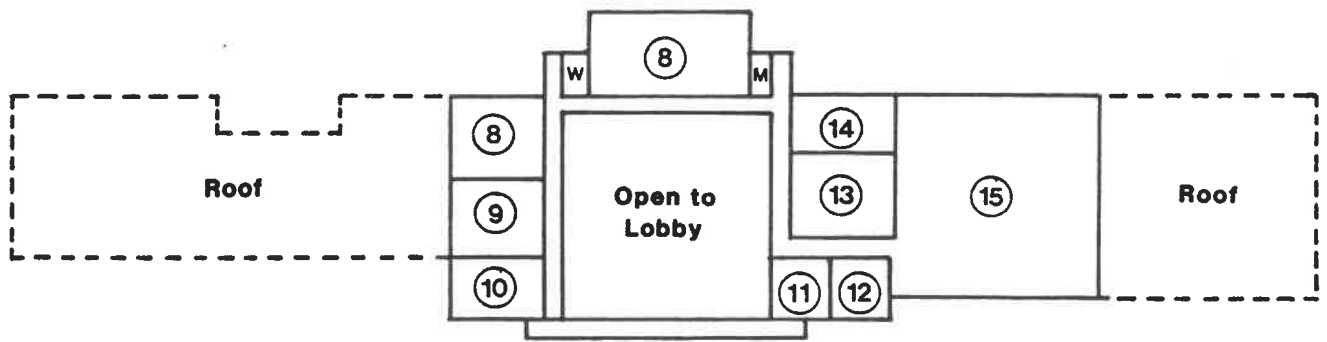
TOTAL FUEL STORAGE
449,000

TOTAL BASED AIRCRAFT
241





FIRST FLOOR PLAN



SECOND FLOOR PLAN



First Floor Facilities

<u>No.</u>	<u>TENANT</u>	<u>FUNCTION</u>	<u>AREA</u>
1	Cardinal Air Training	Flight Training	2,000 Sq. Ft.
2	Sky Galley	Restaurant	2,700 Sq. Ft.
3	Ed Jones Insurance Agency	Office	800 Sq. Ft.
4	Lobby	Public Space	2,675 Sq. Ft.
5	Loco Blazers	Office	700 Sq. Ft.
6	City of Cincinnati	Pilot Lounge	300 Sq. Ft.
7	Federal Aviation Administration	Flight Service Station	<u>5,000 Sq. Ft.</u>
Total			14,175 Sq. Ft.

Second Floor Facilities

8	City of Cincinnati	Airport Manager	1,200 Sq. Ft.
9	Amphibian Flying Service	Office	400 Sq. Ft.
10	Sky Galley	Office	400 Sq. Ft.
11	The Bernard Group	Office	225 Sq. Ft.
12	Blue Chip Aviation	Office	225 Sq. Ft.
13	City of Cincinnati	Utility	500 Sq. Ft.
14	Banyan & Health Care Info	Office	375 Sq. Ft.
15	Greater Cincinnati Airmans Club	Club Room	<u>2,500 Sq. Ft.</u>
Total			5,825 Sq. Ft.
TOTAL 1 & 2			20,000 Sq. Ft.



utilization of space.

4. Maintenance and Crash, Fire and Rescue

In addition to the numerous tenants located on the Airport, several buildings and facilities exist primarily for the operation and maintenance of the airside and landside facilities, equipment, and personnel. Included in this list are the control tower, Crash, Fire and Rescue (CFR), and Airport maintenance facilities.

3. AIRSPACE

There are three major components of the airspace system which encompasses Lunken Field: enroute, transitional, and terminal facilities. Each component has a specific function and is supported in its role by a network of air traffic control facilities, personnel, and navigational aids. Airspace for the Cincinnati area is depicted in Exhibit I-6.

Major airspace changes within the region may affect the Lunken Field airspace area. The changes include:

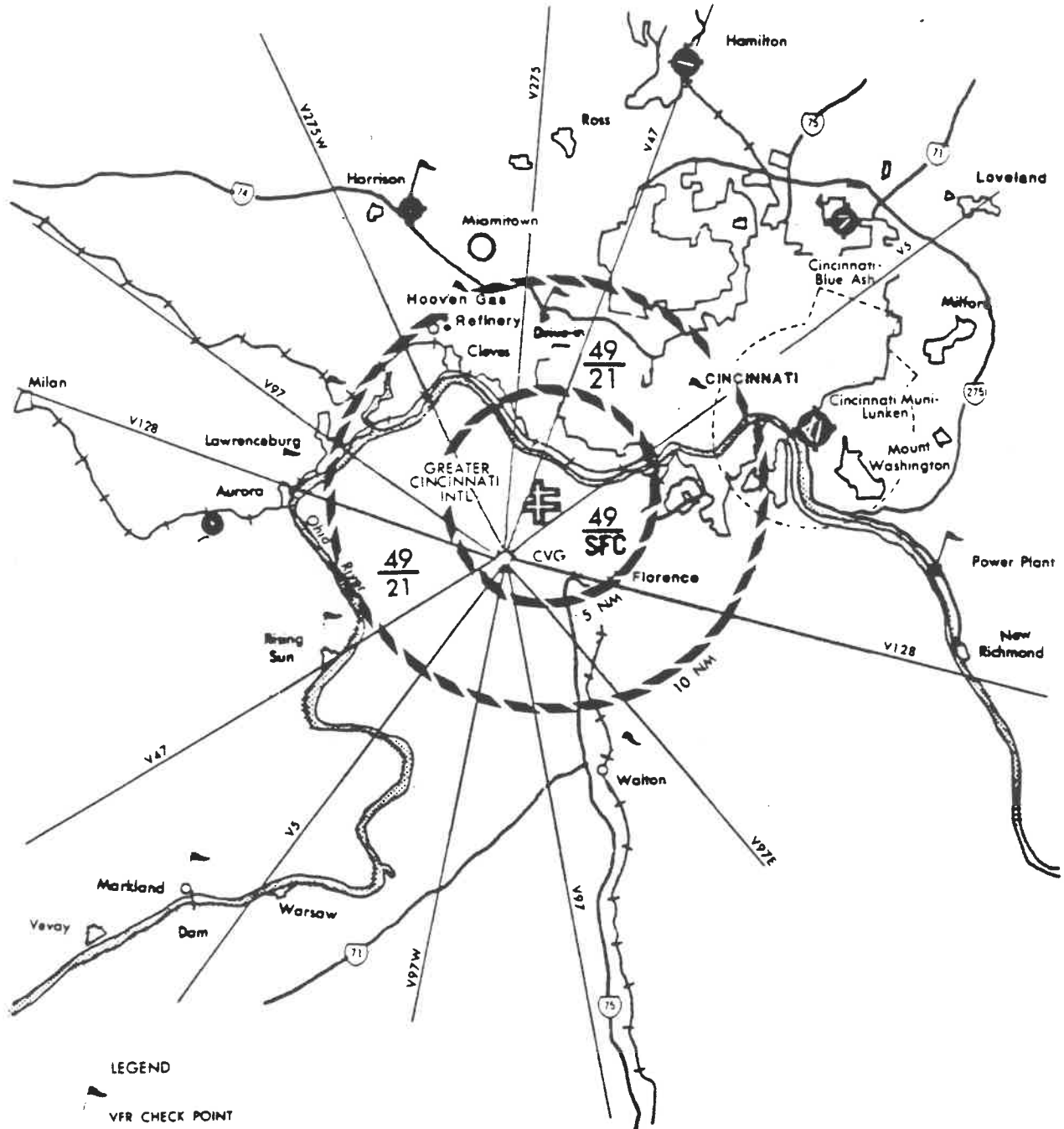
- . The recent designation of Airport Radar Service Area (ARSA) to replace Terminal Radar Service Area (TRSA) surrounding Greater Cincinnati International Airport
- . The planned addition of a parallel north/south runway at Greater Cincinnati International Airport, located 6,000 feet to the east of the existing Runway 18/36
- . Relocation of the Blue Ash general aviation reliever airport to southern Warren County

The effects of each are discussed in the following sections.

(1) Enroute Airspace

Air traffic control for Instrument Flight Rule (IFR) aircraft in the Cincinnati area (but outside of the Greater Cincinnati and Lunken approach and traffic areas) is the

**COVINGTON, KENTUCKY
GREATER CINCINNATI INTERNATIONAL AIRPORT
FIELD ELEV. 891' MSL**



Prepared by the
 FEDERAL AVIATION ADMINISTRATION
 Cartographic Standards Section
 ATO-259



**Lunken Field
 Airport Master Plan**

CINCINNATI AIRSPACE

**EXHIBIT
 I-6**

responsibility of the Indianapolis Air Route Traffic Control Center (ARTCC). IFR and VFR aircraft flying within this region typically follow designated routes known as victor airways and jet routes, delineated by a system of radio equipment called VORs (very-high frequency omnirange equipment) located across the United States. The nearest VOR to Lunken is the Cincinnati (CVG) VOR which is located southwest of Greater Cincinnati International Airport.

(2) Transitional Airspace

Control of arrivals, departures and overflights operating within the Cincinnati area is the responsibility of the Greater Cincinnati International Airport Radar Approach Control Facility (RAPCON). Located at Greater Cincinnati, this approach facility is also responsible for guiding aircraft to and from Lunken and other satellite airports in the area.

Recently, the designation for this airspace was changed from a Terminal Radar Service Area (TRSA) to an Airport Radar Service Area (ARSA) by the FAA. The primary distinction between the two is that pilots within the ARSA are required to maintain two-way radio communication with Air Traffic Control (ATC) personnel. Implementation of ARSA procedures are intended to reduce the risk of midair collisions and promote the efficient control of air traffic in terminal areas.

Within the area surrounding the Airport, there are two major planning efforts underway which may affect aircraft operating into and out of Lunken Field. As discussed earlier, they include the relocation of the Blue Ash general aviation reliever airport to southern Warren County and the planned addition of a north/south runway at Greater

Cincinnati International Airport.

Although the Blue Ash replacement project will primarily affect the number of aircraft based at Lunken, the planned runway at CVG may have a major effect on the approach and departure procedures at Lunken in order to maintain adequate separation between aircraft operating from the two facilities. The north/south orientation of traffic at CVG is believed to be compatible with the 2/20 (northeast/southwest) runway orientation at Lunken and may result in fewer delays than currently exist when CVG is operating in an east/west mode. Further effects of each of these projects are addressed in later chapters of this report.

Additional airspace considerations, such as the impact of area airports on the future role of Lunken Field, are discussed in the airfield alternatives phase of the study (Chapter IV). Public and private use airports in the Cincinnati area were examined as part of the Lunken Field study in efforts to minimize future airspace conflicts between the facilities. Table I-2 provides a summary of facilities at each of the area airports.

(3) Terminal Airspace

Terminal airspace facilities for Lunken Field include all visual and electronic equipment and personnel located at the Airport to aid pilots in navigating to and landing at the Airport. These facilities include the control tower, navigational aids (NAVAIDs), and visual aids.

The Lunken Air Traffic Control Tower (ATCT) directs all traffic at the Airport and in the immediate airspace, up to approximately five miles from the tower. The tower is

TABLE I-2

Lunken Field Master Plan Update

CINCINNATI AREA AIRPORTS

	Blue Ash	Greater Cincinnati	Hamilton	Clermont County	Harrison
Airport Classification	General Utility	Air Carrier Transport	General Utility	General Utility	Private
Primary Runway Heading	6/24	18/36	11/29	4/22	18/36
Primary Runway Length	3500'	9,500'	5,440'	3,732'	3,050'
NAVAIDs	VOR	ILS (CAT II)	NDB	NDB	NDB
Acreage	229	4,804	200	21	13
Based Aircraft	118	36	177	41	45
Single Engine	105	14	149	38	43
Twin Engine	13	10	26	3	2
Corporate Jet	0	10	0	0	0
Helicopter	0	2	1	0	0
Other	0	0	1	0	0
Annual Operations	50,850	*33,394	160,650	35,800	30,000
Local	35,000	8,344	126,000	28,800	25,000
Itinerant	15,850	25,050	34,650	7,000	5,000
Annual Capacity	166,100	370,000	149,500	120,000	100,000
Hourly Capacity (VFR)	99	83	91	82	60
Hourly Capacity (IFR)	36	51	36	36	-

* General Aviation Only

Source: FAA Airport Master Record Form 5010 (1986).

responsible for issuing clearances to aircraft landing or departing the Airport.

Lunken has four published instrument approaches to the airfield. Of these, one provides precision glide slope information to Runway 20L. The remaining three instrument approaches are nonprecision. Exhibit I-7 depicts the primary ILS approach to Lunken Field.

Relocation of the FAA Flight Service Station, located within the terminal building, is currently under review by the FAA. At this time, a final closing date for this facility is uncertain.

4. METEOROLOGICAL DATA

Annual wind and weather conditions influence the daily operational capacity of Lunken Field by affecting the percentage of time the FAA can direct traffic using Visual Flight Rules (VFR) instead of the more stringent and capacity-reducing Instrument Flight Rules (IFR). The weather categories and frequency of occurrence for each are shown in Table I-3.

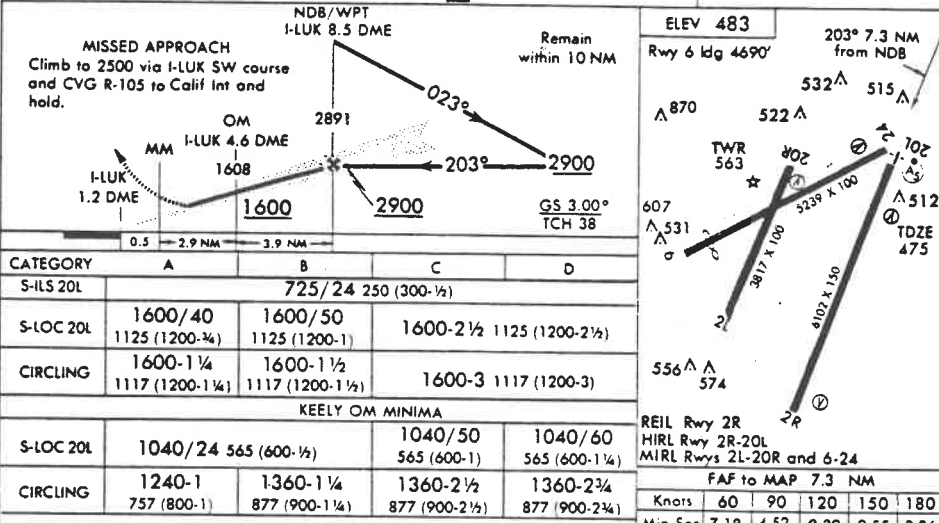
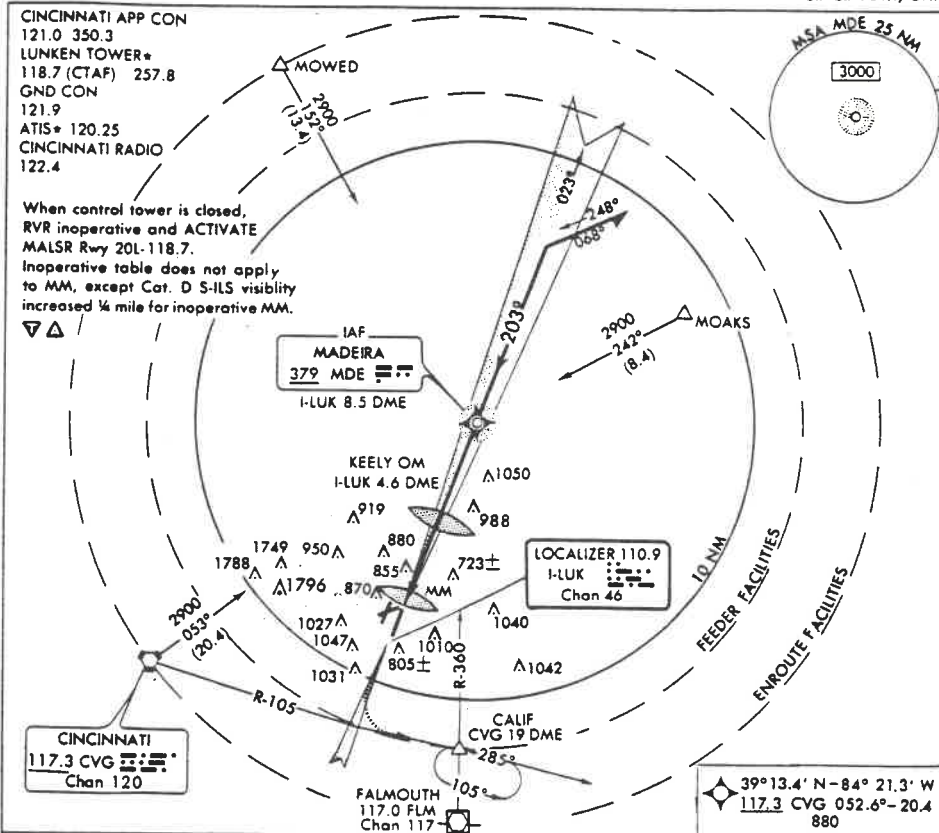
For the evaluation of existing meteorological conditions at Lunken Field, surface weather observations including wind direction, speed, cloud ceiling, and visibility limitations were utilized from CVG. Obtained from the National Climatic Data Center in Asheville, North Carolina, the weather data covered the period from 1973 to 1982. These data, consisting of over 57,128 observations, were combined with Lunken Field runway data and computer-analyzed to calculate the most accurate weather description and runway coverage possible.

Limitations used in the analysis included a 13-knot crosswind component and a 10.5-knot crosswind component, in

Amdt 12

ILS RWY 20L

54 CINCINNATI MUNI AIRPORT-LUNKEN FIELD (LUK)
AL-83 (FAA) CINCINNATI, OHIO



ILS RWY 20L

39°06' N · 84°25' W
CINCINNATI MUNI AIRPORT-LUNKEN FIELD (LUK)



Lunken Field
Airport Master Plan

ILS APPROACH TO R/W 20L

EXHIBIT
I-7

TABLE I-3

Lunken Field Master Plan Update

IFR AND VFR
WEATHER CATEGORIES

<u>Weather Category</u>	<u>Definition</u>				<u>Percentage Occurrence</u>
	<u>Minimum</u>		<u>Maximum</u>		
	<u>Ceiling</u>	<u>Visibility</u>	<u>Ceiling</u>	<u>Visibility</u>	
All Weather	0	0	None	None	100 %
VFR	1,000 ft.	3 mi.	None	None	84 %
IFR	0	0	1,000 ft.	3 mi.	16 %

Source: National Oceanic and Atmospheric Center, Asheville, N.C. (1973-1983).

recognition of the varying sizes of aircraft involved. Each analysis included a five-knot tailwind. When wind conditions exceed these limits on a single runway, traffic must then be directed to a crosswind runway.

For runway wind coverage analysis, the data were summarized according to the average annual occurrence of wind conditions by velocity and direction for all weather, instrument and visual flight rule categories (IFR and VFR).

From the analysis of weather occurrence information, the weather coverage provided by each runway (for each weather category and maximum crosswind component) was calculated. These coverages are presented in Table I-4. As shown, the existing runway configurations offer 98.97 percent coverage during all weather conditions with a 13-knot maximum crosswind component.

5. GROUND ACCESS

Ground access to the Airport is provided primarily via Kellogg Avenue, Wilmer Avenue, and Beechmont Avenue. Within five to 10 minutes, access may be gained to Interstates 71, 471, and 275. The roadway system in the Lunken area is depicted in Exhibit I-8. On-airport parking is generally provided by each tenant at the Airport. The terminal building provides 150 spaces for public parking.

TABLE I-4

Lunken Field Master Plan Update

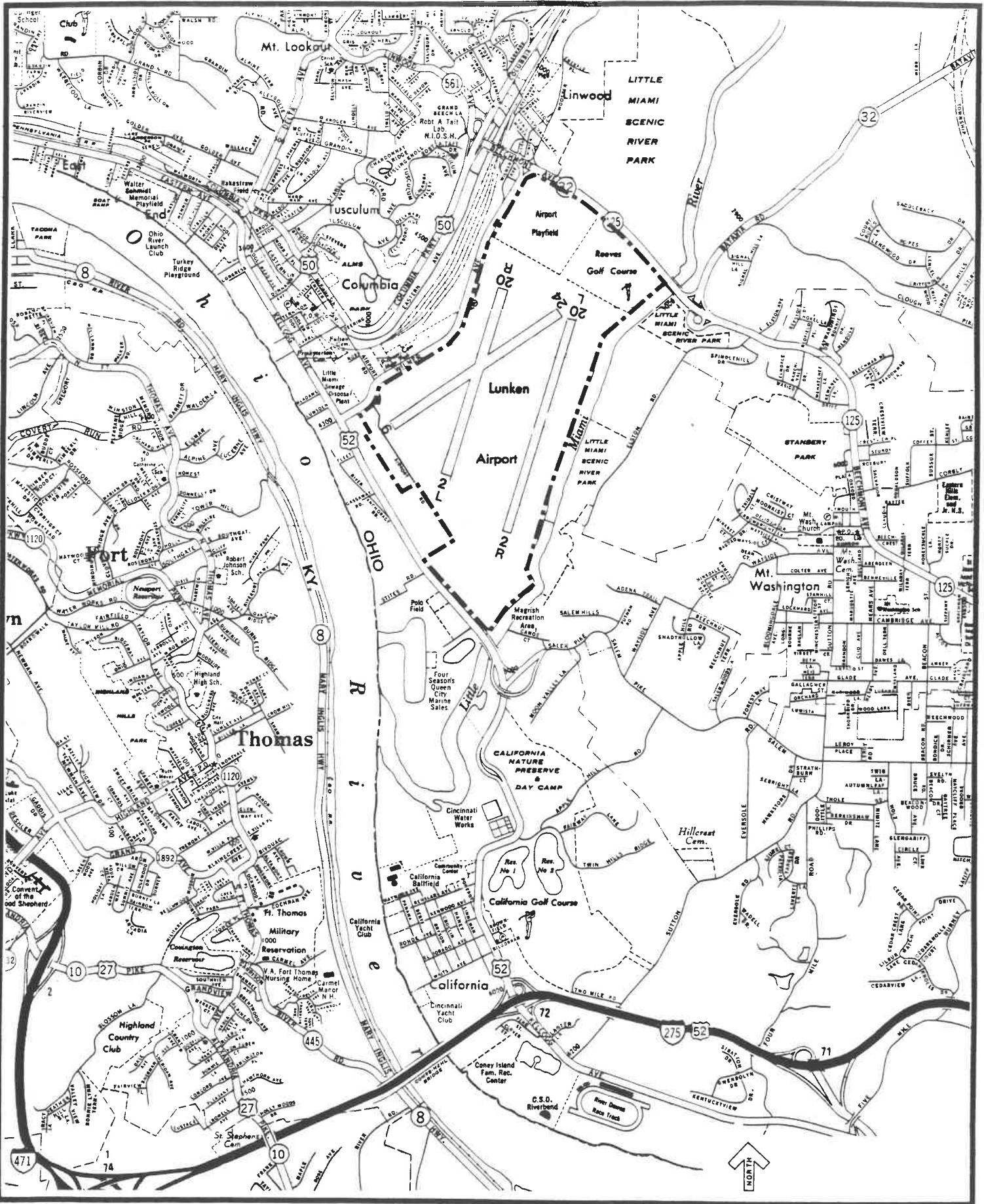
RUNWAY WIND COVERAGE
(Percent)

Single Runway ^{1/}	<u>13 Knot Crosswind</u>			<u>10.5 Knot Crosswind</u>		
	<u>IFR</u>	<u>VFR</u>	<u>All Weather</u>	<u>IFR</u>	<u>VFR</u>	<u>All Weather</u>
20L	66.76	71.70	70.95	63.94	68.54	67.86
2R	58.15	52.40	53.36	56.34	50.51	51.48
20R	66.85	71.82	71.08	64.04	68.63	67.95
2L	58.20	52.42	53.38	56.08	50.17	51.16
6	56.60	50.39	51.43	54.77	49.12	50.07
24	69.81	75.40	74.55	67.19	72.04	71.31
Calms	28.57	27.99	28.15	28.57	27.99	28.15
<u>Combined Runways ^{2/}</u>						
2R/20L	96.34	96.11	96.16	91.71	91.06	91.19
2L/20R	96.48	96.25	96.31	91.55	90.81	90.96
6/24	97.84	97.80	97.83	93.39	93.17	93.23
<u>All Runways</u>	99.05	98.96	98.97	97.24	96.88	96.95

1/ These percentages represent zero allowable tailwind and include calms.

2/ These percentages include opposing runways. They are calculated by adding the percentages for each single runway and subtracting the calms.

Source: National Oceanic and Atmospheric Center, Asheville, N.C. (1973-1983).



Lunken Field
Airport Master Plan

AIRPORT ACCESS

EXHIBIT
I-8

6. AIRPORT OPERATIONS SUMMARY

The following table presents a 10-year summary of Airport operations:

<u>Fiscal Year</u>	<u>Aircraft Operations</u>		
	<u>Itinerant</u>	<u>Local</u>	<u>Total</u>
1976	97,170	126,126	223,296
1977	95,737	129,837	225,574
1978	85,663	90,394	176,057
1979	91,871	89,827	181,698
1980	92,426	82,330	174,756
1981	94,278	93,775	188,053
1982	83,797	70,776	154,573
1983	78,654	58,535	137,189
1984	79,358	69,287	148,645
1985	85,904	81,851	167,755

As discussed previously, this aircraft operations pattern resembles the general aviation air traffic activity experienced across the country during these years. Projections of future aviation demand at Lunken Field are provided in Chapter II.

7. FUEL SUMMARY

The following table presents a six-year summary of fuel flowage at Lunken Field:

<u>Year</u>	<u>Fuel Dispensed (Gallons)</u>		
	<u>AvGas</u>	<u>Jet Fuel</u>	<u>Total</u>
1980	689,210	3,228,475	3,917,685
1981	694,549	3,319,786	4,014,335
1982	586,539	3,104,548	3,690,997
1983	463,377	3,456,810	3,920,187
1984	488,765	3,995,436	4,484,201
1985	483,721	4,578,561	5,062,282

reflected in the large amounts of jet fuel sold. 1/

8. SOCIOECONOMIC DATA

Socioeconomic data were collected from city, county, state, and federal sources. Particular emphasis was placed on employment, income, and industry trends. Listed below are some selected Cincinnati area socioeconomic characteristics:

. Form of Government

- Fulltime Mayor
- Fulltime City Manager
- Fulltime City Council

. OKI Region - Population

- 1980 population: 1,665,000
- 2000 population:(est.) 1,804,000

From 1980 to 2000, area population is expected to grow 8 percent as compared to a 26 percent growth rate for the United States.

As shown in Exhibit I-9, more than half of the expected growth in area population will occur in Butler and Clermont counties.

. Income

Mean Household (OKI Region) - \$ 19,000

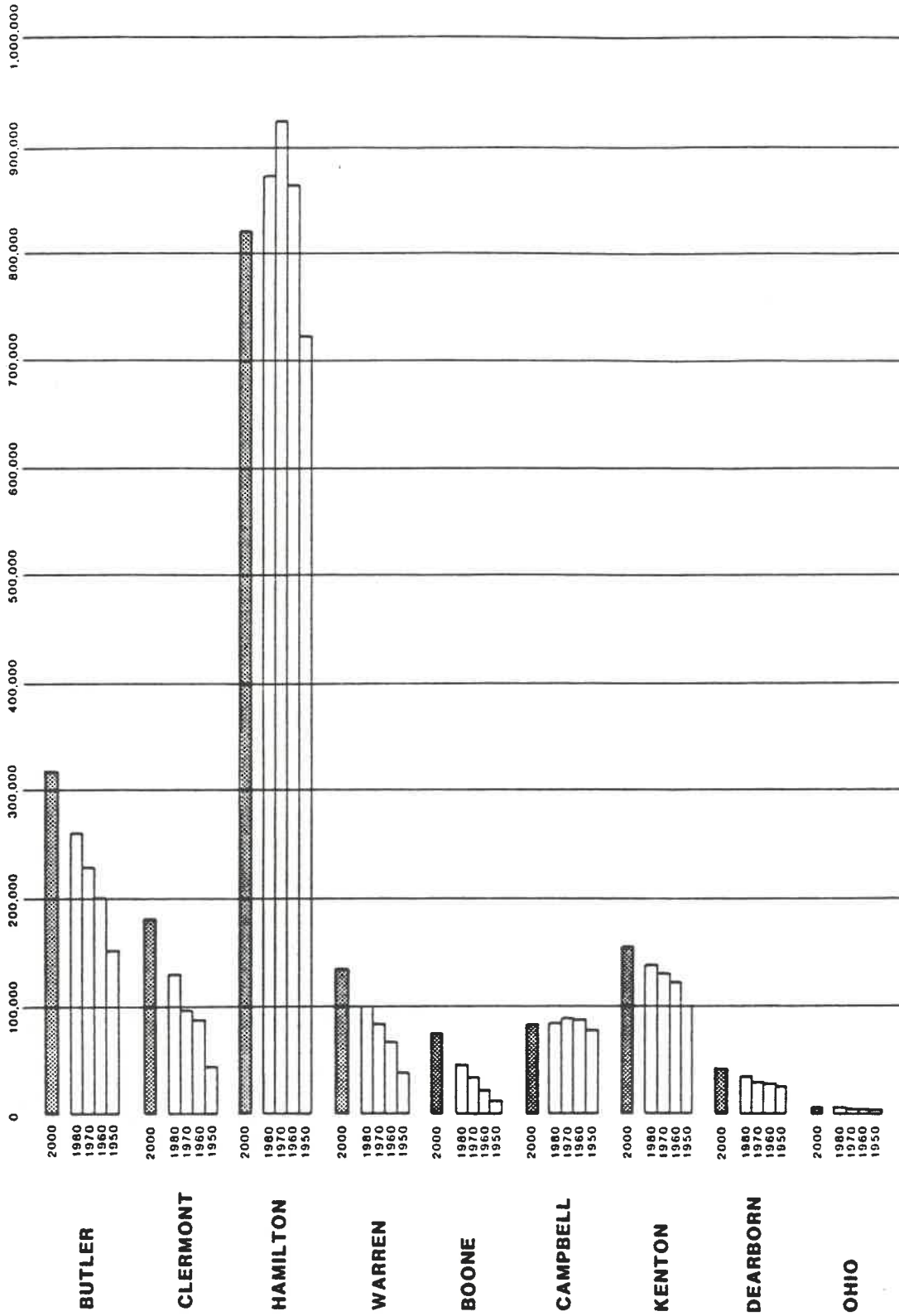
. OKI Region - Employment

- 1980: 729,000
- 2000:(est.) 900,000

Employment in the region is projected to equal the projected national increase of 23 percent over the next 20 years.

1/ Typically, private aviation (i.e., general aviation minus corporate aviation) utilizes mostly aviation gasoline (AvGas) while corporate aircraft primarily utilize jet fuel.

POPULATION TRENDS FOR OKI COUNTIES



Source: U.S. Census; Projections by the Ohio-Kentucky-Indiana Regional Council of Governments and the Ohio Department of Economic and Community Development.



Lunken Field
Airport Master Plan

OKI REGION POPULATION

EXHIBIT
I-9

II.

Aviation Demand Projections

II. AVIATION DEMAND PROJECTIONS

Projections of aviation demand are a key element in all airport planning. Demand projections provide a basis for determining the type, size, and timing of aviation facility development and a platform upon which the master plan is based. Consequently, these projections influence virtually all phases of the planning process.

This chapter provides projections of unconstrained aviation demand at Lunken Field through the year 2006. The projections are documented in the following sections:

- . Based Aircraft
- . Aircraft Operations
- . Fleet Mix

These projections represent unconstrained potential demand (based on the assumption that no insurmountable obstacles to growth exist). The existence of constraints to growth may require revisions to the projections.

1. BASED AIRCRAFT

A review of available data on Lunken Field's based aircraft showed that the historical information was not reasonably accurate. Therefore, it was determined that the best approach to accurately projecting the number of based aircraft at the Airport was to focus upon the relationship between the number of registered aircraft in the area and the number of based aircraft at Lunken Field. Registered aircraft in the Cincinnati Metropolitan Statistical Area (MSA) were the focus of analysis. The Cincinnati MSA includes Butler, Clermont, Hamilton, and Warren Counties in Ohio; Boone, Campbell, and Kenton Counties in Kentucky; and Dearborn County in Indiana. These counties were selected because the Airport's service area extends over some

portion of each and data for an entire MSA tends to be more readily accessible than for a portion of an MSA.

In developing the MSA registered aircraft projections, four methodologies were used:

- . Socioeconomic Projections
- . Share of U.S. Market
- . Trend Analysis
- . Propensity to Buy Aircraft

(1) Socioeconomic Projections

This methodology relates the levels of registered aircraft in the MSA with various socioeconomic factors, resulting in representation of the historical relationship between the registered aircraft and the chosen socioeconomic factor. This projection technique assumes that the historical relationship will remain constant throughout the planning period.

The projections of MSA registered aircraft, shown on the following table, were developed using historical data on MSA population and per capita personal income (PCPI) for 1976 through 1985.

<u>Year</u>	<u>Population</u> ^{1/}	<u>MSA Aircraft</u> ^{2/}	<u>PCPI</u>	<u>MSA Aircraft</u> ^{2/}
1985	1,678,979	1,096	\$11,266	1,096
1991	1,708,758	1,255	\$13,137	1,465
1996	1,741,722	1,420	\$15,077	1,805
2006	1,803,640	1,735	\$18,983	2,490

- 1/ Population and PCPI from National Planning Association. PCPI in constant year dollars.
- 2/ Historical MSA aircraft from Census of U.S. Civil Aircraft, calendar year 1985. Projections of aircraft = $-7390.9047 + (\text{Population} \times 0.00506)$ with r squared = 0.89 and $-845.2992 + (\text{PCPI} \times 0.17575)$ with r squared = 0.88.

(2) Share of the U.S. Market Projections

The historical number of MSA registered aircraft was compared with the number of U.S. registered aircraft. The area maintained roughly 0.48 to 0.49 percent of the U.S. market between 1977 and 1984 and captured approximately 0.51 percent of the market in 1985. The constant share of the market projection, shown below, assumes that the area will continue to hold the 1985 share through the planning period while the expanding market share projection assumes a moderate growth to 0.52 percent in 2006.

<u>Year</u>	<u>Constant Market Share</u>		<u>Expanding Market Share</u>	
	<u>%</u>	<u>Aircraft</u>	<u>%</u>	<u>Aircraft</u>
1985	0.5062	1,096	0.5062	1,096
1991	0.5062	1,210	0.5101	1,220
1996	0.5062	1,310	0.5134	1,330
2006	0.5062	1,530	0.5200	1,570

(3) Trend Analysis Projections

Trend analysis (or time series analysis) relates the chronological levels of area registered aircraft between 1976 and 1985. The resultant linear equation is essentially a representation of the historical growth rate of registered aircraft in the MSA during this time period. The results of this analysis are shown below:

<u>Year</u>	<u>MSA Aircraft</u> ^{1/}
1985	1,096
1991	1,265
1996	1,385
2006	1,635

1/ Projected registered aircraft = $-48,053.8848 + (\text{year} \times 24,7697)$ with r squared = 0.73.

(4) Propensity to Buy Aircraft (PBA) Projections

Past aviation studies have indicated a direct correlation between income levels and the propensity to buy and keep general aviation aircraft. Therefore, a review of per capita personal income (PCPI) and the propensity to own aircraft in the MSA was conducted. The results of this analysis are presented below. The future propensity ratios are based upon the 10-year historical mean.

<u>Year</u>	<u>MSA Aircraft</u>	<u>PCPI</u>	<u>Propensity Ratio</u>
1985	1,096	\$11,266	0.09728
1991	1,253	\$13,137	0.09535
1996	1,438	\$15,077	0.09535
2006	1,810	\$18,983	0.09535

(5) Preferred Projection of Area Registered Aircraft

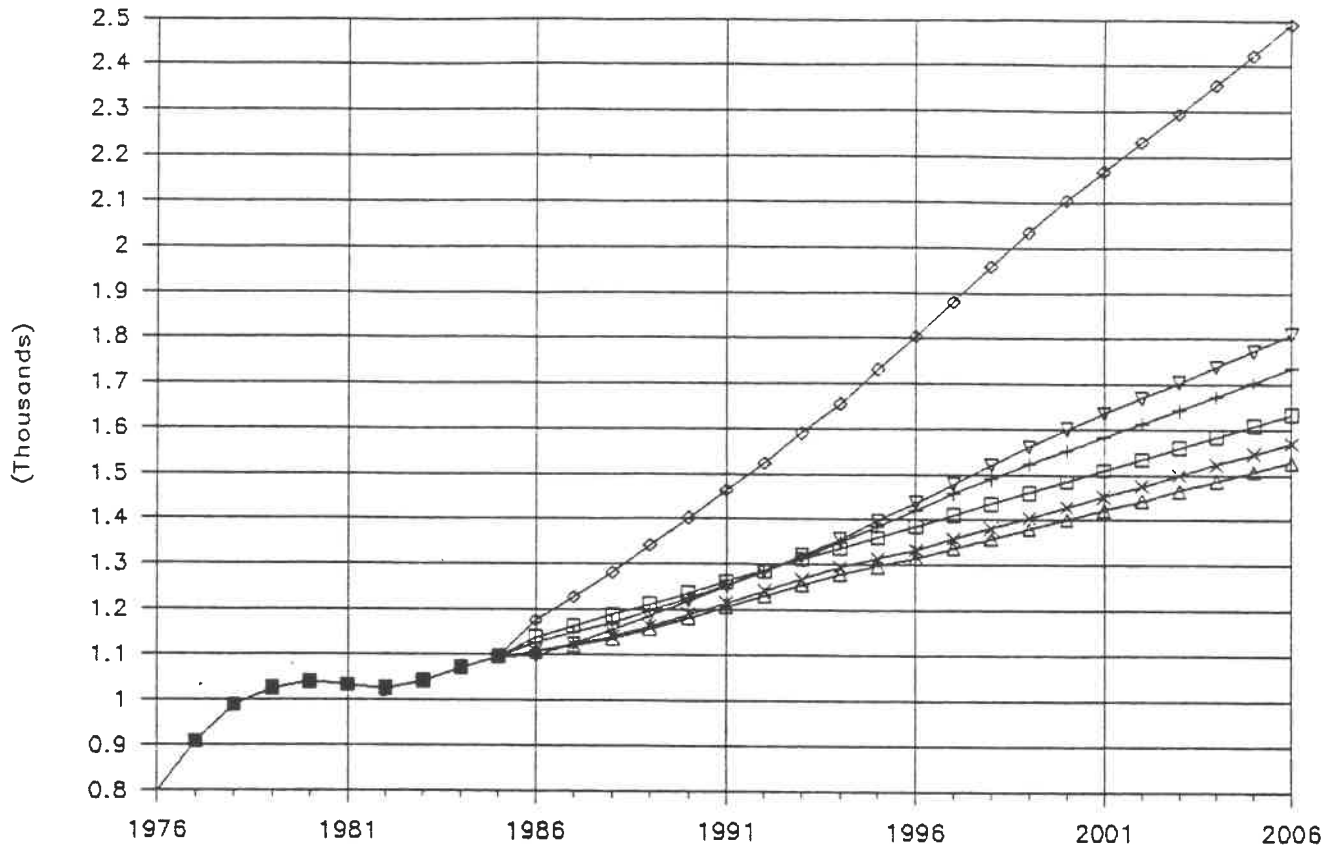
Exhibit II-1 illustrates the results of the four projection techniques. Examination of this exhibit shows that five of the six projections fall into a relatively narrow range. The PCPI regression projection is the exception. It is much higher than the other projections.

The population regression projection was selected as the preferred projection, for the following reasons:

- . The PCPI regression projection is obviously too optimistic and can be eliminated from consideration.
- . Because it relies heavily upon PCPI projections, the propensity to buy aircraft projection is also considered somewhat optimistic.
- . The time series projection was not used because it is "hindsight" and can only evaluate historical trends with no sensitivity concerning future influences (socioeconomic, etc.). Because the years 1976 to 1985 were particularly poor years for general aviation, this projection may be slightly pessimistic.
- . The two market share projections represent the most conservative projections and are useful in representing the lower limits of the projection range.

(6) Lunken Field Based Aircraft Projection

The final step in developing the based aircraft projection was to determine that portion of the MSA registered aircraft based at Lunken Field. The inventory determined that 241 aircraft are based at the Airport. This represents 22 percent of the MSA registered aircraft. While it may seem logical that the Airport would retain this portion of the market given that conditions at surrounding



- Historical
- + Population Projection (Preferred)
- ◇ PCPI Projection
- △ Static Market Share
- × Growing Market Share
- ▽ Propensity to Buy Aircraft



Lunken Field
Airport Master Plan

AREA REGISTERED
AIRCRAFT PROJECTIONS

EXHIBIT
II-1

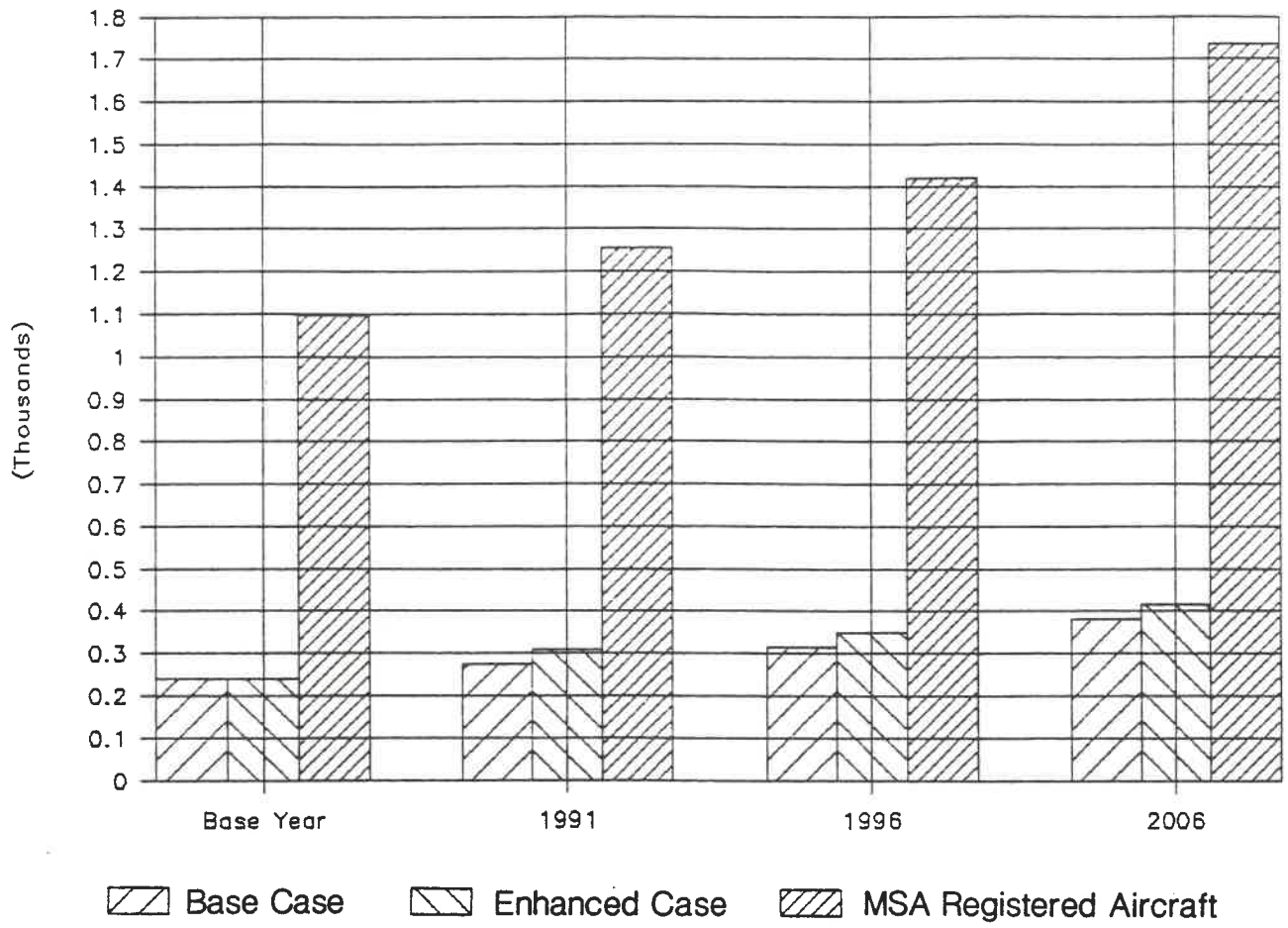
airports remain static, this is not the case. A recommended replacement site has been selected for the Blue Ash Airport. The existing facility, approximately 10 miles from Lunken Field, will be closed, and it is anticipated that a new airport will be opened approximately 10 miles to the east of the existing site.

The impact of the Blue Ash Airport replacement airport on the surrounding airports, including Lunken Field, has been carefully analyzed. No clear answer is apparent, however. Therefore, two projection scenarios were developed for Lunken Field. The first, called the base case, assumes that none of the Blue Ash Airport based aircraft will be relocated to Lunken Field. The second scenario, or enhanced case, assumes that some of the Blue Ash aircraft will be based at Lunken Field. Based on analysis of the Blue Ash corporate users' locations and other factors, it was determined that as many as 35 aircraft may be transferred from Blue Ash to Lunken Field by 1991. The two projections are presented below and illustrated on Exhibit II-2.

<u>Year</u>	<u>Lunken Field Based Aircraft</u>	
	<u>Base Case</u>	<u>Enhanced Case</u>
1986	241	241
1991	275	310
1996	315	350
2006	380	415

2. AIRCRAFT OPERATIONS

This section presents projections of annual aircraft operations, local versus itinerant operations, instrument approaches, number of military operations, and airfield peaking characteristics.



(1) Annual Aircraft Operations

The projection of annual aircraft operations was developed using two different approaches: operations per based aircraft (OPBA) and market share analysis. The OPBA projection technique ties the number of annual operations to the number of based aircraft and utilizes the based aircraft projection as the basis for future activity levels. The market share projection technique analyzes the historical relationship between the local airport's and the nation's annual general aviation operations and projects the observed trends into the future. The base case projection is based upon the market share analysis while the enhanced case projection utilizes the OPBA technique.

The base case projection, presented below, assumes that Lunken Field will continue to capture 0.45 percent of the total U.S. general aviation operations. The Airport has achieved this market share three of the past five years.

The enhanced case, also shown below, is based upon OPBA because the potential influx of Blue Ash aircraft by 1991 disrupts the historical relationships necessary for market share projections. OPBA are expected to grow from the 707 estimated in 1986 to 795 in 2006. This increase in OPBA is a result of the Airport's role as the area's primary corporate airport and the assumption that increases in the number of based corporate or business use aircraft result in higher OPBA numbers.

<u>Year</u>	<u>Lunken Field Annual Operations</u>	
	<u>Base Case</u>	<u>Enhanced Case</u>
1986	170,400	170,400
1991	205,700	224,000
1996	242,600	259,100
2006	315,900	331,300

The base case operations projection results in an increase of approximately 3.1 percent per year while the enhanced case has an overall growth rate of 3.4 percent per year. The higher growth rate of the enhanced case is a result of the influx of Blue Ash aircraft, as shown on Exhibit II-3.

(2) Local and Itinerant Operations

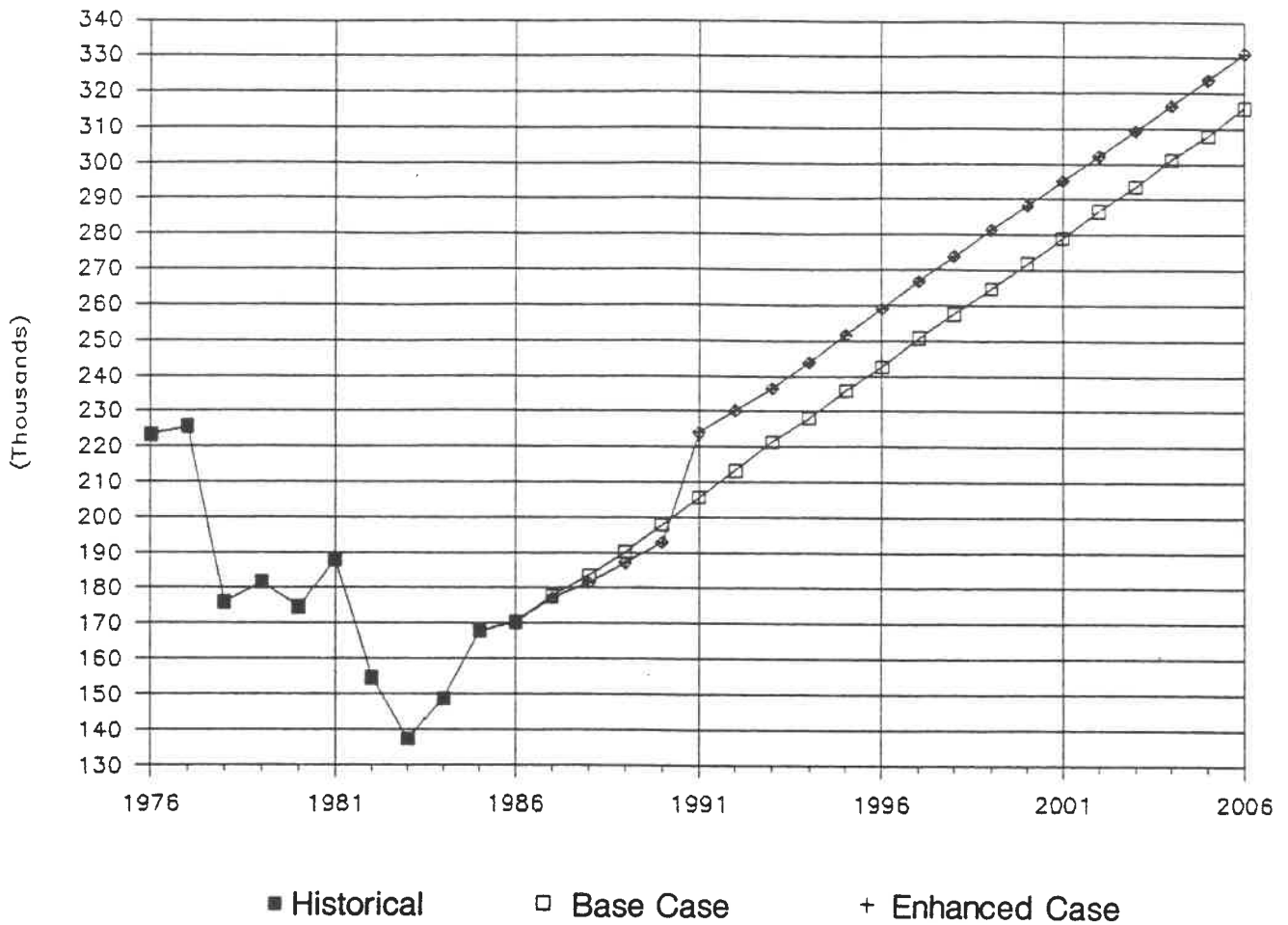
Local operations, defined by the FAA, are operations that:

- . Are known to be departing for or arriving from flight in practice areas located within a 20-mile radius of the airport.
- . Operate in the local traffic patterns or within site of the airport.
- . Are executing simulated instrument approaches in low passes at an airport.

Itinerant operations are all other operations. Examination of the Airport's historical relationship between local and itinerant operations shows that the percentage split has been roughly 50 percent itinerant and 50 percent local for six of the past nine years. Therefore, it was assumed that 50 percent will continue to represent the local versus itinerant operations split.

(3) Instrument Approaches

Annual instrument approaches (instrument flight rule condition approaches conducted in actual instrument flight rule conditions) were projected by relating historical instrument approaches to historical operations and projecting the observed trend into the future. Lunken Field



has historically conducted a higher than average percentage of instrument approaches (as great as five percent in 1985 but between 2.3 and 3.1 percent for 1981 to 1984). Given the historical data, the trend to more avionics in all aircraft, and the general shift to more business class aircraft, it was assumed that instrument approaches will be equal to 4.5 percent of annual operations. The projection is presented below.

<u>Year</u>	<u>Instrument Approaches</u>	
	<u>Base Case</u>	<u>Enhanced Case</u>
1986	8,390	8,390
1991	9,250	10,080
1996	10,920	11,660
2006	14,220	14,960

(4) Military Operations

Military operations at Lunken Field declined from 1,227 in 1979 to approximately 900 estimated for 1986. Historically, they have made up less than one percent of the airfield's operational activity. It was assumed that military operations will make up 0.5 percent (the observed percentage for 1985 and 1986) of the base case operations projections. The projection is summarized below.

<u>Year</u>	<u>Total Military Operations</u>
1986	890
1991	1,130
1996	1,210
2006	1,580

Unless the Department of Defense requirements change, Lunken Field's use by the military will remain low.

(5) Airfield Peaking Characteristics

Because many facility needs are related to levels of activity during peak periods, projections were developed for peak month, design day, design hour, and average peak hour. A comprehensive historical data pool was examined for Lunken Field to determine the peaking characteristics. The approach taken to extract the necessary activity descriptions is outlined below.

- Peak month is defined as the calendar month when peak aircraft operations occur. Review of data from the past seven years, presented below, showed that the monthly peaking percentage for projections should be 10 percent.

<u>Year</u>	<u>Peak Month</u>	<u>Number of Operations</u>	<u>Annual Operations</u>	<u>Percent</u>
1979	August	18,690	181,469	10.3%
1980	July	17,266	174,109	9.9%
1981	July	19,568	184,145	10.6%
1982	June	15,654	145,114	10.8%
1983	September	13,978	134,429	10.4%
1984	June	15,238	152,680	10.0%
1985	May	16,759	168,157	10.0%

- Design day is defined as the average day within the peak month. This indicator can be easily developed by dividing peak month operations by 30 or 31 days per month. A 31-day month was assumed for design day operations at Lunken Field.
- Design hour operations, defined as the peak hour within the design day, often range between 10 and 15 percent of the design day for total general aviation operations. Note that the design hour does not represent the absolute busiest hour ever experienced by the Airport; rather, it is a typical busy hour during a typical busy day. Lunken operational data for July 1986 were examined and the peak hour operations were identified for each day of the month. The peak hour operations were combined and divided by the total monthly operations to yield a representative peaking of 14.4 percent. This figure was selected to represent the design hour operational peaking

percentage for projections.

- . Average peak hour demand during the peak month is a very specialized peaking percentage used in the determination of the airport's capacity. Examination of the historical records determined that this planning figure is equal to nine percent of the design day operations. Table II-1 presents the projected airfield peaking characteristics.

3. FLEET MIX

Projections of the Airport's based and operational fleet mixes are especially useful in developing future plans. The based aircraft fleet mix was determined using the historical fleet mix percentages for Lunken Field, the area, and the U.S. as well as projected U.S. and area registered aircraft fleet mixes. The projected based aircraft fleet mix percentages are presented below.

<u>Year</u>	<u>Single-Engine</u>	<u>Twin-Engine</u>	<u>Business Jet</u>	<u>Helicopter</u>	<u>Total</u>
1986	52.7%	28.6%	17.0%	1.9%	100.0%
1991	50.0%	30.0%	18.0%	2.0%	100.0%
1996	48.0%	31.0%	19.0%	2.0%	100.0%
2006	45.0%	21.0%	21.0%	3.0%	100.0%

Lunken Field currently has a relatively high percentage of twin-engine and business jet aircraft. This trend is expected to continue into the future. The reduction in the percentage of single-engine aircraft is reflective of national trends.

The operational fleet mix percentages were developed for Lunken Field using actual operational data, national trends, area trends, and Lunken based aircraft expectations. As with based aircraft, the Airport has a relatively high percentage of twin-engine and business jet aircraft operations, reflective of its role as the area's primary corporate airport. Operational fleet

TABLE II-1

Lunken Field Master Plan Update
 AIRFIELD PEAKING CHARACTERISTICS

	1991		1996		2006	
	Base Case	Enhanced Case	Base Case	Enhanced Case	Base Case	Enhanced Case
Annual Operations	205,700	224,000	242,600	259,100	315,900	331,300
Peaking Factor	10%	10%	10%	10%	10%	10%
Peak Month Operations	20,570	22,400	24,260	25,910	31,590	33,130
Design Day Operations	665	720	780	835	1,020	1,070
Peaking Factor	14.4%	14.4%	14.4%	14.4%	14.4%	14.4%
Design Hour Operation	96	104	112	120	147	154
Average Peak Hour Demand	60	65	70	75	92	96

Source: Aviation Planning Associates, Inc.

mix projections are presented below.

<u>Year</u>	<u>Single-Engine</u>	<u>Twin-Engine</u>	<u>Business Jet</u>	<u>Helicopter</u>	<u>Total</u>
1986	45.0%	37.0%	17.0%	1.0%	100.0%
1991	44.0%	37.0%	18.0%	1.0%	100.0%
1996	43.0%	37.0%	19.0%	1.0%	100.0%
2006	40.0%	38.0%	21.0%	1.0%	100.0%

4. OTHER PROJECTIONS

Two additional aviation demand elements, air cargo and volume of dispensed fuel, were examined to determine their possible impacts on Lunken Field.

(1) Air Cargo

Very little data exist concerning the volumes of air cargo passing through Lunken Field. The amount is relatively small and primarily limited to incidental cargo carried by businesses on their own aircraft for their own use. Express freight and cancelled check flights occur nightly. These freight operations occur without fixed freight facilities. Because the volume is low and not expected to significantly increase, and due to the absence of any reliable historical data, no projection of air cargo demand was prepared.

(2) Volume of Dispensed Fuel

The volume of dispensed fuel was projected based upon the historical relationships between annual operations and volume and type of fuel dispensed. The trend over the past six years has been to higher volumes of fuel dispensed per operation and a pronounced shift to jet fuel. This trend is

expected to continue until jet fuel makes up 95 percent of the total volume. The projections, in millions of gallons, are summarized below.

<u>Year</u>	<u>Base Case</u>			<u>Enhanced Case</u>		
	<u>Gas</u>	<u>Jet</u>	<u>Total</u>	<u>Gas</u>	<u>Jet</u>	<u>Total</u>
1985	0.48	4.58	5.06	0.48	4.58	5.06
1991	0.38	6.03	6.41	0.42	6.57	6.99
1996	0.39	7.42	7.81	0.42	7.93	8.35
2006	0.54	10.26	10.80	0.57	10.76	11.33

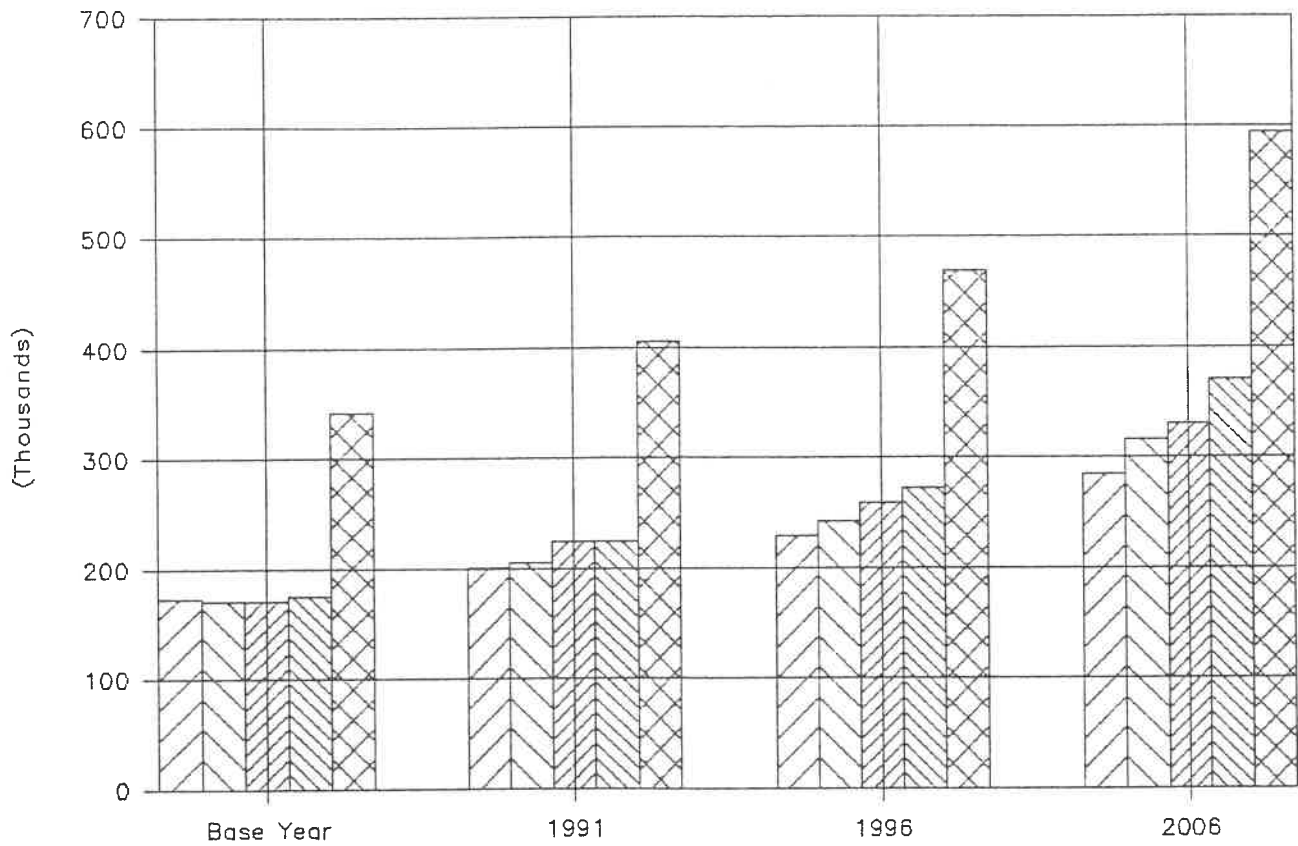
5. COMPARISON OF PROJECTIONS

The preferred projections of based aircraft and annual operations were compared to the 1975 Master Plan forecast, the FAA's terminal area forecasts (TAF), and the National Plan of Integrated Airport Systems 1984-1983 (NPIAS). The Ohio State Aviation System Plan is currently under revision and current projections are not yet available. Exhibit II-4 shows that the base case, enhanced case, TAF, and NPIAS annual operations projections fall within a fairly narrow range. The 1975 Master Plan projections are quite high, missing the base year by approximately 170,000 operations. This degree of error is not unusual for an 11-year-old forecast, but does indicate that they should be rejected from further use.

Exhibit II-5 illustrates the based aircraft projections. It should be noted again that the 1975 Master Plan projections should be retired from use due to inaccuracies caused by time. The NPIAS and base and enhanced case projections are in general agreement in number of aircraft and growth rates.

6. SUMMARY

For convenience, the major aviation demand projections are summarized on Tables II-2 and II-3. The unconstrained demand at



TAF
 Base Case
 Enhanced Case
 NPIAS
 75 Plan



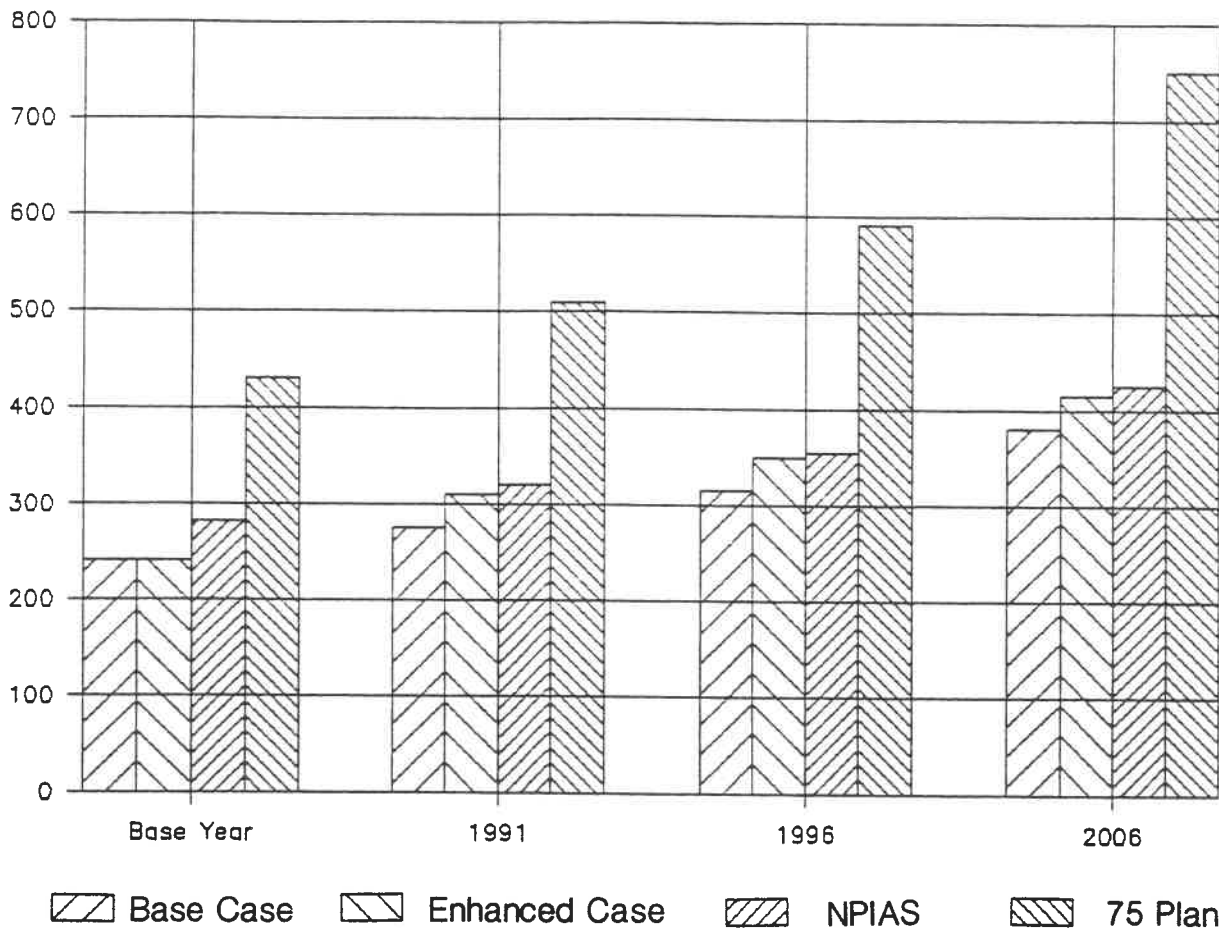


TABLE II-2

Lunken Field Master Plan Update

PROJECTION SUMMARY

Aviation Demand Element	Base Year	Projection Year		
	1986	1991	1996	2006
Area Registered Aircraft 1/	1,096 2/	1,255	1,420	1,735
LUK Based Aircraft: 4/				
Base Case 3/	241	275	315	380
Enhanced Case	241	310	350	415
Annual Aircraft Operations:				
Base Case	170,400 5/	205,700	242,600	315,900
Enhanced Case	170,400	224,000	259,100	331,300
Annual Military Operations	890 5/	1,130	1,210	1,580
Annual Instrument Approaches:				
Base Case	8,390 5/	9,250	10,920	14,220
Enhanced Case	8,390	10,080	11,660	14,960
Design Hour Operations:				
Base Case	79 5/	96	112	147
Enhanced Case	79	104	120	154
Total Fuel Dispensed: (in millions of gallons)				
Base Case	5.06 2/	6.41	7.81	10.80
Enhanced Case	5.06	6.99	8.35	11.13

1/ Area = Butler, Clermont, Hamilton, and Warren counties in Ohio; Boone, Kenton, and Campbell counties in Kentucky; and Dearborn County in Indiana.

2/ 1985 data.

3/ Base case assumes no Blue Ash aircraft; the enhanced case assumes the addition of 35 Blue Ash aircraft by 1991.

4/ LUK = Lunken Field

5/ 1986 estimated based upon six months of data.

Source: Aviation Planning Associates, Inc.

TABLE II-3

Lunken Field Master Plan Update

FLEET MIX SUMMARY ^{1/}

	<u>Base Year</u>	<u>Projection Year</u>		
	<u>1986</u>	<u>1991</u>	<u>1996</u>	<u>2006</u>
Single-Engine				
Based	53%	50%	48%	45%
Operational	45%	44%	43%	40%
Twin-Engine				
Based	29%	30%	31%	31%
Operational	37%	37%	37%	38%
Business Jet				
Based	17%	18%	19%	21%
Operational	17%	18%	19%	21%
Helicopter				
Based	2%	2%	2%	3%
Operational	1%	1%	1%	1%

^{1/} Based aircraft fleet mix expressed as a percentage of total based aircraft. Operational fleet mix expressed as a percentage of total annual operations.

Source: Aviation Planning Associates, Inc.

Lunken Field is expected to increase roughly two to three percent per year during the planning period. The Airport will continue to experience a healthy demand for based aircraft facilities, steady growth in total operations, and a high percentage of instrument approaches. The Airport's based aircraft and operational fleet mixes will continue to experience the national trend toward increased use of business class aircraft with moderate growth in business jets and twin-engine aircraft.

III.

Demand/Capacity and Facility Requirements

III. DEMAND/CAPACITY ANALYSES AND DETERMINATION OF FACILITY REQUIREMENTS

This chapter describes the facilities required to accommodate aviation demand at Lunken Field during the 20-year planning period. Facility specifications were developed by comparing the existing capacities of Lunken's airside and landside facilities to the aviation demand projections presented in Chapter II.

The facility requirements identified in this chapter represent a level of detail which is common to a master planning effort, not the level that would be suitable for an architectural or engineering design study. Individual quantities of improvements are identified to provide a general basis for identification and evaluation of development alternatives (discussed in Chapter IV). This chapter is organized in the following sections:

- . Airfield Facility Requirements
 - Runways and Taxiways
 - Instrumentation and Lighting
- . Landside Facility Requirements
 - Functional Areas Defined
 - Distribution of Based Aircraft
 - Functional Area Growth
- . Summary

1. AIRFIELD FACILITY REQUIREMENTS

Airfield facility requirements were identified based on comparison of the airfield's existing capacity with future aviation demands. Requirements for Lunken Field, in response to this relationship between the demand placed on the airfield and its capacity to meet that demand, are presented in the following

development categories:

- . Runways and Taxiways
- . Airfield Instrumentation and Lighting

Before proceeding with the determination of airfield facility requirements for Lunken Field, it is appropriate to examine the airport's role and resulting facility classification. Applying FAA standards to the airport's runway lengths and weight bearing capacities, the primary runway (2R/20L) is classified as a transport runway, the crosswind runway (6/24) is a general utility runway, and Runway 2L/20R is a basic utility stage II runway. These roles are not expected to change throughout the planning period.

In determining design standards for the Airport, its critical aircraft must be selected. An airplane's wingspan is the principal physical characteristic affecting airport design. Since the magnitude of other airplane physical characteristics correlates with wingspan, the FAA has developed an airplane design group concept which groups airplanes by wingspan and relates airport design standards to these design groups. ^{1/}

The most demanding aircraft representative of aircraft using Lunken Field on a regular basis is the Gulfstream III. This aircraft has a wingspan of approximately 78 feet and is classified under Design Group II. Design Group II includes aircraft with wingspans of 49 feet up to, but not including, 79 feet. Design Group II aircraft includes Lear jets, Citations, Gulfstreams, and other larger business jets.

^{1/} Federal Aviation Administration, "Airport Design Standards-Transport Airports" and "Utility Airports - Air Access to National Transportation."

(1) Runways and Taxiways

The requirements for runways and taxiways may be described in a number of terms. In this study, the following descriptors are used:

- . Runway Orientation
- . Runway Capacity
- . Runway Length
- . Geometric Design Standards
- . Pavement Strength
- . Taxiway Configuration

Each of these requirement categories is discussed below.

1. Runway Orientation

The orientation of runways for takeoff and landing operations is primarily a function of wind velocity and direction, combined with the ability of aircraft to operate under adverse conditions. As a general rule, the primary runway at an airport is oriented as close as practical in the direction of the prevailing winds. The most desirable runway configuration provides the highest wind coverage for a given maximum crosswind component. Runway wind coverage is that percent of time in which operations can safely occur because of acceptable crosswind components. The crosswind component is the vector of wind velocity and direction which acts at a right angle to the runway. The desirable wind coverage for a runway system has been set by the FAA at 95 percent with a 12-mph (10.5 knot) crosswind component. ^{1/}

The individual runways at Lunken Field combine to provide 97 percent all weather, 12-mph crosswind component wind coverage. Of the 84 percent of the time VFR conditions are likely to occur, Lunken Field enjoys 97 percent 12-mph crosswind component wind coverage. Under IFR conditions, which occur 16 percent of the time, the Airport also has 97 percent coverage. Because the primary runway and crosswind runways are

^{1/} Federal Aviation Administration, "Utility Airports - Air Access to National Transportation."

both capable of supporting the design aircraft, there are no deficiencies in the Airport's current runway orientation.

2. Capacity

In recent years, airfield capacity analyses have changed, both in definition and methodology. The earlier method, often referred to as the Airborne Instrument Laboratory (AIL) method, calculated capacity as the number of aircraft operations which the airfield configuration could accommodate at a specific level of delay. With this technique, the practical capacity level could be increased with additional delay. This methodology was used in the development of the 1975 Master Plan.

The more current definition describes airfield capacity as the maximum number of aircraft operations that an airfield configuration can accommodate during a specified interval of time, when there is a continuous demand for service (i.e., an aircraft is always waiting to depart or land). This more current application of capacity analysis is referred to as the ultimate capacity or the maximum throughput rate. One benefit of this methodology is that it avoids the difficulty of defining an acceptable level of delay, which was a requirement of the AIL methodology.

The ultimate capacity methodology was used for this study because it is more current and widely used throughout the industry; the FAA also prefers this methodology and has devoted time and resources to its enhancement. The capacity analyses are described in the following subsections:

- . Airport Layout and Runway Configurations
- . Operating Flight Rules
- . Airport Fleet Mix and Design Hour Demands
- . Peak-Hour Airfield Capacity Analysis
- . Annual Service Volume
- . Sensitivity Analysis
- . Additional Considerations

The implications of these analyses (i.e., additional airfield requirements) are described in subsequent sections of this chapter.

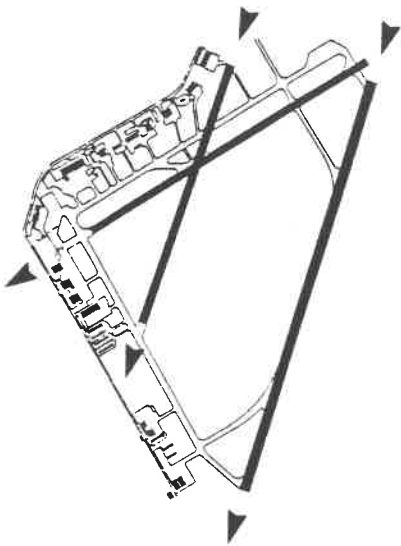
- . Airfield Layout and Runway Configuration - As described in Chapter I, Lunken Field has three runways: two parallel 2/20 runways, and a single 6/24 crosswind runway.

Operationally, the runways are used in different combinations (configurations) depending upon wind and weather conditions and upon the type of demand being accommodated (aircraft fleet mix).

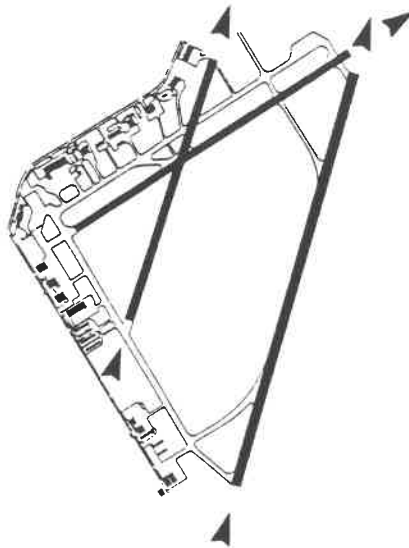
The 2,100-foot horizontal separation between the two parallel runways is sufficient to allow simultaneous, independent arrivals at the Airport during favorable weather conditions. These operating configurations are shown in Exhibits III-1 and III-2. Discussions with Airport staff and FAA air traffic control tower personnel, as well as an analysis of historical and current airport operations, were the basis for development of the specific configurations depicted in these exhibits.

Several assumptions included in the preparation of Exhibits III-1 and III-2 should be discussed. First, these configurations do not include all possible combinations. Rather, they include configurations which are most frequently used. Additionally, the configurations are representations of those used during high or peak demand periods, requiring the air traffic controller to queue aircraft and to operate well defined configurations. During periods when demand is well below peak levels, runway usage is often selected on the basis of convenience as determined by either the origination or destination location. When peak demand periods occur, or when weather conditions require, the air traffic controller shifts to the more defined configurations presented in these exhibits.

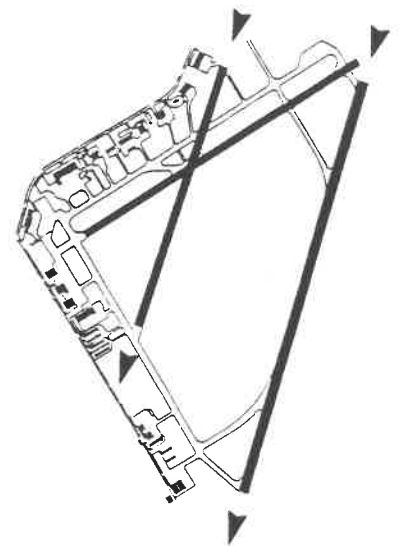
Flight Rules - Exhibits III-1 and III-2 separate the configurations into VFR and IFR categories. The federal government prescribes two basic types of flight rules: visual flight rules (VFR) and instrument flight rules (IFR). VFR are typically in effect when weather conditions are such that aircraft can maintain safe separation by visual means. IFR conditions occur when the visibility or ceiling falls below those minimums prescribed under VFR.



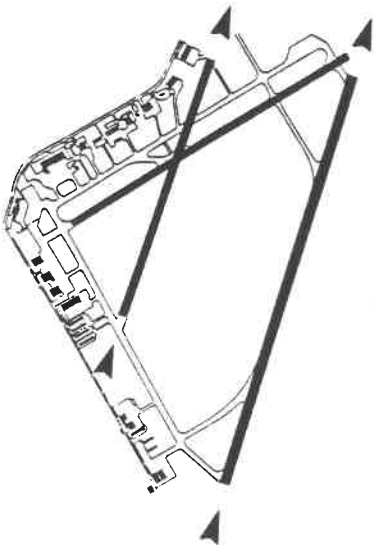
VFR 1



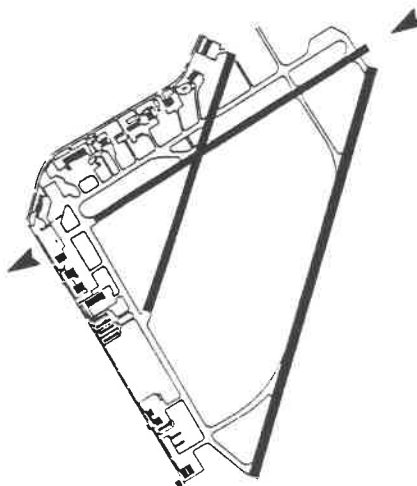
VFR 2



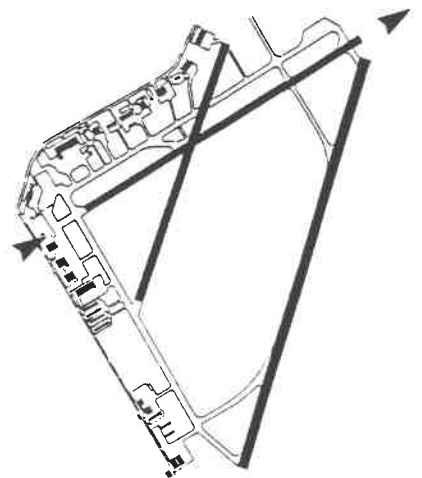
VFR 3



VFR 4



VFR 5



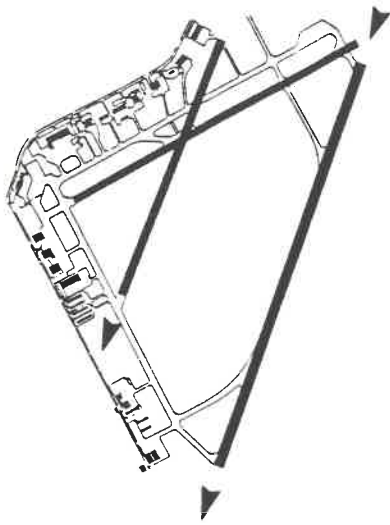
VFR 6



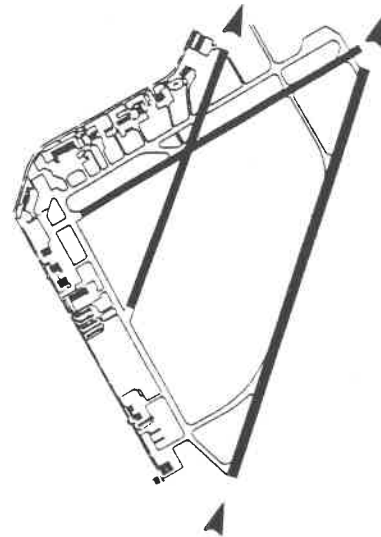
Lunken Field
Airport Master Plan

VFR OPERATING CONFIGURATIONS

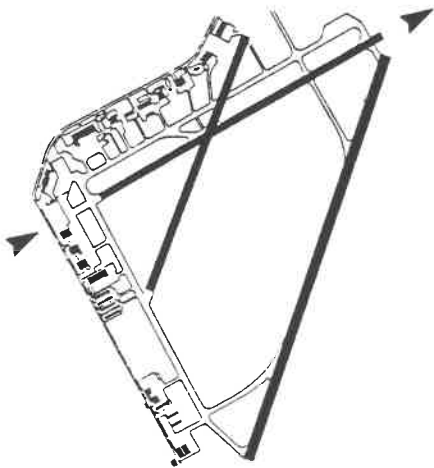
EXHIBIT
III-1



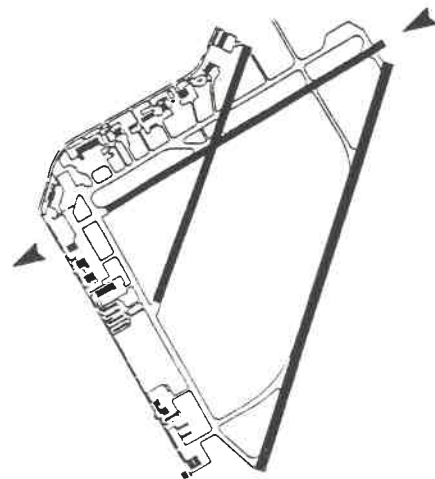
IFR 1



IFR 2



IFR 3



IFR 4



Lunken Field
Airport Master Plan

IFR OPERATING CONFIGURATIONS

EXHIBIT
III-2

For Lunken, VFR minimums are 1,000 feet above Airport elevation and three nautical miles visibility. During periods of IFR, aircraft operating patterns become the responsibility of the control tower. In such cases, traffic configurations are dependent upon the existence of instrument NAVAIDS and the degree of precision which they supply.

The distinction between IFR and VFR is important because the separation distance required between aircraft operating in IFR conditions is greater than that required during VFR conditions. Consequently, fewer aircraft operations can occur in the same configuration during IFR conditions than during VFR conditions. As described in Chapter I, VFR conditions occur 84 percent of the time.

Aircraft Fleet Mix and Peak-Hour Demand - The projected aircraft fleet mix for Lunken was also developed within the projection of demand effort. For purposes of the airfield capacity analyses, aircraft fleet mix has been categorized into the four aircraft classes listed in Table III-1. Also shown in Table III-1 are the physical aspects of the four aircraft classes and their relationship to terms used in wake turbulence standards.

Similar to the runway use configurations, aircraft fleet mix estimations must consider VFR and IFR conditions to adjust for the decrease in demand during IFR periods. To develop peak hour fleet mix estimations for VFR and IFR, the following assumptions were made:

- All Class C aircraft were assumed to have instrument capability; therefore, IFR and VFR demands are the same, resulting in an increased fleet mix percentage during IFR conditions.
- The effect of weather on noncorporate general aviation traffic is assumed to vary for the different aircraft classifications. Seventy-five percent of Class A and 50 percent of Class B operations are expected to drop out during IFR conditions.

TABLE III-1
Lunken Field Master Plan Update
AIRCRAFT FLEET MIX CLASSES

Aircraft Class	Maximum Certificated Takeoff Weight (lbs)	Number of Engines	Wake Turbulence Classification
A	12,500 or Less	Single	Small (S)
B		Multi	
C	12,500 - 300,000	Multi	Large (L)
D	Over 300,000	Multi	Heavy (H)

Source: FAA Advisory Circular 150/5060-5 "Airport Capacity and Delay."

Table III-2 shows the resulting VFR and IFR fleet mix projections for the planning periods.

Chapter II identified annual demand projections of aircraft operations in an unconstrained environment based upon historical Lunken activity. From this information, capacity analyses were performed for the existing case as well as for each of the planning periods (i.e., 1991, 1996, and 2006). Capacity constraints that were identified are addressed in a subsequent sensitivity analyses which identify capacity-increasing alternatives for the airfield. Further constraints, if identified, are addressed through a redistribution of demand to other airports within the Cincinnati region.

Peaking characteristics, based on Lunken's historical aviation activity, are summarized as follows:

<u>Period</u>	<u>Peaking Characteristics</u>
Peak Month	10% of Annual Demand
Average Day	Peak Month/31 Days
Peak Hour	9% of Average Day

The resulting peak hour demands are shown in the following table:

	<u>1986</u>	<u>1991</u>	<u>1996</u>	<u>2006</u>
Peak Hour Operations	49	60	70	92

As shown, the peak hour demand continues at an unconstrained rate in conjunction with the annual demand estimations included in Chapter II. Should the Airport reach a demand which results in significant delays per aircraft operation, however, it is assumed that the peaking characteristics for Lunken will change along with the annual demand for the facility. Further discussion of this

TABLE III-2
Lunken Field Master Plan Update
OPERATIONAL FLEET MIX PERCENTAGES

Aircraft Class	Base Year 1986		1991		1996		2006	
	VFR	IFR	VFR	IFR	VFR	IFR	VFR	IFR
A	46	25	45	23	44	22	41	20
B	37	40	37	40	37	39	38	38
C	17	35	18	37	19	39	21	42
D	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	100%	100%	100%	100%	100%	100%	100%	100%

Source: Aviation Planning Associates, Inc.

relationship is included in later sections of this chapter.

. Peak Hour Airfield Capacity Analysis - The ultimate capacity for each of the predominant runway configurations (VFR and IFR) at Lunken was computed using the most recent version of the FAA's Advisory Circular on runway capacity. Input requirements for these calculations included runway configurations, instrumentation, dimensional criteria and spacing, fleet mix, touch-and-go activity assumptions, and runway exit ratings. Additionally, unique fleet mix data were input for each phase of the planning period; however, a lack of significant change in the percentage of Class C aircraft resulted in identical hourly capacity results.

Assuming that the Airport operates in its greatest capacity configurations whenever possible, an analysis was performed to calculate the amount of time in which it was necessary to use lesser capacity configurations due to weather and wind requirements. These data, in conjunction with an hourly capacity and percent maximum capacity weighting factor (defined by the FAA Advisory Circular), were used to calculate an existing airfield weighted hourly capacity (C_w) of 84.51 operations per hour for the Airport.

. Annual Service Volume - Annual capacity, or annual service volume (ASV), was calculated using the weighted hourly capacity (C_w) and the peaking characteristics of the Airport. Assuming an unconstrained demand, and therefore the existing peaking characteristics, the ASV for the Airport was calculated as 291,000 operations. The results of this analysis, as well as the C_w for the Airport, are presented in Table III-3.

Table III-4 presents estimations for the average annual aircraft delay dependent upon the ratio of annual demand to annual service volume. As shown, this relationship increases exponentially as capacity approaches and exceeds 100 percent. Unconstrained demand at Lunken, by 2006, will approach over four minutes delay per

TABLE III-3
Lunken Field Master Plan Update
AIRFIELD DEMAND/CAPACITY
ANALYSIS RESULTS

<u>Period</u>	<u>Variable</u>	<u>Capacity</u>	<u>Demand</u>			
			<u>1986</u>	<u>1991</u>	<u>1996</u>	<u>2006</u>
Hourly	C _w	85	49	60	70	92
Annual	ASV	291,090	170,400	205,700	242,600	315,900
Percent of Capacity			59%	71%	83%	109%

Source: Aviation Planning Associates, Inc.

TABLE III-4

Lunken Field Master Plan Update

AVERAGE ANNUAL AIRCRAFT
DELAY (MINUTES)

<u>Percent of Capacity</u>	<u>Estimated Average Annual Aircraft Delay (Minutes Per Operation)</u> ^{1/}
10 %	0.0
20	0.1
30	0.2
40	0.3
50	0.4
60	0.5
70	0.7
80	1.0
90	1.5
100	2.3
110	4.5
120	8.5
130	12.5

^{1/} Source: FAA Advisory Circular 150/5060-5, "Airport Capacity and Delay."

aircraft. The actual delay at any given time depends on a number of conditions and can vary by a factor of five or more.

Sensitivity Analysis - In view of the expected capacity limitations associated with the existing airfield, further analyses were performed to determine if improvements may be made to fully meet the projected demand. Although specific plans and facilities will be identified in the subsequent alternatives chapter, this section identifies general capacity-increasing factors which may be utilized at Lunken. In performing this analysis, each of the inputs to the hourly capacity calculation was analyzed to identify possible increases, including:

- Runway orientations and configurations
- Taxiway locations (i.e., runway exit factors)
- Fleet mix
- Airport approach aids
- Touch-and-go factors

It is important to note that increased hourly capacity would also be supplied by the addition of a runway to the airfield system. For this analysis, however, it was estimated that such an increase would not justify the additional land acquisition, terrain, and noise problems. This alternative is discussed further in Chapter IV, Identification and Evaluation of Alternatives.

In recalculating the hourly capacities for different airfield improvements, taxiway enhancements (i.e., runway exits) were found to result in significant increases by allowing landing aircraft to maneuver off the landing area as quickly as possible, thereby releasing the runway for another aircraft. For an exit to be effective within this analysis, it must be located in an area which allows quick egress by landing aircraft. For these analyses, the appropriate range was determined to be 2,000 to 4,000 feet from the

beginning of the runway. Currently, Runways 2R and 20L do not have exits within this range.

This lack of suitable taxiways was also noted in Chapter I because of the air traffic control problems associated with runway/taxiway crossings. For the following analysis, it was assumed that each runway contained at least one exit taxiway between 2,000 and 4,000 feet from the beginning of the runway.

The effects of the taxiway improvements on the airfield capacity are presented in the following table:

<u>Configuration</u>	<u>C_w</u>	<u>ASV</u>
Existing (Base)	84.51	291,000
With Taxiway Additions	88.07	303,000

As shown, the added improvements give the airfield an additional four percent annual service volume. This increased capacity is estimated to cut the average aircraft delay in 2006 from over four minutes to approximately three minutes per aircraft.

Additional instrumentation, including a straight-in nonprecision approach to Runway 6 to replace the current circling approach, was also examined as a capacity-enhancing measure. ^{1/} It was found that the additional straight-in approach failed to provide any measurable capacity increases.

^{1/} The term "straight-in" denotes an approach which serves the nearest runway, as compared to a "circling" approach which serves a separate runway and requires the pilot to maneuver into a landing position from a higher altitude. The "circling" approach generally cannot be attempted safely during periods of very low visibility. Additionally, the term "precision" denotes the use of an electronic signal (a glide slope), which provides the pilot with vertical guidance information during the approach. The precision approach provides the pilot with the most accurate guidance information.

As discussed earlier, the ASV of the airfield is also dependent upon the peaking characteristics of the Airport's traffic. As the demand for the facility increases and approaches the ASV, especially during peak hours, it is assumed that traffic will be diverted to other airports or be operated during nonpeak hours. The result of this variation would be a lowering of the hourly peaking percentage.

Consequently, as the demand begins to affect the peaking characteristics, the ASV increases. The following equation shows this relationship:

$$ASV = C_w \cdot D \cdot H = 291,090$$

Variable	Existing Value
C_w = Weighted Hourly Capacity	85
D = Ratio of Annual Demand to Avg. Daily Demand During Peak Month	311
H = Ratio of Avg. Daily Demand to Average Peak Hour Demand During Peak Month	11

As H becomes larger, due to a levelling off of peak hour traffic and an increase during non-peak periods, ASV increases accordingly. As previously discussed, the annual demand for Lunken is expected to surpass the ASV during the last phase of the planning period (i.e., sometime between 1996 and 2006). If, however, traffic delays affect Airport peaking characteristics, as expected, it is reasonable to assume that the ASV will not be exceeded. The remainder of this study was based upon this assumption.

3. Runway Length

Runway length requirements at Lunken Field were determined using the design aircraft's general specifications and the generalized characteristics of the general aviation fleet. The Gulfstream III's

general specifications are ^{1/}:

- . Approach speed - 136 knots
- . Wingspan - 77.8 feet
- . Length - 82.7 feet
- . Maximum takeoff weight - 68,700 pounds (dual wheel gear)
- . Runway length requirements at 68,700 pounds-6,100 feet

The generalized runway takeoff length requirements for turbojet aircraft under 60,000 pounds are ^{2/}:

- . 4,700 feet for 75 percent of the fleet at 60 percent useful load
- . 5,700 feet for 100 percent of the fleet at 60 percent useful load

Runway 2R/20L, the primary runway, is of sufficient length (6,100 feet) to accommodate the design aircraft as well as 100 percent of the under 60,000 pounds turbojet fleet at 60 percent useful weight. The crosswind runway, Runway 6/24, is of sufficient length (5,239 feet) to accommodate over 75 percent of the under 60,000 pound turbojet fleet at 60 percent useful load. Both runways are of sufficient length for their role at the Airport. Runway 2L/20R exceeds the FAA's requirement of 3,200 feet for a basic utility Stage II runway by approximately 617 feet and requires no additional length. ^{3/}

4. Geometric Design Standards

Runways and taxiways at Lunken Field should be designed in accordance with the FAA standards presented in Table III-5, based upon their anticipated use. For

1/ Data on Gulfstream III provided by the manufacturer.

2/ FAA, "Airport Design Standards - Transport Airports."

3/ FAA, "Utility Airports - Air Access to National Transportation."

TABLE III-5

Lunken Field Master Plan Update

AIRFIELD DESIGN STANDARDS

Descriptor	Runway 2L/20R Visual Utility Runway	Runway 6/24 Nonprecision Transport Runway	Runways 2R/20L and 6/24 Precision Transport Runway
	Aircraft Design Group I ^{1/}	Aircraft Design Group II ^{2/}	Aircraft Design Group III ^{2/}
Runway Width	60 feet	100 feet	100 feet
Runway Safety Area:			
Width	120 150 feet	500 feet	500 feet
Length	240 feet	1,000 feet	1,000 feet
Taxiway Width	25 feet	50 feet	50 feet
Taxiway Safety Area Width	49 feet	79 feet	118 feet
Runway Centerline to:			
Parallel Runway Centerline			
. During IFR Conditions	-	4,300 feet	4,300 feet
. During VFR Conditions	700 feet	700 feet	700 feet
Parallel Taxiway Centerline	225 feet	400 feet	400 feet
Building Restriction Line	200 feet	500 feet	750 feet
Aircraft Tie-Down Area	200 feet	500 feet	500 feet
Property Line	250 feet	500 feet	750 feet
Taxiway Centerline to:			
Parallel Taxiway Centerline	69 feet	103 feet	153 feet
Fixed or Moveable Obstacle	50 feet	64 feet	94 feet
Aircraft Tie Down Area	50 feet	64 feet	94 feet

^{1/} Federal Aviation Administration, "Utility Airports - Air Access to National Transportation."

^{2/} Federal Aviation Administration, "Airport Design Standards - Transport Airports."

example, the more demanding transport category standards should supersede the utility standards when the runway or taxiway will be, or is expected to be, used by the transport category aircraft.

All proposed improvements to the airfield will incorporate these standards except in cases where existing conditions make it impossible to do so.

Several areas of the airfield fall outside the minimum design standards. These include:

- . The clear zones for Runways 2R, 2L, 6, and 20L extend off Airport property and must be under positive control of the Airport.
- . The Avionics, Inc., hangar (Building 15, shown on Exhibit I-4) is in the safety area of Runway 6/24.
- . The aircraft parking apron of the Avionics, Inc., hangar is within the aircraft parking line 250 feet off the Runway 6 centerline.
- . A small portion of the aircraft parking apron of the Condor Hangar (Building 1 shown on Exhibit I-4) is within the aircraft parking line for Runway 20R.
- . Four buildings are within the Runway 6 building restriction line (BRL). Two are on Airport property (the Avionics, Inc., hangar and an Airport support building) and two are off Airport property on the Ohio River side of the levee.
- . Five buildings are within Runway 20L's BRL. All are on Airport property and are associated with the Lunken Golf Course and Playfield. Exhibit I-4 shows the building locations near Beechmont Avenue.

While the above deficiencies are undesirable, their rectification may be an unproductive use of time and money. Many of the areas were developed under standards that are now inapplicable due to airfield growth or were revised to more demanding dimensions. All new development on the airfield should follow the appropriate design standards except for the variations required to integrate improvements into the existing facilities. Chapter IV addresses the feasibility of correcting these problem areas.

5. Pavement Strength

The weight bearing capacity of Runway 2R/20L is 40,000 pounds single wheel (S), 50,000 pounds dual wheel (D), and 95,000 pounds dual tandem (DT); Runway 6/24 is 11,000-S, 20,000-D, 55,000-DT; and Runway 2L/20R is 11,000-S. These capacities are listed in the FAA's "Airport/Facility Directory" effective August 28, 1986, to October 23, 1986, and concur with the FAA's 5010 form and other published sources. However, there is some doubt concerning the published strength of the runways. The 1975 Master Plan indicates that Runways 6/24 and 2R/20L were rated at 50,000-S, 75,000-D, and 138,000-DT. Discussions with the City of Cincinnati Engineering Department have failed to resolve this discrepancy.

The weight bearing capacities of the runways should be as follows:

- . Runway 2R/20L - 45,000-S, 70,000-D, and 135,000-DT
- . Runway 6/24 - 45,000-S, 70,000-D, and 135,000-DT
- . Runway 2L/20R - 12,500-S

Runways 2R/20L and 6/24 must accommodate the design aircraft weighing approximately 70,000 pounds (dual wheel gear) at maximum takeoff weight while Runway 2L/20R must accommodate light aircraft weighing no more than 12,500 pounds (single wheel gear). Until the pavement strength discrepancy is resolved, the strength of Runways 2R/20L and 6/24 will be considered deficient and the upgrade of these runways will be considered a facility requirement.

6. Taxiway Configuration

The Airport's taxiway configuration or layout is generally good. However, there are two areas where improvements need to be made. As was determined by the airfield capacity analysis, the addition of a taxiway parallel to Runway 2R/20L with acute angle exits near the middle of the runway will increase the airfield's capacity by four percent or 12,000 annual operations. The second area of concern is the configuration of the taxiways and taxilanes crossing the clear zone of Runway 20R. Chapter IV examines these taxiways and explores ways to consolidate them to minimize the

number of clear zone crossings while maintaining the access integrity of the area. Other taxiways and taxilanes may be necessary to accommodate future development.

(2) Instrumentation and Lighting

The airfield currently has extensive instrumentation and lighting facilities, as shown on Table I-1 and Exhibit I-3 (Chapter I). However, additional equipment is necessary, as described below.

1. Instrumentation

Safety considerations dictate the need for an additional straight-in precision approach to the south of the Airport (i.e., to Runway 2R).

Two factors which impact this situation are the recently designated Airport Radar Service Area (ARSA), and the planned runway at Greater Cincinnati International Airport. Both were described in Chapter I.

Currently, traffic at Greater Cincinnati International Airport operates conflicting approaches approximately 26 percent of the time and conflicting departures 16 percent of the time. ^{1/} When these operations are in effect, air traffic control procedures negatively affect operations south of Lunken by relocating traffic to the east, or by merging the traffic, causing delays. With the additional runway at Greater Cincinnati (targeted for completion in 1989), however, the conflicting approaches and departures are expected to be reduced to 4 percent and 8 percent, respectively, minimizing the traffic conflicts between the two airports. Additionally, the recent designation of the area's airspace from a TRSA to an ARSA makes radio communication in the region mandatory, further alleviating potential traffic conflicts.

^{1/} Conflicting operations include arrivals to Runways 27L and 27R, and departures from Runways 9L and 9R. Source: Greater Cincinnati International Airport Environmental Assessment, Aviation Planning Associates, Inc., 1986.

The resultant IFR capability of Lunken with the additional precision approach to Runway 2R would provide straight-in precision approaches from the north and south, and a straight-in nonprecision approach from the northeast. This system is expected to coordinate well with the north/south operating environment at CVG, although no capacity increases at Lunken are readily estimated.

2. Lighting

The following additional lighting is needed for Lunken Field:

- . Runway 2R - MALSR
- . Runway 2L - REIL and PAPI-4
- . Runway 20R - REIL
- . Runway 6 - REIL and PAPI-4
- . Runway 24 - REIL

In addition to the airfield improvements described, special-use airfield additions such as added heliport facilities and a banner-towing pick-up site, merit consideration. Although both are typically used by a small percentage of the Airport's total users, they provide an additional safety margin when these operations are in effect and are following formalized procedures.

2. LANDSIDE AIRPORT FACILITIES

The following sections describe the landside facilities needed to meet the projected demand during the planning period. It should be noted that these facility requirements do not include the replacement or restoration of existing facilities which are in need of such services or existing facilities identified to be within critical safety areas or clear zones. Should any existing facility need replacement, relocation, or rehabilitation, this need is in addition to requirements noted in this section. General planning criteria were used to identify total land, building, and apron requirements for each functional area.

(1) Functional Areas Defined

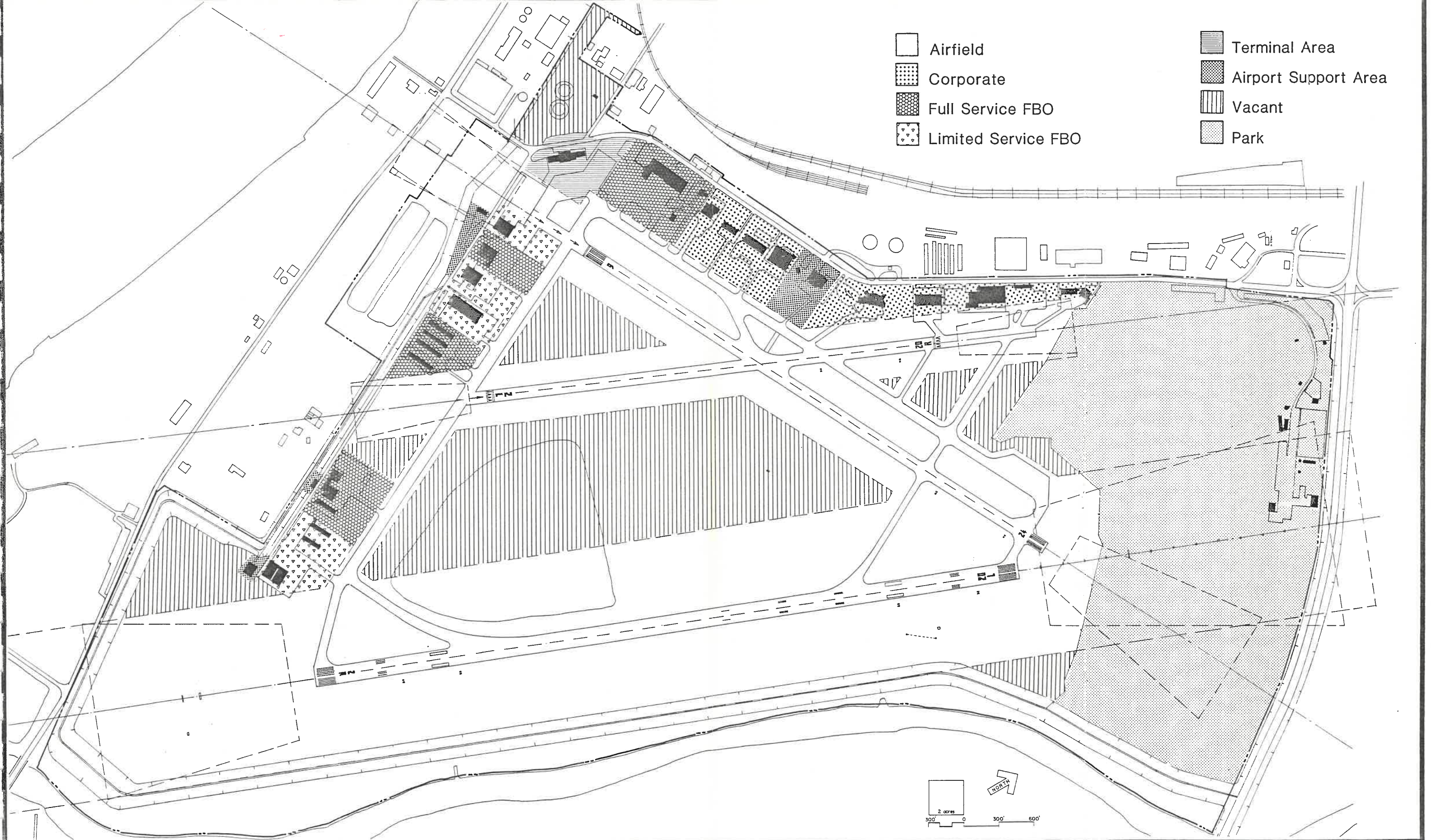
In determining these facility requirements, the following functional areas were identified at Lunken:

- . Corporate - Corporate areas are those leaseholds held primarily by corporate flight departments for the storage, maintenance, and operation of corporate aircraft. Conventional hangars are the primary storage method for these operators.
- . Full Service Fixed Base Operators - Full service FBOs provide services and products to the aviation community at the Airport including fueling, maintenance, and storage of based and itinerant aircraft. Three FBOs are in operation at Lunken Field.
- . Limited Service Fixed Base Operators - In addition to the FBOs and corporate leaseholders located on the field, there exist specialized commercial aviation leaseholders identified as limited service FBOs. These operators generally provide individual services, including engine maintenance, avionics repair, or T-hangar rental.
- . Terminal Area - The terminal area includes the terminal building, terminal auto parking, and terminal area public apron.
- . Airport Support Areas - The facilities for the storage and maintenance of Airport machinery and equipment, the CFR station, and the air traffic control tower.
- . Vacant Areas - In addition to the areas defined for the airfield, Airport, and tenants, there are areas of the Airport which are presently vacant. These areas are also identified and included in this analysis.

Exhibit III-3 shows the functional areas.

(2) Distribution of Based Aircraft

Where appropriate, these analyses were based upon the



- Airfield
- Corporate
- Full Service FBO
- Limited Service FBO
- Terminal Area
- Airport Support Area
- Vacant
- Park



growth of based aircraft within each functional area. Consequently, the existing and projected aircraft estimations presented in Chapter II were distributed among each of the functional areas and storage methods. Table III-6 presents a summary of this analysis.

(3) Functional Area Growth

Each functional area was analyzed to determine the amount of growth necessary to meet future demands. The corporate, full service FBO, and limited service FBO functional areas were determined using growth in based aircraft. The terminal area and airport support areas were examined using standard planning criteria for similar airports. The vacant areas are, of course, reduced as needed to accommodate future growth. The functional areas are discussed below.

1. Corporate, Limited Service FBO, and Full Service FBO

The future areas required for these functional areas are based on the growth in based aircraft, storage patterns, and land utilization rates (land area per aircraft). The following assumptions and observations were incorporated into the analysis:

- . Using data from Exhibit I-4 (Chapter I), the average ratio of required land per aircraft was calculated within each area. ^{1/} Where necessary, adjustments were made to these ratios to account for areas which are not utilized to their full capacity.
- . Historical data indicate that corporate aircraft require larger building (hangar) facilities than noncorporate general aviation aircraft. For instance, Table III-7 presents

^{1/} It should be noted that these land quantities include the hangar, apron, maintenance, and auto parking facilities for each functional area.

TABLE III-6

Lunken Field Master Plan Update

AIRCRAFT DISTRIBUTION

<u>Functional Area</u>	<u>1986</u>	<u>1991</u>	<u>1996</u>	<u>2006</u>
Corporate	39	48	59	80
Full Service FBO	113	127	144	170
Limited Service FBO	<u>89</u>	<u>100</u>	<u>112</u>	<u>130</u>
TOTAL	241	275	315	380
<u>Storage Method</u>	<u>1986</u>	<u>1991</u>	<u>1996</u>	<u>2006</u>
Conventional				
Hangar	73	89	107	139
T-Hangar	51	71	92	113
Paved Tie-Down	82	85	88	101
Turf Tie-Down	<u>35</u>	<u>30</u>	<u>28</u>	<u>27</u>
TOTAL	241	275	315	380

Source: Aviation Planning Associates, Inc.

TABLE III-7

Lunken Field Master Plan Update

AREA REQUIREMENTS

FUNCTIONAL AREA	Based Aircraft				Land Requirement Per Aircraft Ratio (sq. ft.)			
	Existing	1991	1996	2006	Existing	1991	1996	2006
Corporate	39	50	60	80	22,897	22,000	21,000	20,000
Full Svc FBO	113	127	144	170	5,358	5,250	5,100	5,000
Limit Svc FBO	<u>88</u>	<u>98</u>	<u>111</u>	<u>130</u>	3,019	3,000	3,000	3,000
Total	240	275	315	380				

	Total Land Requirement (acres)			
	Existing	1991	1996	2006
Corporate	20.50	25.25	28.93	36.73
Full Svc FBO	13.90	15.13	16.86	19.51
Limit Svc FBO	<u>6.10</u>	<u>6.75</u>	<u>7.64</u>	<u>8.95</u>
Total	40.50	47.13	53.43	65.19

FUNCTIONAL AREA	Hangared Aircraft Estimation				Building Requirement Per Aircraft Ratio (sq. ft.)			
	Existing	1991	1996	2006	Existing	1991	1996	2006
Corporate	34	42	52	71	4,478	4,478	4,478	4,478
Full Svc FBO	63	80	98	120	1,868	1,868	1,868	1,868
Limit Svc FBO	<u>26</u>	<u>38</u>	<u>49</u>	<u>62</u>	3,662	3,500	3,300	3,000
Total	123	160	199	253				

Functional Area	Total Building Requirement (sq. ft.)			
	Existing	1991	1995	2006
Corporate	152,252	188,076	232,856	317,938
Full Svc FBO	117,684	149,440	183,064	224,160
Limit Svc FBO	<u>95,212</u>	<u>133,000</u>	<u>161,700</u>	<u>186,000</u>
Total	365,148	470,516	577,620	728,098

Source: Aviation Planning Associates, Inc.

the building requirements per hangared aircraft for each functional area. As shown, corporate aircraft require approximately 4,500 square feet of building area per aircraft, compared to limited service and full service FBO aircraft which require approximately 1,800 to 3,600 square feet for each aircraft. These ratios were found to be consistent with general aviation storage requirements across the country.

After determining the appropriate land area per aircraft and building area per aircraft ratios for each functional area, facility requirements were developed commensurate with the growth in the based aircraft for that user type. Table III-7 presents the results of this analysis. Study of the data on Table III-7 shows that the total land requirement will expand at roughly seven acres every five years with a total increase of approximately 25 acres over the 20-year planning period. The total building requirements are expected to nearly double, reflecting the fact that the current hangar area is insufficient to meet the current demand for hangar storage. The trend toward more business use aircraft at Lunken Field results in a greater demand for hangar space, and the escalation in the cost of aircraft has resulted in an increase in demand for more hangar space as owners seek to better protect their costly investments.

2. Terminal Area

As stated previously, the terminal area consists of the terminal building, auto parking, and public apron. The role of the terminal area on a general aviation airport like Lunken Field is somewhat diminished in importance when compared with the role of a passenger terminal at a commercial service airport. However, an adequate terminal facility is essential to the well being of any general aviation airport of Lunken Field's size. In addition to providing adequate office space and public areas for the administration of the airport, it should also be the focus of the public's perception of the airport. The terminal area contains, by a large measure, the facilities by which the airport is judged by the public. Therefore, every effort should be made to assure that the terminal area is aesthetically pleasing as well as capable of meeting its functional role.

(1) Building Area

The terminal building at Lunken Field has approximately 20,000 square feet of space on two floors and is occupied by several organizations and businesses including a restaurant and airport and private offices. This building is rich with the history of aviation in Cincinnati as well as the nation. For example, it was the original home of American Airlines. The center portion was dedicated on May 21 and 22, 1938. The north and south wings were added at a later date. The overall appearance of the building is poor. While a general inventory of the building indicates it is structurally sound, it is in need of rehabilitation to modernize the HVAC system, plumbing, and electrical systems as well as the overall appearance. The front of the building should be landscaped and the restaurant's dumpster should be moved to a less prominent location.

The overall size of the building is adequate. Based on a general terminal planning criteria of 98 square feet of building for each design hour operation, 2006 requirements for direct general aviation terminal uses (administrative offices, pilots lounge, restrooms, etc.) are 14,500 square feet.

In view of the excess capacity of this historic building, additional compatible revenue-producing uses should be encouraged. Some examples include:

- . Commercial office space (insurance, real estate, law, accounting, etc.)
- . Governmental office space (local, state, federal)
- . Specialty shops (flowers, hobby, book, maps, etc.)
- . Traditional concessions (rental car, etc.)
- . Aviation concessions (FBO office, aerial photography office, flight school, sightseeing operator, aircraft sales, etc.)

(2) Terminal Apron

The apron area located in front of the terminal building provides parking facilities for terminal lessees and their patrons. Additionally, this apron serves as a portion of the itinerant apron used by general aviation aircraft operating at the Airport. To calculate the ability of this area to meet future aviation needs, the following methodology was used:

- . As a result of the projections analysis (Chapter I), it was estimated that 74 arrival operations will occur during the design hour in 2006.
- . Of these, half (37) occur by transient aircraft (locally based aircraft would typically not utilize the terminal apron).
- . Of the aircraft remaining, one-third (12) are estimated to stop at the terminal ramp instead of proceeding to an FBO ramp.
- . A requirement of 600 square yards of apron per aircraft was identified, representing a total of 7,200 square yards. Existing apron area totals 11,900 square yards, an excess of 4,700 square yards.

Consequently, no additional apron is required.

(3) Auto Parking

Auto parking requirements can be estimated for a mixed use facility like the Lunken Field terminal building by allowing one parking space for every 100 to 150 square feet of building space. This yields a requirement for approximately 160 to 200 total parking spaces in the terminal area. The area currently has approximately 160 total parking spaces. However, not all of these spaces are appropriately located. The parking directly in front of the building requires the hazardous negotiation of Wilmer Avenue and the larger lot across Wilmer Avenue requires crossing the avenue on foot to access the building. Therefore, the terminal area parking

should be reconfigured to include approximately 200 spaces with safe, convenient access to the terminal.

3. Airport Support Facilities

As identified earlier, there are five airport support facilities on the Airport. The CFR facility and control tower are adequate to serve the demands of Airport users given the existing Airport configuration. The three maintenance buildings, while adequate for current needs, should be consolidated on to one site. In addition, the building nearest the terminal is in the clear zone and building restriction line of Runway 6.

4. Airport Access

As outlined in Chapter I (Exhibit I-8), Airport access is provided by Wilmer Avenue, which runs between Beechmont Avenue and Kellogg Avenue. Additional access may be achieved via Airport Road from Eastern Avenue. Airport Road continues to the southeast to provide access to the general aviation facilities southeast of the terminal building.

These roadways combine to provide adequate Airport access. However, the access systems needs improvement in three general areas:

- . Signage
- . Terminal Area
- . Airport Road

The number, location, and uniformity of the road signs giving direction to the location of the Airport should be improved. This would require the placement of approximately 10 to 15 signs on the network of roadway providing Airport access.

The proximity of Wilmer Avenue to the terminal building and Wilmer Avenue and Airport Road intersections hinder access to the terminal area. This problem may be resolved by reconfiguring the roadways in the immediate area, relocating the terminal area auto parking, or some combination of both. Chapter IV examines this issue in greater detail.

Airport Road on Airport property has insufficient capacity to support the demands that will be placed on it by future development. It will require a turning lane and greater pavement strength.

3. SUMMARY

The analysis of Lunken Field's capacity to meet projected demand determined that the airfield should have sufficient capacity throughout the planning period, with moderate delays occurring after the turn of the century. The analysis showed that the Airport's primary and crosswind runways need additional pavement strength, additional instrumentation and lighting is required, approximately 25 acres of additional area is required for aircraft storage and related services, the terminal building should be remodeled, and the access system needs improvements. These requirements are summarized below and on Table III-8. Note that the requirements on Table III-8 are presented incrementally, not in terms of total requirements, in three phases of development short- (present to 1990), intermediate- (1991-1995), and long-term (1996-2006).

- . Runway 2R/20L must be upgraded to accommodate 70,000 pounds dual wheel aircraft. Because of the potential for serious and accelerated pavement destruction resulting from the regular accommodation of overweight aircraft, this improvement should be undertaken in Phase I.
- . Runway 6/24 must also be upgraded to accommodate 70,000 pounds dual wheel aircraft. Because it is the crosswind runway with lower usage, the improvement can be delayed until Phase II.
- . Positive control over the off-airport property clear zones should be acquired. This should be an ongoing process.
- . A parallel taxiway for Runway 2R/20L should be constructed. It should have acute angle exits at its midpoint and be able to accommodate 70,000 pound dual wheel aircraft. It is a Phase I project because it will increase the Airport's capacity. (Capacity enhancement projects are normally begun when an airport is at 60 percent capacity.)

TABLE III-8

Lunken Field Master Plan Update

INCREMENTAL FACILITY REQUIREMENTS

	Phase I <u>Present - 1990</u>	Phase II <u>1991 - 1995</u>	Phase III <u>1996 - 2006</u>
AIRFIELD			
Runways:			
- Strengthen Runway 2R/20L to 70,000 dual wheel	X	-	-
- Strengthen Runway 6/24 to 70,000 dual wheel	-	X	-
- Gain positive control over all clear zones	X	X	X
Taxiways:			
- Parallel taxiway for RW 2R/20L	X	-	-
- Reconfigure Runway 20R clear zone taxiways	-	X	-
Instrumentation:			
- Precision approach to RW 2R	-	X	-
- Straight-in approach to RW 6	-	-	X
Lighting:			
- Runway 2R - MALSR	-	X	-
- Runway 2L - REIL and PAPI-4	-	X	-
- Runway 20R - REIL	-	X	-
- Runway 6 - REIL and PAPI-4	X	-	-
- Runway 24 - REIL	X	-	-
LANDSIDE			
Aircraft Storage Functional Areas:			
- Corporate	4.75 Ac.	3.68 Ac.	7.80 Ac.
- Full Service FBO	1.23 Ac.	1.73 Ac.	2.65 Ac.
- Limited Service FBO	<u>0.65 Ac.</u>	<u>0.89 Ac.</u>	<u>1.31 Ac.</u>
- Total Land Required	6.63 Ac.	6.30 Ac.	11.76 Ac.
Terminal Area:			
- Remodel Building	-	X	-
- Reconfigure Auto Parking	-	X	-
Airport Access:			
- Signage System	X	X	X
- Terminal Area Improvements	-	X	-
- Airport Road Improvements	-	X	-

Source: Aviation Planning Associates, Inc.

- . The taxiways/taxilanes in the clear zone of Runway 20R should be reconfigured or modified to limit the extent of clear zone crossing. This is a Phase II project.
- . The precision approach to Runway 2R should be in place at roughly the same time the additional runway at Greater Cincinnati International Airport comes on line (1989). This would place the project in late Phase I or early Phase II.
- . A straight-in nonprecision approach to Runway 6 to replace the circling approach should be operational in Phase III.
- . The medium intensity approach lighting system with runway alignment indicator lights (MALSR) for Runway 2R complements the precision approach slated for installation in late Phase I or early Phase II.
- . The runway end indicator lights (REIL) and precision approach path indicator (PAPI) for Runway 2L and the REIL for Runway 20R are low priority safety enhancements that should be undertaken in Phase II.
- . The REIL and PAPI for Runway 6 and REIL for Runway 24 are also safety enhancements. Because Runway 6/24 is the crosswind runway, the improvements should be completed in Phase I.
- . The aircraft storage functional area requirements are driven by based aircraft demands. Therefore, the timing is a function of the based aircraft projections.
- . The terminal area improvements should be undertaken when funding becomes available. However, delay past Phase II may result in greater remodeling costs and a loss of nonaviation tenants.
- . The Airport access signage system should be continually improved as necessary.
- . The terminal access improvements should correspond with the remodeling of the terminal building and parking improvements.
- . The improvements to Airport Road on Airport property (increase to three lanes and increase the pavement strength) will be necessary in Phase II. It is estimated that the activity on this area of the Airport will be great enough to merit this improvement between 1991 and 1995.

Chapter IV discusses the alternative development approaches identified to meet these facility requirements, and yields a plan to keep the area's primary general aviation airport viable through the 20-year planning period.

IV.

Identification and Evaluation of Alternatives

IV. IDENTIFICATION AND EVALUATION OF ALTERNATIVES

Based on the facility requirements identified in Chapter III, this chapter presents a set of development options (alternatives) for providing the facilities to satisfy projected aviation demand at Lunken Field. The development alternatives were evaluated on operational, environmental, and financial criteria to determine which alternative will best satisfy the identified needs of the Airport. A preferred alternative was selected based upon the results of the evaluations.

The selection of a preferred development alternative is the culmination of the master planning process. The objective of the alternatives analysis is to produce a balanced airside and landside complex to serve forecast aviation demand. All work completed prior to the alternatives analysis was input into the alternative identification/evaluation/recommendation process. Beyond this phase, efforts were focused on refining and developing the selected recommendations.

Alternatives were developed in four primary areas of Airport operations:

- . Airfield
- . Tenant Facilities
- . Terminal Area and Airport Access
- . Levee Project

The alternatives described in this chapter incorporate "reasonable" growth scenarios. Other alternative schemes considered in the process are not presented due to a variety of factors that caused them to be considered unreasonable.

1. SUMMARY OF FACILITY RECOMMENDATIONS

The following sections summarize the airfield, tenant

facilities, terminal/access, and levee project recommendations discussed in Chapter III.

(1) Airfield Recommendations

Recommended airfield development, illustrated on Exhibit IV-1, includes the following:

- . Strengthen Runways 2R/20L and 6/24 to 70,000 pounds dual wheel.
- . Install a parallel taxiway for Runway 2R/20L.
- . Reconfigure Runway 20R's clear zone taxiways (Taxiways G and D).
- . Install a precision approach (MLS with MALSR) to Runway 2R.
- . Install REILs on Runways 2L, 20R, 6, and 24 and PAPI-4s on Runways 6 and 2L.

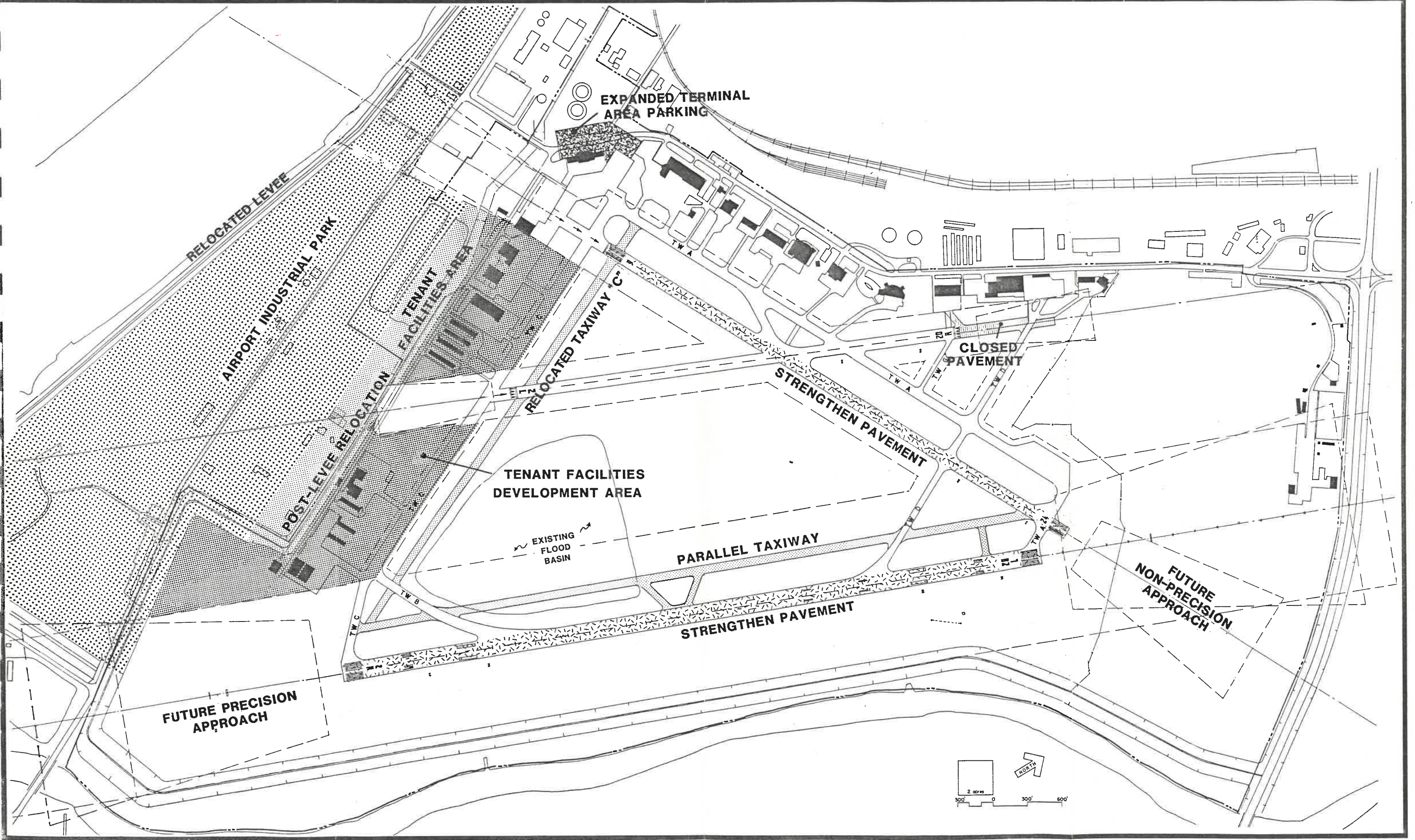
(2) Tenant Facilities Recommendations

The area recommended for tenant facilities expansion is the western Airport area, as illustrated on Exhibit IV-1. The development on the site, shown in detail on the Airport Layout Plan (Chapter V), will be situated to take full advantage of the relocation of Taxiway C and the possible relocation of the levee.

(3) Terminal Area and Airport Access Recommendations

The terminal area and airport access recommendations are listed below:

- . The terminal building should be remodeled with emphasis on revenue-producing commercial use.



- . Terminal area parking should be expanded adjacent to the terminal and the Wilmer Avenue, Airport Road intersection should be reconfigured.
- . An airport access signage system should be implemented with directional signs on key area roadways.
- . Airport Road should be upgraded as dictated by the southern Airport development with a connector to Kellogg Avenue west of Runway end 2R.

(4) Levee Project Recommendations

Relocation of the levee from its existing location to near the bank of the Ohio River (see Exhibit IV-1) is under consideration by the City of Cincinnati. This project is discussed in context of the Lunken Field Master Plan Update because it would impact the Airport by facilitating:

- . Expansion of the southern airfield tenant area toward the Ohio River
- . An Airport industrial park to aid in generating Airport revenues
- . Removal of the displaced threshold on Runway 6
- . Relocation of Airport Road toward the Ohio River

The levee project is currently under study to determine the types of potential environmental impacts which would need to be addressed in an environmental assessment.

2. AIRFIELD ALTERNATIVES/RECOMMENDATIONS

The airfield projects listed on Table III-8, Incremental Facility Requirement (Chapter III), are all singular projects; that is, the implementation of one project does not preclude the implementation of any other project. Seven airfield alternatives were evaluated using this "go/no-go" methodology. They include

the following:

- . Strengthen Runway 2R/20L to 70,000 pounds dual wheel to accommodate the design aircraft.
- . Strengthen Runway 6/24 to 70,000 pounds dual wheel to accommodate the design aircraft.
- . Install a parallel taxiway for Runway 2R/20L as capacity enhancement.
- . Reconfigure Runway 20R's clear zone taxiways for improved safety.
- . Install a precision approach to Runway 2R for safety and capacity enhancement.
- . Install a straight-in approach to Runway 6 for safety capacity enhancement.
- . Install various lighting improvements (REIL and PAPI-15) for safety.

(1) Strengthen Runway 2R/20L

(2) Strengthen Runway 6/24

The first two airfield projects, strengthening Runways 2R/20L and 6/24, are necessary to accommodate the Airport's design aircraft. As noted in Chapter III, both runways must be upgraded to 70,000 pounds dual wheel to accommodate the design aircraft. Operation of aircraft exceeding the runway's weight bearing capacity will result in premature pavement failure and require costly reconstruction of the runways.

Assuming that an overlay will provide sufficient increases in strength, it is estimated that the cost will be approximately \$1,200,000 for Runway 2R/20L and \$700,000 for Runway 6/24. The cost of rebuilding the runways could be four times as great.

(3) Install Parallel Taxiway for Runway 2R/20L

The installation of a taxiway parallel to the west side of Runway 2R/20L is a capacity enhancement project. This project has the potential to increase the airfield's annual service volume (ASV) by approximately 12,000 operations. Because the airfield will reach 100 percent capacity around the year 2000 and delays will begin to become a factor, the project will serve to reduce the magnitude of the delays. The reduction in delay can be expressed in dollars as shown below:

<u>Year</u>	<u>Delay Reduction With New Taxiway</u>	<u>Average Hourly Cost of Delay</u>	<u>1/</u>	<u>Savings With New Taxiway</u>
1991	170 hours	\$ 380		\$ 64,600
1996	400 hours	\$ 395		\$ 158,000
2006	6,850 hours	\$ 420		\$ 2,877,000

1/ Average hourly cost of delay derived from Economic Values for Evaluation of FAA Investment and Regulatory Programs, FAA Office of Aviation Policy and Plans, September 1981 (Report No. FAA-APO-81-3 and FAA-APO-84-3) and projected operational fleet mix. The costs include aircraft operating costs and the value of the passengers' time.

These numbers illustrate the significant reduction in delay costs associated with the project by the year 2006. The cost of the taxiway project is estimated to be approximately \$4,000,000. Given the expected reduction in delay and resulting savings, the project will have a 10- to 11-year payback period (assuming the taxiway is in use by 1991). Therefore, it is recommended that the project be undertaken.

(4) Reconfigure Runway 20R Clear Zone Taxiways

The clear zone of Runway 20R contains several taxiways (Taxiways D and G) as well as the closed portion of the runway. Normally, closed pavement in a clear zone is not a problem. However, the existing taxiways encourage the use of the closed runway pavement. This causes aircraft to spend more time within the clear zone. While the optimum situation of a clear zone free from all obstacles (including taxiways) cannot be practically achieved for Runway 20R, the situation can be improved. An effective, practical solution is to remove the closed pavement, realign Taxiway G into the Kroger hangar from Runway 20R, and strengthen it from Runway 20R to Taxiway A. It is estimated that this project will cost approximately \$60,000.

(5) Install Precision Approach to Runway 2R

(6) Install Straight-in Approach to Runway 6/24

The precision approach (Microwave Landing System) to Runway 2R and a straight-in approach to Runway 6 are proposed primarily as safety enhancements. Both will result in very small capacity increases, but will provide improved airfield usability under adverse conditions and a more desirable base for corporate aircraft. However, the improved safety resulting from these projects is their principal justification.

The detailed cost/benefit analysis required for FAA evaluation and approval of these projects is outside the scope of this study; however, both projects meet the minimum requirements for implementation as set forth in the FAA publication, Airway Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services,

Order 7031.2C, dated November 15, 1984. The estimated cost of these projects is \$750,000 (including lighting).

(7) Improve Lighting

The various lighting projects, with the exception of the MALSR for Runway 2R's precision approach, are relatively inexpensive projects. The REILs for Runways 2L, 20R, 6, and 24 will help to positively identify the runway ends. This is particularly important on runways with displaced or relocated thresholds (Runway 6), or with taxiway crossings near but not at the threshold (Runways 2L, 20R, 6, and 24). The cost of a REIL is roughly \$5,000 depending on local conditions. Given the relatively low cost of REILs when compared to their safety benefit, it is recommended that the REILs be installed.

The PAPI-4s for Runways 2L and 6 serve to provide positive glide slope and alignment information. Given the relocated and displaced thresholds on Runways 6 and 2L, this glide slope assistance will be particularly useful and a significant safety enhancement. A typical PAPI-4 installation costs approximately \$20,000 depending upon local conditions. As with the REILs discussed above, the relatively low cost of the PAPI-4s is easily offset by the enhanced safety.

The MALSR for Runway 2R's precision approach must be installed with the precision approach equipment. Its cost is included in the precision approach estimates.

3. TENANT FACILITIES ALTERNATIVES/RECOMMENDATIONS

Facilities analysis presented in Chapter III indicated a need for a significant increase in the amount of land needed by

Airport tenants (corporate users and full and limited service FBOs). Just under 25 acres of additional land will be required over the 20-year planning period. Four distinct alternative sites for this new development were identified. They are presented on Exhibit IV-2 and described below:

. Site 1 - South Airfield

This site includes the existing southern airfield development, the vacant triangle between Runway 2R's clear zone and the levee, and the vacant area between the existing development and Taxiway C.

. Site 2 - Center Field

The second area is the vacant site between Runways 2L/20R, 2R/20L, and 6/24 and the flood control basin.

. Site 3 - Wilmer Avenue

The Wilmer Avenue site is the area commonly referred to as "Corporate Row" between Wilmer Avenue, Taxiway A, and Runway end 20R.

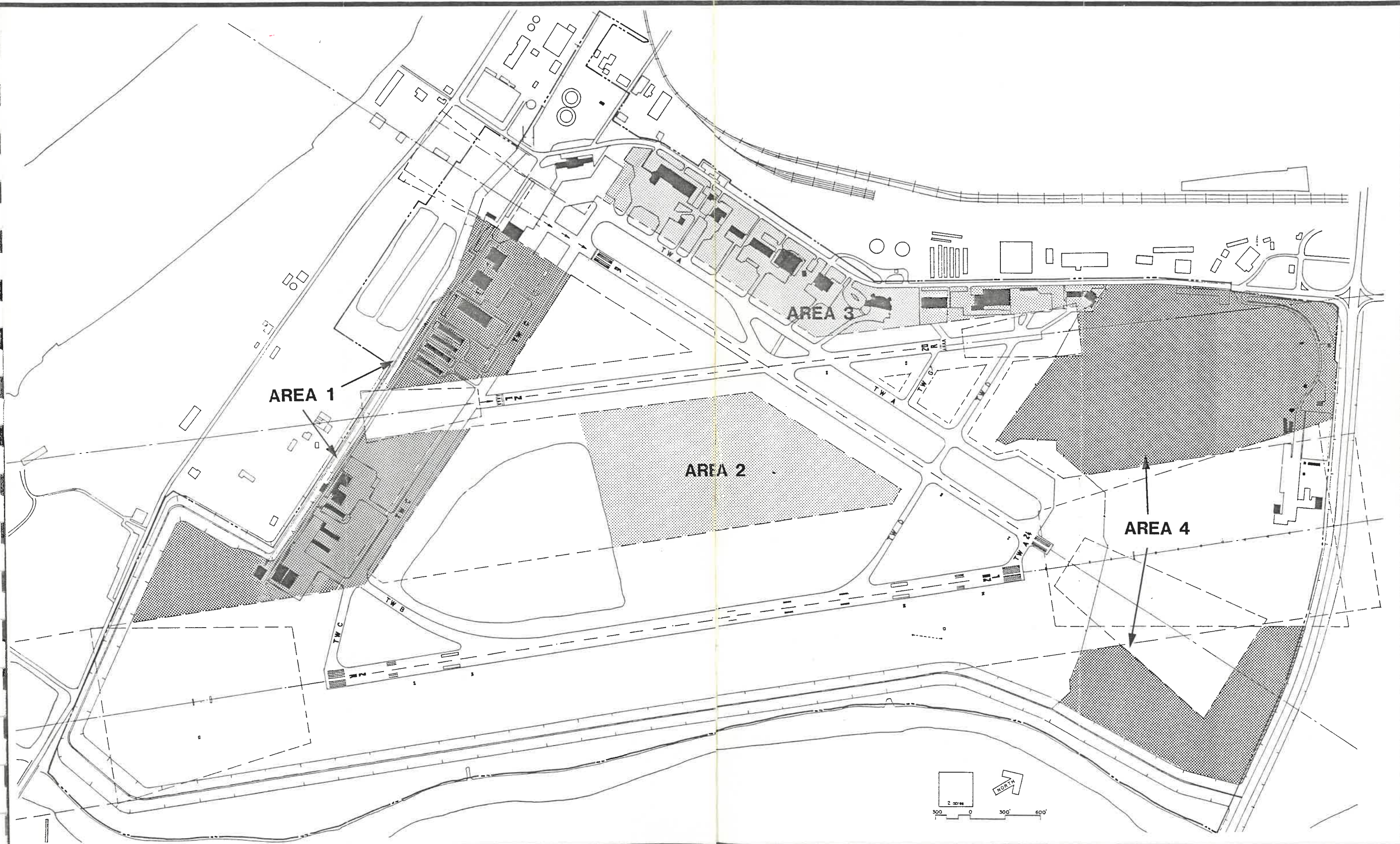
. Site 4 - Recreation Area

This site is the land north of the airfield and outside the clear zones that is currently under the control of the Cincinnati Parks Department. It contains a golf course, tennis courts, ball fields, picnic areas, driving range, batting cages, and other facilities.

The alternative sites were evaluated based on four major criteria: site availability, site suitability, logistics, and development costs.

(1) Evaluation of Site Availability

The four sites were examined to determine how extensively they are developed and if the existing development is suitable for reconfiguration or integration into an expansion plan. As the following matrix illustrates, Sites 1 and 2 are considered generally



acceptable while Sites 3 and 4 are completely unacceptable. Therefore, Sites 3 and 4 were dropped from further consideration.

	<u>Site 1</u>	<u>Site 2</u>	<u>Site 3</u>	<u>Site 4</u>
Existing Development	1	3	0	0
Availability	<u>2</u>	<u>3</u>	<u>0</u>	<u>0</u>
Total	3	6	0	0

Site 1 was rated poor (1) in the existing development area because most of the area is developed. Site 2 was rated good (3) because it is practically clear of any development. Sites 3 and 4 were rated unacceptable (0) because they are extensively developed.

Site 1 was rated fair (2) in terms of availability due to its vacant areas and the fact that many of the buildings are near the end of their useful lives and are considered well suited for removal to allow reconfiguration of the area for new development. Site 2 was rated good (3) because it is generally available for development. Sites 3 and 4 were rated unacceptable (0) because the existing development cannot be easily altered. The buildings on Site 3 are in excellent condition and their reconfiguration is considered impractical. The recreation facilities on Site 4 are well established and are considered the highest and best use of the land.

(2) Site Suitability

The evaluation of the suitability of the sites addressed site size, layout/shape, and development constraints. As the following matrix shows, the sites are generally equal in this area.

	<u>Site 1</u>	<u>Site 2</u>
Size	3	3
Layout	2	3
Constraints	<u>2</u>	<u>1</u>
Total	7	7

Both sites have adequate area to accommodate the 24.7 acres of new development needed to meet the planning period facility requirements. Site 1 has approximately 35 acres of undeveloped land and Site 2 has 51 acres.

Site 1 was rated fair (2) concerning its layout/shape because the triangular area west of Runway 2R's clear zone is somewhat removed from the airfield even though it makes up one-third of the site's undeveloped land. Site 2's layout/shape is good (3). It is situated in proximity to all the runways, is isolated from outside interference (resulting in excellent security), and its long, narrow shape will allow for high density development and little wasted area.

Site 1 was rated fair (2) in the constraints to development category because most of the existing development must be removed to allow for maximum usage of the area and the triangular area west of Runway 2R's clear zone is below grade and will require some degree of site preparation. Site 2 was rated poor (1) because there is no roadway access, the terrain is uneven and will require extensive preparation, and development of the area will block the view of Runway 2R/20L and its recommended parallel taxiway from the control tower. (Building heights would need to be less than 15 feet for the eastern side of its site, less than 20 feet for the center of the site, and less than 25 feet for the western portion of the site to prevent visual obstruction of the taxiway centerline.)

(3) Site Logistics

Logistical evaluation of Sites 1 and 2 was conducted to determine the impact of the expected development on aircraft and automobile traffic flow. As the matrix below indicates, both sites are equal in this area. For this analysis, it was assumed that sufficient infrastructure would be in place to accommodate the development.

	<u>Site 1</u>	<u>Site 2</u>
Aircraft Circulation	3	3
Automobile Circulation	<u>3</u>	<u>3</u>
Total	6	6

Both sites were rated good (3) in their potential ability to accommodate taxiing aircraft traffic flow. Site 2 is marginally better due to its central location. Both sites were also rated good (3) in their potential ability to accommodate future automobile traffic flow.

(4) Site Development Costs

The final site evaluation focused on the cost of preparing the sites for construction of the new facilities. These costs include utilities, roadways, area taxiways, surface preparation (earth work), and other special costs. No consideration was given to the cost of the hangars and ramp because these costs would be the same for any site. As the following matrix illustrates, Site 1 is roughly one-half as expensive to prepare for development as Site 2.

	<u>Site 1</u>	<u>Site 2</u>
Utilities	\$ 22,000	\$ 84,000
Roadway	110,000	650,000
Taxiway	980,000	980,000
Surface Preparation	70,000	170,000
Other	<u>-0-</u>	<u>500,000</u>
Total	\$1,182,000	\$2,384,000

The cost of bringing new utilities into the areas of both sites currently without power, water, and sewer is estimated to be approximately four times as expensive for Site 2 as Site 1. The reason for this is that much of Site 1 currently has utilities in place while Site 2 has none. The access roadway into Site 2 will be roughly six times as costly as Site 1 because more roadway is required and the roadway must pass under Taxiway C (via a terminal). Both sites will require one new taxiway (in addition to the parallel taxiway recommended for Runway 2R/20L). Site 1 requires the relocation of Taxiway C and Site 2 would require a taxiway parallel to Runway 2L/20R. The cost of the taxiway is roughly the same for either site because the length requirement is nearly equal. Site 2's surface preparation/earth work would be roughly twice as expensive due to the rugged terrain. Site 2 would also require the relocation of the air traffic control tower (listed as \$500,000 under Other).

As the following evaluation summary matrix shows, Site 1 is the logical choice for the majority of new development.

	<u>Site 1</u>	<u>Site 2</u>
Site Availability	3	3
Site Suitability	7	7
Site Logistics	6	6
Development Costs	\$1,182,000	\$2,384,000

4. TERMINAL AREA AND AIRPORT ACCESS

This section addresses alternatives for terminal building, terminal area auto parking and access, and Airport Road improvements.

(1) Terminal Building

Two terminal building alternatives were considered: remodeling the existing building or replacing the existing building with a new terminal on or near the existing site. Early in the evaluation process, it was determined that the existing terminal building is of such historical significance that it cannot be dismantled. The only alternative is to remodel/restore the building to a state worthy of its rich heritage.

(2) Terminal Area Auto Parking and Access Improvements

Chapter III identified the need to reconfigure Wilmer Avenue near the terminal building to relieve congestion and allow easier access to the terminal, provide approximately 200 auto parking spaces close to the terminal building, and improve the Airport signage system.

Several alternative configurations of Wilmer Avenue near the terminal building were considered. Alternative 1 called for expanding and paring the gravel lot across Wilmer Avenue in front of the terminal building. Alternative 2 would require reconfiguration of the Wilmer Avenue/Airport Road intersection to provide adequate parking adjacent to the terminal and improve the sight distance and safety of Airport users turning onto Airport Road from Wilmer Avenue.

Alternative 1 was rejected because of the safety and convenience factors associated with separation of the parking lot and terminal building by Wilmer Avenue. Therefore, when the terminal building is remodeled, it is recommended that the intersection of Airport Road and Wilmer Avenue be reconfigured to allow adequate auto parking adjacent to the terminal building.

Airport access signs should be located at the intersection of Beechmont and Wilmer avenues (four signs), at Kellogg and Wilmer avenues (two signs), at I-275 and Kellogg Avenue (six signs), on Columbia Parkway at Beechmont (one sign), on Batavia Road at Beechmont (one sign), at Wooster Pike and Red Bank Road (two signs), at Wooster Pike and Beechmont Circle (two signs), on Eastern Avenue at Airport Road (two signs), on Columbia Parkway at Delta Avenue (two signs), and on Delta Avenue at Eastern Avenue (two signs).

(3) Airport Road Improvements

Required improvements to the portion of Airport Road serving the southwestern portion of the Airport include the addition of a turning lane and the increase in the strength of the pavement. Because the majority of the new development will occur in this portion of the Airport, Airport Road must be upgraded to meet the future demand. Failure to achieve this will result in unnecessary congestion and premature pavement failure. Therefore, it is recommended that Airport Road be upgraded as future development requires. Only very rough estimates can be prepared because the roadway layout is dependent upon future development.

V.

Environmental Review

V. ENVIRONMENTAL REVIEW

This chapter presents an analysis of the potential environmental effects of the proposed Master Plan Update developments. The environmental review, conducted in accordance with FAA Order 5050.4A, Airport Environmental Handbook, focused on existing (1986) and future (2006) impacts of the proposed development plan.

1. NOISE

Noise is defined as "unwanted sound," and is one of the major concerns of airport owners and airport neighbors affected by it. Noise is measured in decibels (dB). The A-weighted decibel scale (dBA) was developed to measure sounds with more emphasis on frequencies that can be heard by the human ear. This scale is used to measure aircraft sound levels.

The noise analysis for Lunken Field was conducted utilizing the Day-Night Sound Level (Ldn) noise metric. Although other noise metrics exist, the Ldn measure has been identified by the FAA, Environmental Protection Agency, and the Department of Housing and Urban Development as being a particularly useful tool in evaluating the effects of aircraft noise. The Ldn metric identifies a single value of A-weighted sound for a duration of 24 hours that includes all of the time-varying sound energy for that period, with a 10-dBA penalty applied to nighttime sounds. Nighttime operations are perceived as being noisier than daytime operations because ambient noise levels occurring during the day tend to mask aircraft noise.

Three different Ldn levels (65, 70, and 75 Ldn) were evaluated in this analysis; 75 Ldn reflects the most severe noise impact, while 65 Ldn reflects the least severe impact. Noise sensitive land uses, such as residential uses, are generally

considered "clearly unacceptable" in areas where noise exposure exceeds 75 Ldn and "normally acceptable" in areas exposed to less than 65 Ldn. Residential and other noise-sensitive land uses are generally considered "normally unacceptable" in regions exposed to levels between 65 Ldn and 75 Ldn.

The FAA Integrated Noise Model (INM) Version 3.8 was used to analyze the noise impacts on the areas around Lunken Field. The model uses data on activity and operational characteristics to generate noise exposure contours, which are computer-generated drawings depicting noise impacts. Key inputs to the noise model include the following:

- . Aircraft Activity

Average annual days aircraft activity for 1986 and projected levels for 2006 were identified for the noise analyses. (Activity data used for the noise analysis were revised to include additional operations by a freight operator that initiated operations at the Airport in 1987.) The 2006 activity projections are presented in Table V-1. If an environmental assessment is required for this project, the additional freight operations will be addressed for the existing case used in the environmental evaluation.

- . Fleet Mix

Fleet mix refers to the various categories of aircraft operating at the Airport. For these analyses, fleet mix projections were based upon the data presented in Chapter II and revised to include the additional cargo operations. Fleet mix data are presented in Table V-2.

- . Runway End Utilizations

Runway end utilization assumptions were developed based on discussions with the Airport management and a review of historical wind conditions. These utilization assumptions are presented in Table V-3.

- . Approach and Takeoff Profiles

Approach and takeoff profiles identify aircraft altitudes along the flight path. Standard approach and

TABLE V-1
Lunken Field Master Plan Update
DAILY OPERATIONS -

	<u>1986</u>	<u>2006</u>
Local 1/	230	454
Itinerant 1/	237	454
Additional Cargo 2/	<u>-</u>	<u>40</u>
Total	467	948

1/ These operations are based upon an average annual day.

2/ These operations are scheduled to operate only four days a week.

Source: Aviation Planning Associates, Inc.

TABLE V-2
Lunken Field Master Plan Update
OPERATIONAL FLEET MIX

	<u>1986</u>	<u>2006</u>
Single Engine	45%	38%
Twin Engine	20	20
Multiengine Turboprop	17	19
Jet	17	22
Helicopter	<u>1</u>	<u>1</u>
Total	100%	100%

Source: Aviation Planning Associates, Inc.

TABLE V-3
Lunken Field Master Plan Update
RUNWAY END UTILIZATIONS

<u>Runway End</u>	<u>Multiengine Turboprop and Jet Aircraft</u>	<u>Twin-Engine Aircraft</u>	<u>Single-Engine Aircraft</u>
6	5%	5%	5%
24	10	10	10
2L	--	2	15
20R	--	7	49
2R	20	18	5
20L	<u>65</u>	<u>58</u>	<u>16</u>
	100%	100%	100%

Source: FAA Air Traffic Control Tower, Lunken Field.

takeoff profiles, as identified in the INM, were used for this analysis.

. Flight Tracks

Flight tracks are the projection on the ground of an aircraft's path. No two flight tracks are the same, due to meteorological conditions, aircraft type, stage length, and pilot judgment. Generalized flight track assumptions were developed based on historical operation conditions and discussions with Airport personnel. For noise abatement purposes, the additional cargo departures would follow the river corridor whenever weather conditions permit.

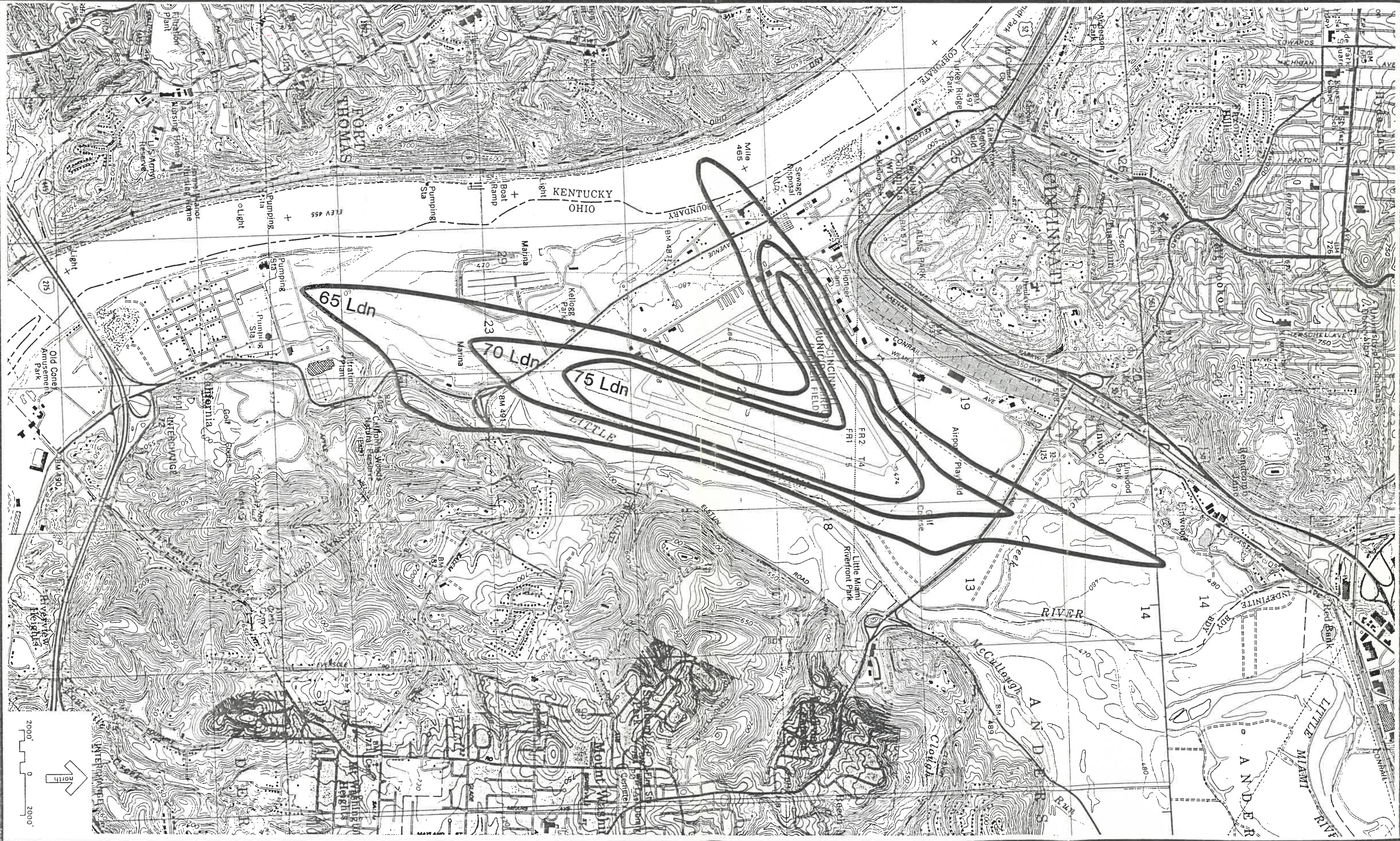
The 1986 and 2006 noise exposure contours generated by the INM are presented in Exhibits V-1 and V-2. The square mileage affected by each Ldn contour is as follows:

<u>Year</u>	<u>65 to 70 Ldn</u>	<u>70 to 75 Ldn</u>	<u>75 Ldn & Greater</u>	<u>Total</u>
1986	0.68	0.25	0.41	1.34
2006	1.50	0.56	0.30	2.36

2. COMPATIBLE LAND USE

The FAA's Land Use Guidance Charts for Airport Noise Interpolation and Land Use Noise Sensitivity Interpolation are helpful in depicting the types of land uses which are compatible in an airport environment. The charts are shown in Exhibits V-3 and V-4. These guidelines were applied to the evaluation of land uses around Lunken Field.

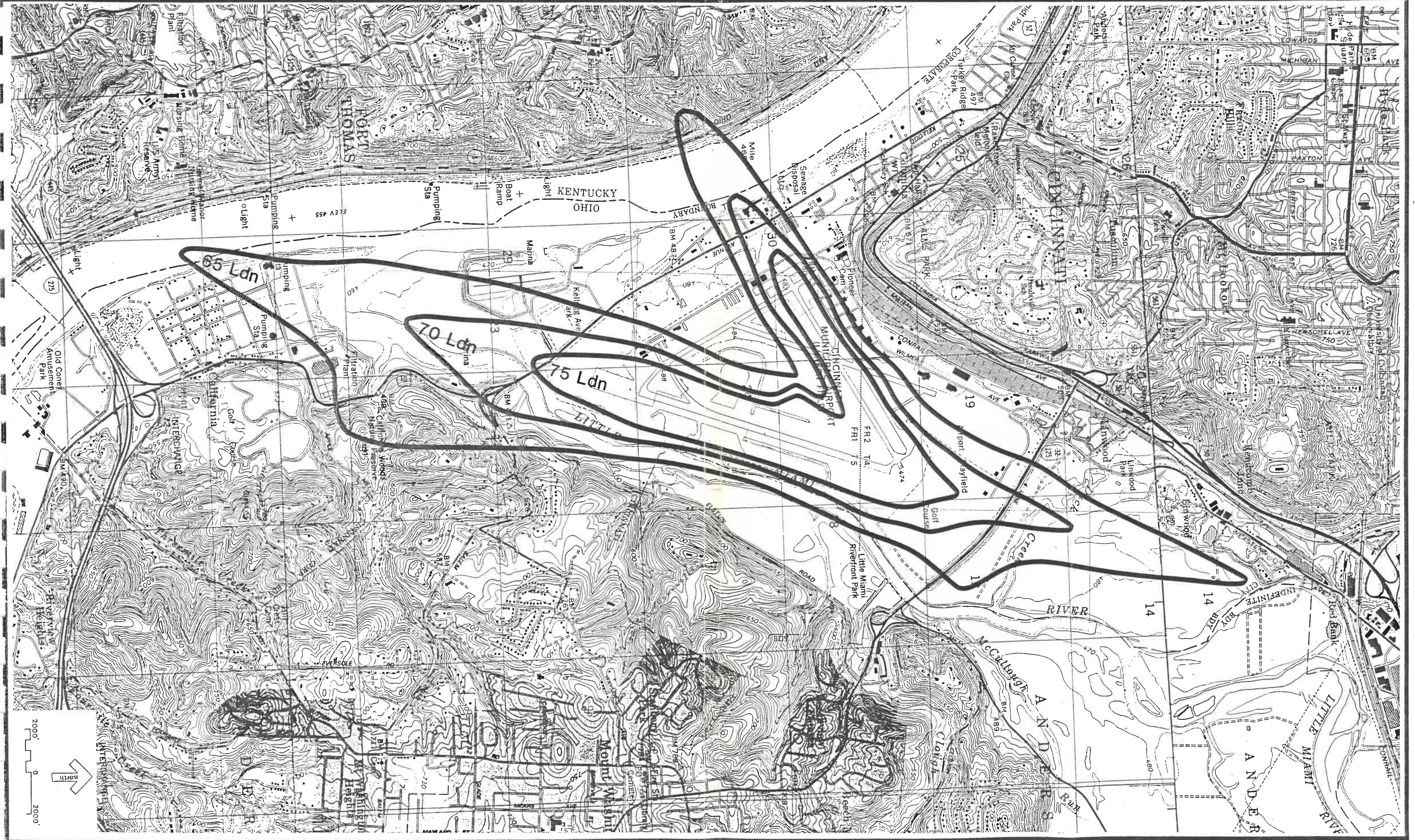
The current land uses surrounding Lunken Field consist largely of open space, recreational areas, commercial developments, and industrial developments. Concentrations of residential areas can be found northeast and west of the Airport boundary. To evaluate the impact of aircraft noise on potentially sensitive land uses, the INM-generated noise contours were examined. Estimates of the number of people located within



Lunken Field
Airport Master Plan

1986 NOISE EXPOSURE CONTOURS

EXHIBIT
V-1



Lunken Field
Airport Master Plan

2006 NOISE EXPOSURE CONTOURS

EXHIBIT
V-2

LAND USE GUIDANCE CHART I: AIRPORT NOISE INTERPOLATION

LAND USE GUIDANCE ZONES (LUG)	NOISE EXPOSURE CLASS	INPUTS: AIRCRAFT NOISE ESTIMATING METHODOLOGIES				HUD NOISE ASSESSMENT GUIDELINES	SUGGESTED NOISE CONTROLS
		L _{dn} DAY-NIGHT AVG. SOUND LEVEL	NEF NOISE EXPOSURE FORECAST	CNR COMPOSITE NOISE RATING	CNEL COMMUNITY NOISE EQUIVALENT LEVEL		
A	MINIMAL EXPOSURE	0	0	0	0	"CLEARLY ACCEPTABLE"	NORMALLY REQUIRES NO SPECIAL CONSIDERATIONS
		TO	TO	TO	TO		
B	MODERATE EXPOSURE	55	20	90	55	"NORMALLY ACCEPTABLE"	LAND USE CONTROLS SHOULD BE CONSIDERED
		TO	TO	TO	TO		
C	SIGNIFICANT EXPOSURE	65	30	100	65	"NORMALLY UNACCEPTABLE"	NOISE EASEMENTS, LAND USE, AND OTHER COMPATIBILITY CONTROLS RECOMMENDED
		TO	TO	TO	TO		
D	SEVERE EXPOSURE	75	40	115	75	"CLEARLY UNACCEPTABLE"	CONTAINMENT WITHIN AIRPORT BOUNDARY OR USE OF POSITIVE COMPATIBILITY CONTROLS RECOMMENDED
		TO	TO	TO	TO		
		HIGHER	HIGHER	HIGHER	HIGHER		

Source: Airport-Land use compatibility Planning, U.S. Department of Transportation, Federal Aviation Administration, 1977.





Lunken Field
Airport Master Plan

LAND USE GUIDANCE CHART II

EXHIBIT
V-4

LAND USE GUIDANCE CHART II: LAND USE NOISE SENSITIVITY INTERPOLATION

LAND USE		LUG ZONE ¹		LAND USE		LUG ZONE ¹	
SLUCM NO.	NAME	SUGGESTED	STUDY	SLUCM NO.	NAME	SUGGESTED	STUDY
10	<u>Residential.</u>			30	<u>Manufacturing (continued).²</u>		
11	Household units.	A-B		31	Rubber and miscellaneous plastic products—manufacturing.	C-D	
11,11	Single units—detached.	A		32	Stone, clay, and glass products—manufacturing.	C-D	
11,12	Single units—semi-detached.	A		33	Primary metal industries.	D	
11,13	Single units—attached row.	B		34	Fabricated metal products—manufacturing.	D	
11,21	Two units—side-by-side.	A		35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks—manufacturing.	B	
11,22	Two units—one above the other.	A		39	Miscellaneous manufacturing	C-D	
11,31	Apartments—walk up.	B		40	<u>Transportation, communication, and utilities.</u>		
11,32	Apartments—elevator.	B-C		41	Railroad, rapid rail transit, and street railway transportation.	D	
12	Group quarters.	A-B		42	Motor vehicle transportation.	D	
13	Residential hotels.	B		43	Aircraft transportation.	D	
14	Mobile home parks or courts.	A		44	Marine craft transportation.	D	
15	Transient lodgings.	A		45	Highway and street right-of-way.	D	
19	Other residential.	C		46	Automobile parking.	D	
		A-C		47	Communication.	A-D	
20	<u>Manufacturing.²</u>	C-D		48	Utilities.	A-D	
21	Food and kindred products—manufacturing.	C-D		49	Other transportation, communication, and utilities.	A-D	
22	Textile mill products—manufacturing.	C-D		50	<u>Trade.⁴</u>		
23	Apparel and other finished products made from fabrics, leather, and similar materials—manufacturing.	C-D		51	Wholesale trade	C	
24	Lumber and wood products (except furniture)—manufacturing.	C-D		52	Retail trade—building materials, hardware, and farm equipment.	C-D	
25	Furniture and fixtures—manufacturing.	C-D		53	Retail trade—general merchandise.	C	
26	Paper and allied products—manufacturing.	C-D		54	Retail trade—food.	C	
27	Printing, publishing, and allied industries.	C-D		55	Retail trade—automotive, marine craft, aircraft, and accessories.	C	
28	Chemicals and allied products—manufacturing.	C-D		56	Retail trade—apparel and accessories.	C	
29	Petroleum refining and related industries ³	C-D		57	Retail trade—furniture, home furnishings, and equipment.	C	
				58	Retail trade—eating and drinking.	C-D	
				59	Other retail trade.		
				60	<u>Services.⁴</u>		
				61	Finance, insurance, and real estate services.	B	
				62	Personal services.	B	
				63	Business services.	B	
				64	Repair services.	B	
				65	Professional services.	B-C	
				66	Contract construction services.	C	
				67	Educational services.	B	
				68	Miscellaneous services.	A-B	
				69	Miscellaneous services.	A-C	
				70	<u>Cultural, entertainment, and recreational.</u>		
				71	Cultural activities and nature exhibitions.	A	
				72	Public assembly.	A	
				73	Amusements.	C	
				74	Recreational activities. ⁵	B-C	
				75	Resorts and group camps.	A	
				76	Parks.	A-C	
				79	Other cultural, entertainment, and recreational. ⁶	A-B	
				80	<u>Resource production and extraction.</u>		
				81	Agriculture.	C-D	
				82	Agricultural related activities.	C-D	
				83	Forestry activities and related services.	D	
				84	Fishing activities and related services.	D	
				85	Mining activities and related services.	D	
				89	Other resource production and extraction.	C-D	
				90	<u>Undeveloped land and water areas.</u>		
				91	Undeveloped and unused land area (excluding noncommercial forest development). ⁷	D	
				92	Noncommercial forest development.	D	
				93	Water areas.	A-D	
				94	Vacant floor area.	A-D	
				95	Under construction.	A-D	
				99	Other undeveloped land and water areas. ⁸	A-D	

¹ REFER TO LAND USE GUIDANCE CHART I

² ZONE "C" SUGGESTED MAXIMUM EXCEPT WHERE EXCEEDED BY SELF GENERATED NOISE.

³ ZONE "D" FOR NOISE PURPOSES; OBSERVE NORMAL HAZARD PRECAUTIONS.

⁴ IF ACTIVITY IS NOT IN SUBSTANTIAL, AIR-CONDITIONED BUILDING, GO TO NEXT HIGHER ZONE SLUCM—STANDARD LAND USE CODING MANUAL, SEE PARAGRAPH 21

⁵ REQUIREMENTS LIKELY TO VARY — INDIVIDUAL APPRAISAL RECOMMENDED.

Source: Airport-Land Use Compatibility Planning, U.S. Department of Transportation, Federal Aviation Administration, 1977.

the existing and future noise exposure contours were developed using 1980 U.S. Census data and updated using aerial photos. The estimated impacts are listed in Table V-4. The existing and future noise contours do not include any residential housing within the 75 Ldn contour. A Veterans Administration hospital and nursing home facility and Carmel Manor Nursing Home are located southwest of the Airport in Fort Thomas, Kentucky. Although there are no schools, health facilities, or nursing homes located within the 65 Ldn contours for either the 1986 or 2006 case, careful planning should be taken to maintain a minimal level of aircraft noise impacts to such noise sensitive sites.

Several parks and public recreational areas are located within the 65 Ldn contour. The parks encompassed by the noise contours are listed in Table V-5. There are no recreational areas located within the existing 75 Ldn contour. There are currently portions of Lunken Playfield affected by the 70 Ldn contours. Aircraft noise impacts in the playfield area are not expected to exceed 70 Ldn through the year 2006, however, portions of the Lunken golf course will exceed levels of 75 Ldn by the year 2006. A horse boarding stable and pasture are located south of the Airport near the 65 Ldn contour. Aircraft noise levels in this area are expected to increase to 65 Ldn by the year 2006. Several marinas are also currently affected by the 65 Ldn contour. The marinas, located on the Little Miami and Ohio rivers, will continue to experience aircraft noise impacts of 65 Ldn and greater. Recreational and agricultural land uses are generally acceptable within the 65 Ldn contour and may be considered acceptable within the 70 Ldn contour.

Careful planning of future noise-sensitive developments, including residential housing, should take into account the Airport location and the expected noise impacts. As the Airport and its surrounding community continue to expand, it may be

TABLE V-4
Lunken Field Master Plan Update
AFFECTED POPULATION

<u>Noise Contours</u>	<u>1986</u>	<u>2006</u>
65 to 70 Ldn		
Population	24	58
Housing	12	25
70 to 75 Ldn		
Population	4'	11
Housing	3	6
75 Ldn and greater		
Population	-	-
Housing	-	-
Total		
Population	28	69
Housing	15	31

Source: Aviation Planning Associates, Inc.

TABLE V-5

Lunken Field Master Plan Update

RECREATIONAL AREAS INCLUDED IN
65 LDN OR GREATER NOISE CONTOURS

<u>Recreational Area</u>	<u>1986</u>	<u>2006</u>
Kellogg Avenue Park	Yes	Yes
Lunken Playfield and Golf Course	Yes	Yes
Linwood Park	No	No
Margish Recreational Area	No	Yes
California Nature Preserve	No	Yes
Alms Park	No	No

Source: Aviation Planning Associates, Inc.

necessary to formally institute several noise abatement procedures for all aircraft operations to prevent the existing noise sensitive land uses surrounding the Airport from more extensive aircraft noise exposure.

3. SOCIAL IMPACTS

The purpose of social impact analysis is to determine the effect of airport development on the human environment. The types of social impacts that can generally result from airport development are as follows:

- . Relocation of residences and/or businesses
- . Disruption of established communities
- . Disruption of orderly, planned development
- . Alterations in traffic patterns which may permanently or temporarily restrict traditional community access

The recommended Master Plan Update development improvements include a recommendation that Airport Road be upgraded, which includes the addition of a turning lane and the strengthening of the pavement. Terminal area access will be temporarily disrupted to the southwest portion of the Airport during this construction. The proposed roadway layout is dependent upon future developments. No other social impacts are anticipated.

4. INDUCED SOCIOECONOMIC IMPACTS

This category refers to the potential for induced or secondary impacts on surrounding communities, such as changes in population and business/economic activity due to the proposed developments at Lunken Field. The recommended airfield developments should have no effect in this area. Expansion of the tenant facilities would provide beneficial impacts to the

community through increased revenue and jobs. Restoration of the terminal building and improvements to the Airport access road and other road improvements will create temporary construction jobs.

5. AIR QUALITY

The effects of air pollution, ranging from impaired health to deterioration of structures, are well documented. But historically, airports and aircraft emissions constitute only a minor percentage of the air pollutants in the United States. Air pollution is generally caused by a "stationary" or "point" source, and airports are not considered such sources.

Ohio has an approved State Implementation Plan, which is being updated. Within this plan, "Prevention of Significant Deterioration" (PSD) areas are defined as areas where air quality is cleaner than the standards, and therefore applicable to unique development policies.

Six air quality categories are included in this analysis. At Lunken, categories in which PSD rules apply are:

- . Sulfur Dioxide
- . Nitrous Oxides
- . Lead
- . Total Suspended Particulates

PSD rules do not apply for

- . Carbon Monoxide
- . Ozone

As part of this review, the Ohio Environmental Protection Agency (EPA) was contacted regarding potential air quality impacts. The Airport development is not expected to impact air quality in the region.

6. WATER QUALITY

At this time, the Ohio Environmental Protection Agency (EPA) Division of Water Pollution Control has developed a water quality report for the Little Miami River. Within this report, the effects of Lunken Field on water quality were not primarily considered. Instead, planned impacts of developments upstream were considered.

Planned development of Lunken Field is not expected to adversely affect water quality in the region. If water quality degradation becomes a problem, however, potential mitigation measures will be coordinated with the Ohio EPA.

7. DEPARTMENT OF TRANSPORTATION 4(f) LANDS

The Department of Transportation Act of 1966, Section 4(f) prohibits the taking of public parkland, recreation areas, wildlife and waterfowl refuges or historic sites unless there is "no feasible and prudent alternative." While there are parks and recreational areas in the vicinity, the proposed development is not expected to directly affect these lands. The aircraft noise impacts to parklands and recreation areas are presented in Table V-5.

8. HISTORIC, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

The National Historic Preservation Act of 1966 (as amended), and the Archaeological and Historic Preservation Act of 1974, both apply to federally funded airport projects. Correspondence from the State of Ohio Historic Preservation Office, presented in Appendix V-A to this chapter, indicates that planned development would not affect cultural resources listed on or eligible for the National Register of Historic Places.

9. BIOTIC COMMUNITIES

A variety of trees, vines and shrubs exist in the Cincinnati area. The vegetation in Hamilton County supports a wide variety of wildlife. Fish and amphibians are found in the Little Miami River. No additional land acquisition is expected within the Airport's planned development stages, and therefore, no significant impacts are expected within this area.

10. ENDANGERED OR THREATENED SPECIES OF FLORA AND FAUNA

Coordination with the U.S. Fish and Wildlife Service indicated no impacts on threatened or endangered species.

11. FLOODPLAINS

Although the planned relocation of the levee would affect floodplains in the region, the effects of that project are addressed in a separate environmental impact analyses, and are not included within this review. Within the existing Airport boundaries, a flood control basin is expected to be impacted by proposed development, but not eliminated.

Coordination with the Department of Natural Resources, Division of Water, and the City of Cincinnati, indicated that the Airport is protected by the levee from 100-year floods of the Ohio and Little Miami rivers. When flooding conditions occur, water within the levee is collected by the sewer system and pumped through the levee to the Little Miami River. The flood control basin, within the Airport boundaries, is utilized as a gathering point of storm water run-off within the levee boundaries. Proposed Airport development which affects this basin should address the impacts to its usefulness and its necessity.

12. WETLANDS

The proposed development will not affect any wetlands other than those included in the previous paragraph.

13. COASTAL ZONE MANAGEMENT

Coastal zones will not be affected.

14. COASTAL BARRIERS

No coastal barrier will be affected.

15. FARMLAND

The project will not take prime agricultural lands from agricultural use.

16. ENERGY SUPPLY AND NATURAL RESOURCES

In general, two areas of energy supply should be considered in airport development:

- . Energy consumption by aircraft
- . Energy consumption by vehicles coming to and from the Airport

Airfield improvements at the Airport will reduce aircraft fuel consumption through reduced delay on the ground (improved taxiway structure) and in the air (through airfield capacity enhancements).

Vehicular energy can be expected to increase as passenger levels and aircraft activity increase at the Airport. Specific vehicle miles and resulting energy consumption have not been

calculated for this review. Further analysis will be undertaken, if necessary.

17. LIGHT EMISSIONS

The proposed development will include the installation of additional taxiway lights and runway end identification lights (REILs) on Runway ends 2L, 20R, 6, and 24. Where necessary, these lights will be shielded from residential developments.

18. SOLID WASTE

Airport improvements are not expected to affect the disposal of solid waste at Lunken Field. Volumes of solid waste are expected to increase as a result of the projected increase in aircraft activity and passenger levels. However, trash and other solid waste is removed from the Airport on a contract basis.

19. CONSTRUCTION IMPACTS

Impacts associated with proposed construction activities include noise from equipment, air pollution from dust, water pollution from grading and soil erosion, and traffic impacts from construction vehicles.

Construction equipment will operate primarily during day-time hours, and due to ambient noise levels (including aircraft noise), most noise will not be noticeable.

Contractors will be required to follow the FAA Advisory Circular, "Airport Construction Controls to Prevent Air and Water Pollution," which includes guidelines to guard against undue pollution.

20. WILD, SCENIC, OR RECREATIONAL RIVERS

There are no expected impacts on any wild, scenic, or recreational waterways.

21. VISUAL IMPACTS

Visual impacts of the proposed development will have minimal impacts on off-airport sites. Impacts associated with the recommended lighting system are discussed in Section 17, Light Emissions. Expansion of the tenant facilities are not expected to visually impact any residential or recreational areas in the Airport vicinity.

APPENDIX V-A

Ohio Historic Preservation Office

1985 Velma Avenue
Columbus, Ohio 43211
614/297-2470



OHIO
HISTORICAL
SOCIETY
SINCE 1885

January 21, 1987

Kenneth A. Reed
Consultant
Aviation Planning Associates, Inc
421 Arch Street
Cincinnati, Ohio 45202

Dear Mr. Reed:

Re: Master Plan Update
Lunken Municipal Airport

This letter is in response to your correspondence dated December 23, 1986 concerning the project noted above. My staff has checked the National Register of Historic Places and the Ohio Archaeological Inventory. You should be aware that the location of the airport is very archaeologically sensitive. Two Ohio Archaeological Inventory forms are included for sites that are near the airport. Your drawing seems to indicate that any new developments will be within the existing airport. As long as any new construction occurs on previously disturbed land, we would agree that there would be no effect on significant cultural resources. However, if any work will take place on undisturbed land, further coordination with our office would be necessary.

It is possible that further coordination on alterations to the terminal will be necessary. However, the first step in the Section 106 review process is the identification and evaluation of cultural resources. In order to do this, you will need to provide us with more information about the building (date of construction and photographs). If it is determined that the building meets the National Register criteria, then close coordination with our office will be necessary. But, if it is found that the building is not significant then work may proceed without further involvement with our office.

If you should have any questions, you should contact Catherine Stroup at the number noted above. Thank you for your cooperation.

Sincerely,

W. Ray Luce
State Historic Preservation Officer

Enclosure

VI.

Airport Plans

VI. AIRPORT LAYOUT PLANS

Chapter IV, Identification and Evaluation of Alternatives, described Lunken Field's area development plans in general terms. This chapter presents a more detailed graphic and narrative description of the recommended airfield and terminal area development projects.

The Airport Layout Plans (ALP) package provides a graphic description of the recommended development program. The plans package includes the following drawings:

- . 1 of 11 Existing Airport Layout Plan
- . 2 of 11 Future Airport Layout Plan
- . 3 of 11 Airport Data Summary
- . 4 of 11 North Airfield Plan
- . 5 of 11 South Airfield Plan
- . 6 of 11 Airspace Plan
- . 7 of 11 Approach Plan - Runway 2R/20L, 6/24, 2L/20R
- . 8 of 11 On-Airport Land Use Plan
- . 9 of 11 Off-Airport Land Used Plan
- . 10 of 11 Exhibit A - Property Map
- . 11 of 11 Airport Photograph

Reduced copies of the ALP drawings are provided at the end of this chapter.

The following sections provide a narrative description of the recommended development program, including detailed descriptions of the 23 construction projects and their relative staging. The sections are organized as follows:

- . Airport Design Standards
- . Airport Layout Plan
- . North and South Airfield Plans
- . Airport Obstruction Plans
- . Land Use Plans

1. AIRPORT DESIGN STANDARDS

Airport planning and design are based upon the facility's future mission and the critical aircraft forecast to use it. The FAA has published advisory circulars containing airfield design standards which are intended to provide guidance with flexibility in application to ensure the safety, economy, efficiency, and longevity of the airport.

For geometric design purposes, the FAA's airport classification system is based upon the approach category. The approach categories, as shown in Table VI-1, are determined by the aircraft approach speed, which is defined as 1.3 times the stall speed in the landing configuration of that aircraft at maximum gross landing weight. Aircraft with maximum certificated takeoff weights in excess of 12,500 pounds are classified as large aircraft, while the rest are considered small aircraft.

Based upon approach categories, airports are classified as either utility or transport airports. Utility airport geometric design specifications are for all aircraft in approach categories A and B. A transport airport is defined as an airport which primarily serves approach categories C, D, and E aircraft with maximum certificated takeoff weights above 50,000 pounds.

As shown in Table VI-1, airplane design groups are defined according to the wingspan of the most demanding aircraft using the airport on a regular basis. At Lunken Field, the design aircraft with respect to critical wingspan dimensions were determined to be the Convair 580, the Fairchild F-27, and the Gulfstream III. Therefore, the design criteria utilized for airfield layout at Lunken Field are based on the Class III design group. Several critical dimensional standards associated with the Class III design group are presented in Table VI-2 and Exhibit VI-1. For the most part, these guidelines were used to

TABLE VI-1

Lunken Field Airport Master Plan Update

FAA AIRCRAFT CLASSIFICATIONS

FAA AIRCRAFT APPROACH CATEGORY CLASSIFICATION

<u>Approach Category</u>	<u>Approach Speed, Knots</u>
A	Less than 91
B	91 to 120
C	121 to 140
D	141 to 165
E	166 or Greater

FAA AIRPLANE DESIGN GROUP CLASSIFICATION

<u>Airplane Design Group</u>	<u>Wingspan, Ft.</u>	<u>Typical Aircraft</u>
I	less than 49	Learjet 24, Rockwell Sabre 75A
II	49 but less than 79	Gulfstream II, Rockwell Sabre 80
III	79 but less than 118	B-727, B-737, BAC-111, DC-9, Convair 580, Fairchild F-27
IV	118 but less than 171	A-300, A-310, B-707, DC-8, B-757, B-767, L1011, DC-10
V	171 but less than 197	B-747
VI	197 but less than 262	Future

Source: FAA Advisory Circular 150/5300-12, Airport Design Standards - Transport Airports.

TABLE VI-2

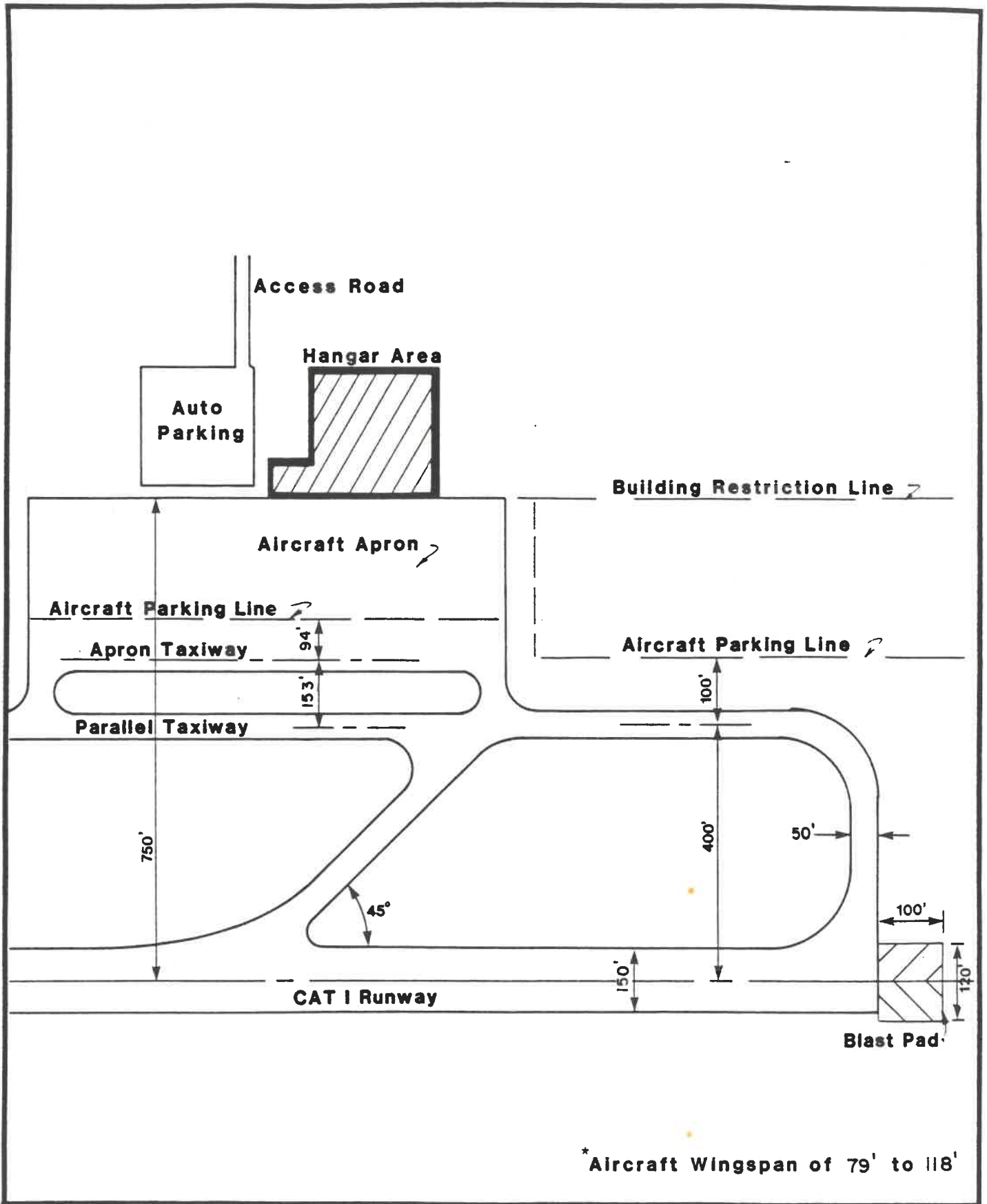
Lunken Field Airport Master Plan Update

RECOMMENDED FAA RUNWAY AND
TAXIWAY DESIGN STANDARDS FOR
CLASS III AIRCRAFT

<u>ITEM</u>	<u>CLASS III AIRCRAFT MINIMUM DESIGN DIMENSIONS (FT.)</u>
Runway Width	150
Runway Centerline to:	
. Taxiway Centerline ^{1/}	400
. Aircraft Parking Area ^{2/}	500
. Property/Building Restriction Line ^{2/, 3/}	750
Taxiway Width	50
Taxiway Centerline to:	
. Parallel Taxiway Centerline	153
. Fixed or Movable Object and to Property Line	94

Source: FAA Advisory Circular 150/5300-12, Airport Design Standards - Transport Airports.

-
- 1/ The location of a parallel taxiway may be adjusted such that no part of an aircraft (tail tip, wing tip) on taxiway centerline is above the runway safety area or penetrates the obstacle free zone (OFZ). For a detailed discussion on the OFZ, see AC 150/5300-4. Figure 2-3, therein, illustrates an OFZ for Aircraft Approach Category C or D airplanes.
- 2/ Buildings and parked aircraft may penetrate the Airport imaginary surfaces defined in Subpart C of FAR Part 77 where an FAA aeronautical study has determined that the specific penetration will not result in a hazard to air navigation.
- 3/ The runway centerline to property/building line separation distance may be reduced to 500 feet (150 m), dependent on an FAA no hazard to air navigation determination.



Lunken Field
Airport Master Plan

* CLASS III TRANSPORT AIRCRAFT
AIRPORT DESIGN STANDARDS

EXHIBIT
VI-1

lay out the facility improvements described in the remaining sections of this chapter. Important exceptions are noted in the text.

2. AIRPORT LAYOUT PLANS

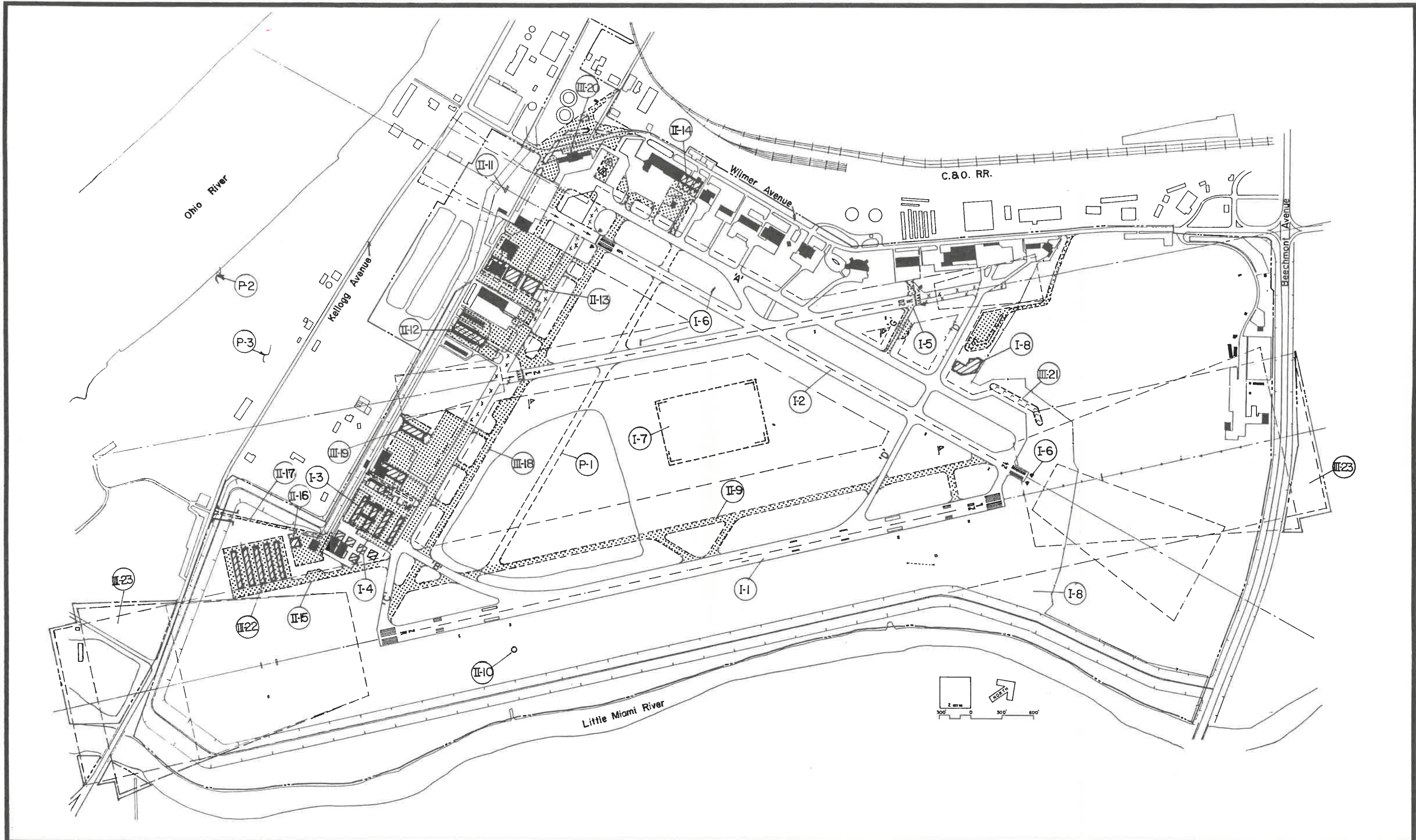
The master planning process culminates with FAA approval of the ALP, which serves as a blueprint for future development of the Airport. For Lunken Field, both an existing and future ALP were prepared. The future ALP depicts the Airport as it exists today, as well as the facilities recommended to accommodate anticipated demand through the planning period. The airport data summary drawing accompanying the ALP presents information regarding the Airport's location, existing and future runways, meteorological data, and other general Airport data.

The development program indicated on the ALP is intended to be conducted incrementally in three phases:

- . Phase I: 1986-1990
- . Phase II: 1991-1995
- . Phase III: 1996-2006

It should be emphasized that the recommended Airport development program described in this chapter is based upon the facilities required to meet the operational and safety needs of Lunken Field for the 20-year planning period. The phasing is intended to be flexible, as a number of factors influence whether a project will take place at a specific time. For example, some items in Phase I may actually take place in the Phase II time frame depending on activity levels, available financing, and operational considerations.

Chapter VII, Economic Feasibility and Financial Plans, discusses the feasibility of each recommended project. The Airport development program depicted on Exhibit VI-2 is intended



to be a guide in the determination of operational needs and practical feasibility of the proposed development projects. This development program, by phase, is described below.

PHASE I DEVELOPMENT (1986-1990) 1/

. I-1 - Runway 2R/20L Strengthening *DONE*

Resurfacing of the primary Runway 2R/20L is required to correct subsurface problems. This runway should be strengthened to accommodate 70,000 pound dual wheel aircraft.

. I-2 - Runway 6/24 Strengthening *DONE UNDER 94*

Resurfacing of crosswind Runway 6/24 is required to prevent further deterioration. This runway should be strengthened to accommodate 70,000 pound dual wheel aircraft.

. I-3 - T-Hangar Development *UNDER MEDIAN FILL*

To meet the short-term requirement for T-Hangar units, the area occupied by facilities 27 and 28 should be redeveloped for the construction of two 14-unit T-Hangars.

. I-4 - Single-Unit Hangar Development *DONE*

To meet the short-term requirement for single-unit corporate hangars, the area occupied by facilities 27 and 28 should be redeveloped for the construction of eight single-unit hangars.

. I-5 - Runway 20R Clear Zone Clearing *DONE*

To enhance the safety of aircraft operations and to improve control tower site visibility, the realignment and strengthening of Taxiway "G" is required. The existing runway pavement not required for Taxiway "D" is to be removed. This project will also include an aircraft holding apron for Runway end 20R. *NOT FROM*

1/ Facility numbers as per Existing Airport Facilities, Exhibit I-4.

. I-6 - Miscellaneous NAVAIDS

To enhance the safety of the airfield system, the installation of REILs on Runways 2L, 20R, 6 and 24 are recommended; the installation of PAPIs on Runways 2L and 6; and the installation of three supplemental wind cones.

. I-7 - Midfield Aircraft Operating Area

To improve the safety and control of helicopter flight training and fixed wing banner-towing operations, a designated area in the midfield is to be adequately marked for daytime operations.

. I-8 - North Airfield Commercial Site

The 4.5-acre site adjacent to Runway end 20R is considered acceptable for compatible Airport commercial development. To gain access to the parcel, a roadway will be required to cross the northwest edge of the adjacent golf course. To compensate the golf course for the loss of land, a comparable amount of Airport land along the Little Miami River levee can be utilized for golf course use.

PHASE II DEVELOPMENT (1991-1995)

. II-9 - Construct Runway 2R/20L Parallel Taxiway

In order to enhance the capacity and safety of Runway 2R/20L, the development of a full parallel taxiway system is required. This project will require the configuration of the midfield flood control basin.

. II-10 - Runway 2R Precision Approach

In conjunction with the new north-south runway project at Greater Cincinnati International Airport, the development of an LOC precision approach to Runway 2R will increase the capacity and operating efficiency of the airfield system.

. II-11 - Runway 24 Nonprecision Approach

In conjunction with the new north-south runway at Greater Cincinnati International Airport, the development of an LOC nonprecision approach to Runway 24 will increase the capacity and safety of the runway.

. II-12 - Special Service FBO

To meet the future requirements for limited service FBO services, the expansion of the existing hangar area along Airport Road is recommended. This project will require the demolition of the existing T-Hangars 19, 20, 21, and 22. ^{1/}

. II-13 - Redevelop Hangar Area

The pre-World War II three-hangar complex south of Runway End 6 is recommended to be redeveloped to meet the future aircraft maintenance and storage requirements of Lunken Field.

. II-14 - FBO Expansion

To meet the future full service FBO requirements of Lunken, expansion of the FBO hangar and apron area along Wilmer Avenue is recommended.

. II-15 - T-Hangar Development

To meet the projected T-Hangar requirement at Lunken, it is recommended that two 16-unit T-Hangars be constructed in the landfill area west of Runway end 2R. This project will require a connecting taxiway from Taxiway "C."

. II-16 - Airport Maintenance

To adequately maintain the additional airfield operating areas, an expansion of the Airport maintenance facility is recommended adjacent to the existing maintenance facility.

. II-17 - Airport Road - Kellogg Avenue Connector

To provide adequate CFR access to the south airfield approach areas, adequate Airport user access to the south airfield FBO and private hangar areas, and improve the Airport Road/Wilmer Avenue intersection problems, an extension of Airport Road to Kellogg Avenue is recommended. This project will require a cut through the Kellogg Avenue levee.

^{1/} See Exhibit I-4 for facilities identification.

PHASE III DEVELOPMENT (1996-2006)

. . III-18 - Construct New Taxiway "C"

To meet the overall hangar and apron area requirements of Lunken Field, the development of a new taxiway system parallel to Taxiway "C" is required. This project will allow hangar and apron development to be extended to the north edge of the existing Taxiway "C."

. III-19 - South Airfield FBO

To better utilize the existing FBO area on the south airfield, it is recommended that the hangar facilities be redeveloped and the apron areas expanded to the edge of old Taxiway "C."

. III-20 - Remodel Terminal Building

To improve the physical and economic viability of the terminal building, it is recommended that the structure be completely remodeled and used for Airport administration and commercial uses. This project will require the reconfiguration of Wilmer Avenue to provide adequate auto parking facilities adjacent to the terminal. Associated with this project will be a Lunken Field signing system at key area roadway intersections.

. III-21 - Noise Berm

In order to lessen the noise impact of aircraft run-up noise on the adjacent golf course, it is recommended that an earth and tree berm be constructed adjacent to the Runway 20L/24 run-up apron area.

. III-22 - T-Hangar Development

To meet the long-term T-hangar requirements of Lunken Field, it is recommended that the T-hangar complex west of Runway end 2R be expanded to accommodate future 14-unit T-hangars.

. III-23 - Runway 2R/20L Avigation Easements

To comply with current FAA extended runway end building restriction area requirements, the Airport is required to have control of property within 3,000 feet of the runway end.

POTENTIAL LONG-TERM PROJECTS

. P-1 - New Taxiway "C"

At such time when the south airfield facility requirements exceed the available land, the relocation of Taxiway "C" 600 feet to the north is recommended. This project will allow an additional 36 acres of hangar and apron development. The reconfiguration of the midfield retention basin will be required.

. P-2 - Relocate Ohio River Levee

In conjunction with other City of Cincinnati commercial/industrial development projects, the relocation of the Ohio River levee will allow the Airport to expand to the southwest.

. P-3 - Airport Industrial Park

With the relocation of the levee, land becomes available for Airport-compatible commercial development.

3. NORTH AND SOUTH AIRFIELD PLANS

The objective of the hangar area development plans (Drawings 4 and 5 of 11) is to provide more detailed drawings of the development illustrated in a general fashion on the ALP. The recommended phasing plan for development of the hangar areas is only one of many scenarios that could be developed to expand upon the existing hangar area configurations.

In most cases, expansion of landside facilities at the Airport can be accommodated on or adjacent to their current sites. These facilities and their expansion plans are depicted on the North and South Airfield plans and other drawings, as applicable.

As shown on the North Airfield Plan, future expansion is very limited. Three areas have the potential for redevelopment: the terminal, Ohio Aviation FBO area, and the vacant area east of

Taxiway "D" adjacent to the golf course.

The South Airfield Plan depicts the complete redevelopment of the old hangars along Airport Road. To allow for the future expansion of the aircraft aprons along the south airfield, Taxiway "C" is recommended to be relocated 225 feet to the north. At such time when additional hangars and aprons are required along the south airfield, Taxiway "C" can be relocated to the north as required.

4. AIRPORT OBSTRUCTION PLANS

The purpose of obstruction plans is to graphically depict physical objects that exist in the navigable airspace surrounding the Airport. The criteria used to define an obstruction to the safety of approaching and departing aircraft are contained in Federal Aviation Regulation (FAR) Part 77, Objects Affecting Navigable Airspace. Lunken Field's existing airspace obstructions are described in detail on two drawings:

- . Airspace Plan
- . Approach Plan - Runways 2R/20L, 6/24, 2L/20R

The airspace plan shows the five imaginary surfaces as defined by Part 77. Based on NOS Obstruction Chart 83 (April 1985), 29 major obstructions penetrate the horizontal surface (Elev. 633).

Related to the Part 77 plan are the approach and clear zone drawings. These drawings show plan and profile views of the approach zones for the existing runways. The information portrayed on these drawings was obtained through on-site inspections, aerial photography, and the NOS Airport Obstruction Chart.

The inner portions of the approach surfaces are called clear zones, which literally means that the areas so defined should be obstruction free. Where obstructions such as trees or NAVAID structures exist, at least one of three actions must be taken:

- . The obstruction must be removed
- . A waiver may be granted from the FAA for retention of the obstruction
- . The threshold of the clear zone may be displaced (threshold is normally 200 feet beyond the physical end of the runway)

As shown on the approach plans, the approach area to Runway 6 is the only runway that has serious obstruction problems. In order to clear the hillside west of the Ohio River in Northern Kentucky, the threshold to Runway 6 has been displaced 559 feet.

5. LAND USE PLANS

The on-airport land use plan depicts general guidelines for development of key functional areas on the Airport. The off-airport land use plan presents guidelines for compatible development of the areas immediately around the Airport. Each layout plan is discussed in more detail in the following paragraphs.

(1) On-Airport Land Use Plan

The purpose of developing an on-airport land use plan is to achieve an arrangement of land uses within the Airport's boundaries which best utilizes available property for current and future Airport needs. Nine basic land uses proposed for Lunken Field are described below:

- Airfield Area - The assignment of land for the airfield has the highest priority, as it represents the most critical airport element. The size of the active airfield is dictated by application of FAA safety criteria for building restriction lines and clear zone areas in the runway approaches. Once these building restriction areas are defined, the configuration of the remaining land uses can be determined.
- Terminal Area - The terminal area includes the terminal complex, associated aprons and airfield connector taxiways, public parking facilities, and the terminal area access system.
- Park - Lunken Playfield, located on the northern boundary, acts as a community buffer and provides a compatible land use for Lunken Field.
- Airport Support Facilities - The purpose of airport support functions is to provide basic services to sustain the operation of the airport. These services include:

 - Employee parking areas
 - FAA navigational facilities
 - Airfield maintenance areas
 - Fuel farm
 - FAA Control Tower
 - Rental car service areas
 - Taxi staging area
 - Crash, fire, and rescue station
 - Airport utility areas
- General Aviation Area - This area includes the following types of development:

 - Private hangars
 - T-Hangars
 - Aircraft Tie-down Areas
- Corporate Aviation - This land use provides for companies with extensive flight operations requirements. The majority of the Wilmer Avenue lease areas are reserved for corporate aviation.
- Full Service FBO - Lunken Field has two areas, (one on the north airfield and one on the south airfield) reserved for full service FBOs. Services provided by these FBOs are:

- Maintenance and storage hangars
 - Transient aircraft parking aprons
 - Public parking areas
 - Aircraft fuel services
- . Limited Service FBO - This land use is intended to accommodate specialized aviation-related commercial services. These services include:
 - Aircraft sales
 - Avionics maintenance
 - Aircraft engine maintenance
 - Aircraft painting
 - Flight training
 - Other aviation-related support functions
 - . Aviation-Related Commercial Area - These development areas provide space adjacent to the Airport and airfield areas for aviation-related businesses. These include:
 - Restaurants
 - Hotels
 - Rental Car Area
 - Flying Clubs
 - Other aviation-related businesses

The Airport currently owns all property necessary for future development of its primary functional areas such as the airfield, terminal area, and support facilities.

(2) Off-Airport Land Use Plan

The role of airports as employers and centers of economic activities has made land adjacent to metropolitan airports prime real estate for commercial, industrial, and residential development. Often this "urbanization" of airport environs has been accomplished without proper and adequate consideration of the effect it might have on airport operations.

The institution of this Master Plan Update, in conjunction with City and regional land use plans, will help

ensure the future compatibility of the Airport and surrounding areas.

With the adoption of the ALP, the FAA Airport District Office requires that all proposed or future airport development be depicted on the ALP and submitted to the FAA for review as to the projects' compliance with the guidelines of the Airport Layout Plan.

Airport Master Plan



CINCINNATI MUNICIPAL AIRPORT LUNKEN FIELD

CITY OF CINCINNATI, OHIO
Department of Public Utilities
Division of General Aviation

March, 1989

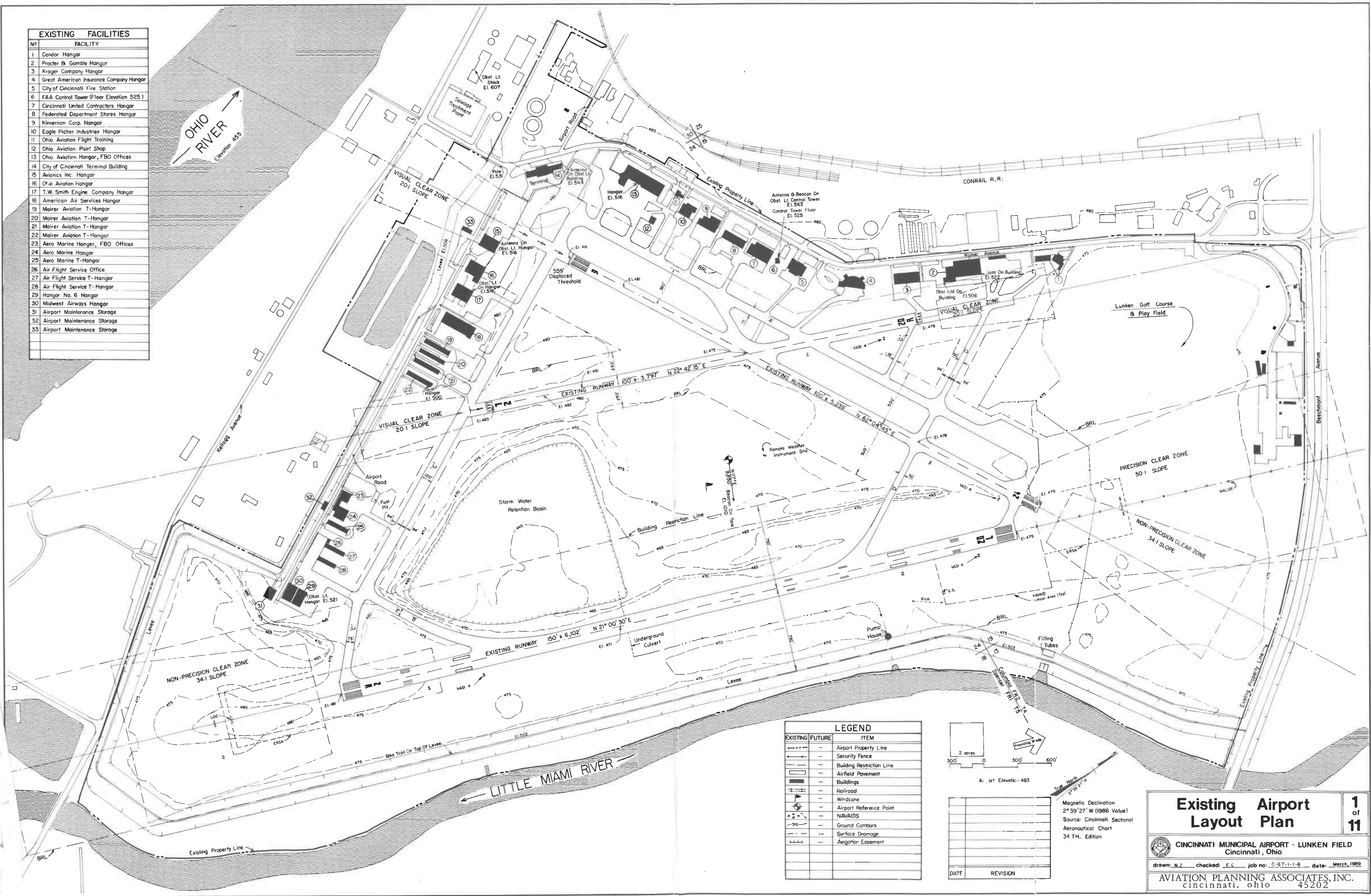
- AVIATION PLANNING ASSOCIATES, INC.
- AIRPORT CORPORATION OF AMERICA
- HENRY WILSON & ASSOCIATES, INC.

DRAWING INDEX

- 1 of 11 Existing Airport Layout Plan
- 2 of 11 Future Airport Layout Plan
- 3 of 11 Airport Data Summary
- 4 of 11 North Airfield Plan
- 5 of 11 South Airfield Plan
- 6 of 11 Airspace Plan
- 7 of 11 Approach Plan Runways 2R-20L, 6-24, 2L-20R
- 8 of 11 On Airport Land Use Plan
- 9 of 11 Off Airport Land Use Plan
- 10 of 11 Exhibit A Property Map
- 11 of 11 Airport Photograph

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EXISTING FACILITIES	
No.	FACILITY
1	Condor Hangar
2	Procter & Gamble Hangar
3	Kroger Company Hangar
4	Great American Insurance Company Hangar
5	City of Cincinnati Fire Station
6	FAA Control Tower (Floor Elevation 525)
7	Cincinnati United Contractors Hangar
8	Federated Department Stores Hangar
9	Kimverson Corp. Hangar
10	Eagle Picher Industries Hangar
11	Ohio Aviation Flight Training
12	Ohio Aviation Paint Shop
13	Ohio Aviation Hangar, FBO Offices
14	City of Cincinnati Terminal Building
15	Avionics Inc. Hangar
16	Ohio Aviation Hangar
17	T.W. Smith Engine Company Hangar
18	American Air Services Hangar
19	Mairer Aviation T-Hangar
20	Mairer Aviation T-Hangar
21	Mairer Aviation T-Hangar
22	Mairer Aviation T-Hangar
23	Aero Marine Hangar, FBO Offices
24	Aero Marine Hangar
25	Aero Marine T-Hangar
26	Air Flight Service Office
27	Air Flight Service T-Hangar
28	Air Flight Service T-Hangar
29	Hangar No. 6 Hangar
30	Midwest Airways Hangar
31	Airport Maintenance Storage
32	Airport Maintenance Storage
33	Airport Maintenance Storage



LEGEND		
EXISTING	FUTURE	ITEM
---	---	Airport Property Line
---	---	Security Fence
---	---	Building Restriction Line
---	---	Airfield Pavement
---	---	Buildings
---	---	Railroad
---	---	Windcone
---	---	Airport Reference Point
---	---	NAVAIDS
---	---	Ground Contours
---	---	Surface Drainage
---	---	Aviation Easement

2 acres

300' 0 300' 600'

Art Elevatic: 483

True North
2°39'27" W

Magnetic Declination
2°39'27" W (1986 Value)
Source: Cincinnati Sectional
Aeronautical Chart
34 TH. Edition

DATE	REVISION

**Existing Airport
Layout Plan**

**1
of
11**

CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
Cincinnati, Ohio

drawn: N.Z. checked: E.C. job no: C-67-1-1-6 date: March, 1989

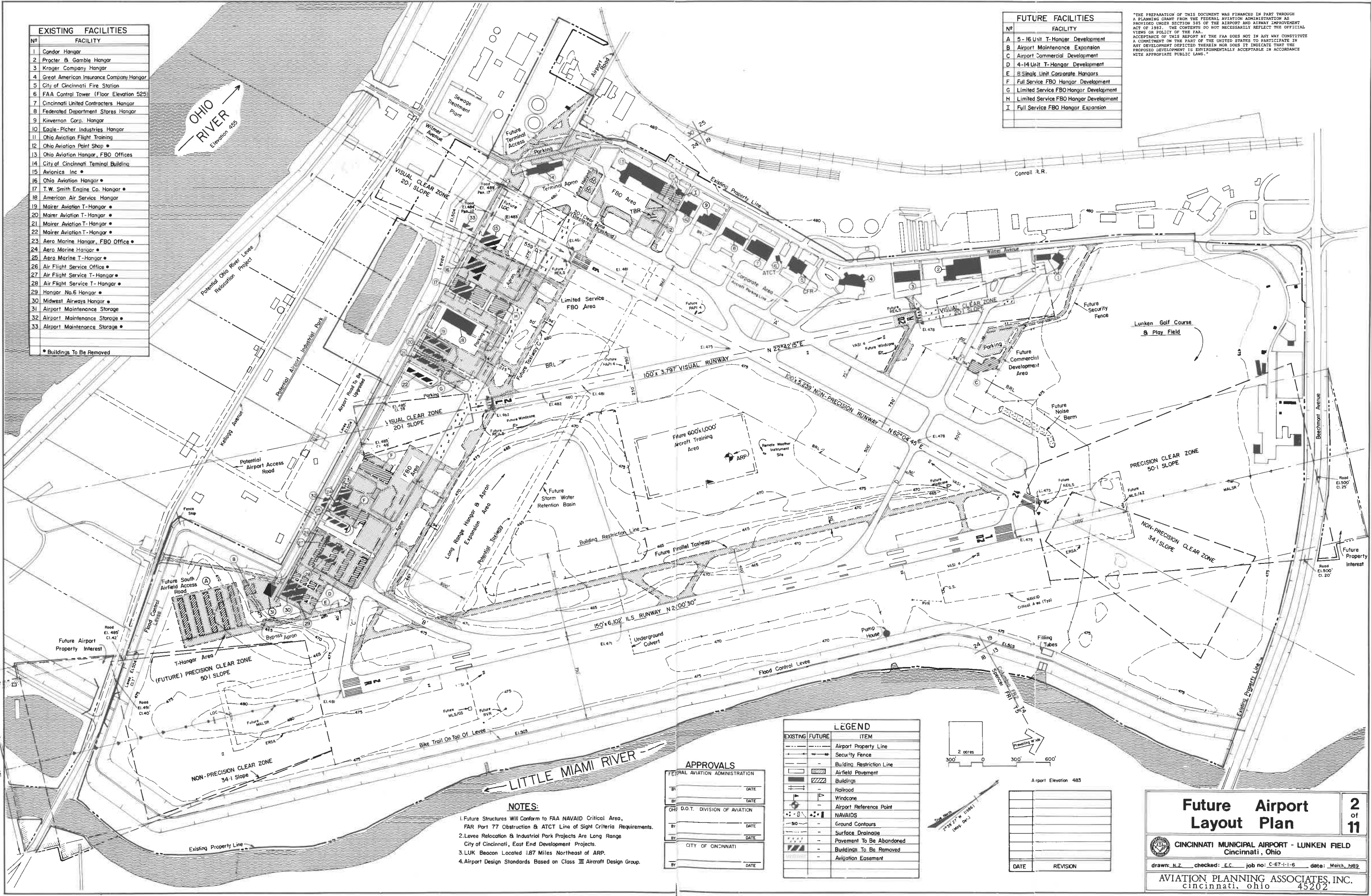
AVIATION PLANNING ASSOCIATES, INC.
cincinnati, ohio 45202

EXISTING FACILITIES	
Nº	FACILITY
1	Candor Hangar
2	Procter & Gamble Hangar
3	Kroger Company Hangar
4	Great American Insurance Company Hangar
5	City of Cincinnati Fire Station
6	FAA Control Tower (Floor Elevation 525)
7	Cincinnati United Contractors Hangar
8	Federated Department Stores Hangar
9	Kinvernon Corp. Hangar
10	Essle-Picher Industries Hangar
11	Ohio Aviation Flight Training
12	Ohio Aviation Paint Shop
13	Ohio Aviation Hangar, FBO Offices
14	City of Cincinnati Terminal Building
15	Avionics Inc.
16	Ohio Aviation Hangar
17	T.W. Smith Engine Co. Hangar
18	American Air Service Hangar
19	Mairer Aviation T-Hangar
20	Mairer Aviation T-Hangar
21	Mairer Aviation T-Hangar
22	Mairer Aviation T-Hangar
23	Aero Marine Hangar, FBO Office
24	Aero Marine Hangar
25	Aero Marine T-Hangar
26	Air Flight Service Office
27	Air Flight Service T-Hangar
28	Air Flight Service T-Hangar
29	Hangar No.6 Hangar
30	Midwest Airways Hangar
31	Airport Maintenance Storage
32	Airport Maintenance Storage
33	Airport Maintenance Storage

• Buildings To Be Removed

FUTURE FACILITIES	
Nº	FACILITY
A	5-16 Unit T-Hangar Development
B	Airport Maintenance Expansion
C	Airport Commercial Development
D	4-14 Unit T-Hangar Development
E	8 Sibaluk Unit Corporate Hangars
F	Full Service FBO Hangar Development
G	Limited Service FBO Hangar Development
H	Limited Service FBO Hangar Development
I	Full Service FBO Hangar Expansion

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EXISTING	FUTURE	ITEM
---	---	Airport Property Line
---	---	Security Fence
---	---	Building Restriction Line
---	---	Airfield Pavement
---	---	Buildings
---	---	Railroad
---	---	Windcone
---	---	Airport Reference Point
---	---	NAVAIDS
---	---	Ground Contours
---	---	Surface Drainage
---	---	Pavement To Be Abandoned
---	---	Buildings To Be Removed
---	---	Aviation Easement

APPROVALS	
FEDERAL AVIATION ADMINISTRATION	DATE
BY	DATE
OHIO D.O.T. DIVISION OF AVIATION	DATE
BY	DATE
CITY OF CINCINNATI	DATE
BY	DATE

- NOTES:**
1. Future Structures Will Conform to FAA NAVAID Critical Area, FAR Part 77 Obstruction & ATCT Line of Sight Criteria Requirements.
 2. Levee Relocation & Industrial Park Projects Are Long Range City of Cincinnati, East End Development Projects.
 3. LUK Beacon Located 1.87 Miles Northeast of ARP.
 4. Airport Design Standards Based on Class III Aircraft Design Group.

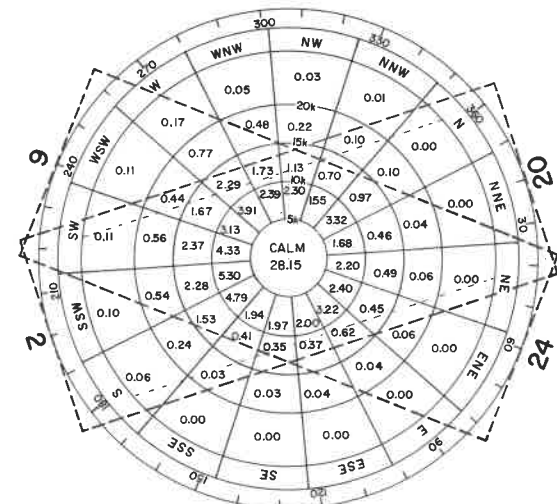
Future Airport Layout Plan

2 of 11

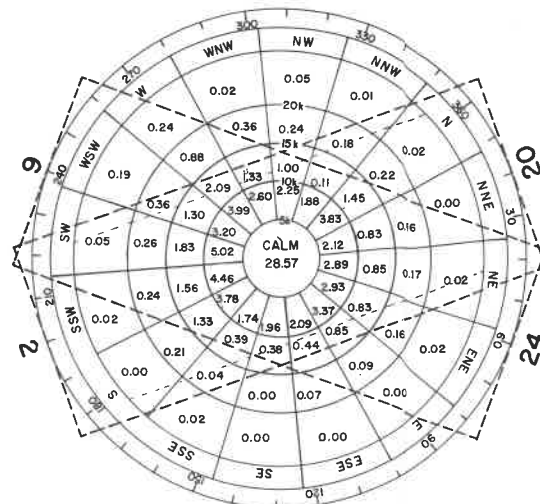
CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
Cincinnati, Ohio

drawn: N.Z. checked: E.C. job no: C-67-1-1-6 date: March, 1982

AVIATION PLANNING ASSOCIATES, INC.
cincinnati, ohio 45202



ALL WEATHER WIND ROSE



IFR WIND ROSE

WIND DATA SUMMARY

15 MPH X-WIND COVERAGE (13 kt.)												
CATEGORY	2-R	20-L	CALMS	TOTAL	2-L	20-R	CALMS	TOTAL	6	24	CALMS	TOTAL
ALL-WEATHER	25.21	42.80	28.15	96.16	25.23	42.93	28.15	96.31	23.28	46.40	28.15	97.83
IFR	29.58	38.19	28.57	96.34	29.63	38.28	28.57	96.48	28.03	41.24	28.57	97.84
VFR	24.41	43.71	27.99	96.11	24.43	43.83	27.99	96.25	22.40	47.41	27.99	97.80

12 MPH X-WIND COVERAGE (10.5 kt.)												
CATEGORY	2-R	20-L	CALMS	TOTAL	2-L	20-R	CALMS	TOTAL	6	24	CALMS	TOTAL
ALL-WEATHER	51.48	67.86	28.15	91.19	51.16	67.95	28.15	90.96	50.07	71.31	28.15	93.23
IFR	56.34	63.94	28.57	91.71	56.08	64.04	28.57	91.55	54.77	67.19	28.57	93.39
VFR	50.51	68.54	27.99	91.06	50.17	68.63	27.99	90.81	49.12	72.04	27.99	93.17

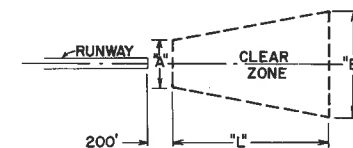
Station: Greater Cincinnati Intl. Airport
 Period: 1973 - 1983
 Source: NOAC

RUNWAY DATA

ITEM	2-R		20-L		2-L		20-R		6		24	
	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future
Physical Length	6,102'	Same	6,102'	Same	3,797'	Same	3,797'	Same	5,239'	Same	5,239'	Same
Displaced Threshold	-	-	-	-	-	-	-	-	559'	Same	-	-
Departure Length	6,102'	Same	6,102'	Same	3,797'	Same	3,797'	Same	5,239'	Same	5,239'	Same
Arrival Length	6,102'	Same	6,102'	Same	3,797'	Same	3,797'	Same	4,680'	Same	5,239'	Same
Width	150'	Same	150'	Same	100'	Same	100'	Same	100'	Same	100'	Same
Surface Composition	(Improved)	Same	(Improved)	Same	Asph.	Same	Asph.	Same	(Improved)	Same	Asph.	Same
Pavement Strength (x1000 lbs)	40-50-50-D 50-50-D	45-50-50-D 50-50-D	40-50-50-D 50-50-D	45-50-50-D 50-50-D	11-S	12.5-S	11-S	12.5-S	11-S 55-51	45-50-50-D 50-50-D	11-S 55-51	45-50-50-D 50-50-D
Approach Category	Non-Precision	Precision	Precision	Same	Visual	Same	Visual	Same	Visual	Same	Non-Precision	Same
Runway Lighting	HIRL	Same	HIRL	Same	MIRL	Same	MIRL	Same	MIRL	Same	MIRL	Same
Runway Marking	NPI	Precision	Precision	Same	Basic	Same	Basic	Same	Basic	Same	NPI	Same
Effective Gradient (%)	0.16	Same	0.16	Same	0.21	Same	0.21	Same	0.15	Same	0.15	Same
A/W Wind Coverage (%) (15MPH)	25.21	Same	42.80	Same	25.23	Same	42.93	Same	23.28	Same	46.40	Same
Bearing (True)	N21°00'E	Same	N21°00'E	Same	N22°42'E	Same	N22°42'E	Same	N62°04'E	Same	N62°04'E	Same
Service Level	Transport	Same	Transport	Same	General Utility	Same	Transport	Same	Transport	Same	Transport	Same
Coordinates	LT 39°05'33" LN 84°25'00"	SAME	LT 39°05'29" LN 84°24'52"	SAME	LT 39°05'55" LN 84°23'58"	SAME	General Utility LAT 39°06'33" LON 84°23'08"	SAME	LAT 39°06'09" LON 84°23'40"	SAME	LAT 39°06'32" LON 84°24'43"	SAME
Nav Aids	Non-Precision VASI-4	(Precision) MALSR MLS-EL & AZ - RVR	(Precision) ILS, MALSR VASI-4, RVR	(Precision)	(Visual)	(Visual)	(Visual)	(Visual)	(Visual)	(Visual)	(Non-Precision) VASI-4	(Non-Precision) REIL

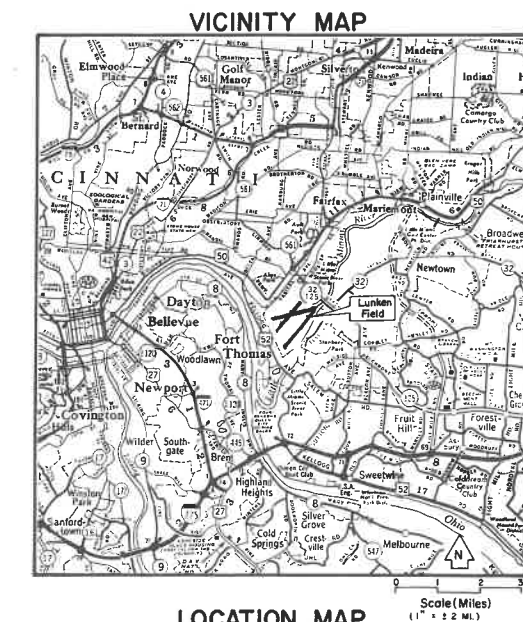
FUTURE CLEAR ZONE DATA

R/W	CATEGORY	Approach Slope	"L"	"A"	"B"
2-R	Precision	50:1	2,500'	1,000'	1,750'
20-L	Precision	50:1	2,500'	1,000'	1,750'
2-L	Visual	20:1	1,000'	250'	450'
20-R	Visual	20:1	1,000'	250'	450'
6	Visual	20:1	1,000'	500'	700'
24	Non-Precision	34:1	1,700'	500'	1,010'



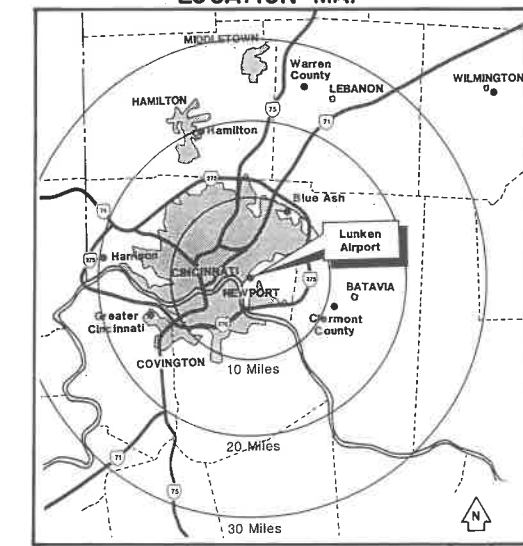
WAIVERS TO AIRPORT DESIGN STANDARDS

N#	OBSTRUCTION	FAA CRITERIA	FAA WAIVER
1	1,3,5,6,7,8,9,11,15,16,17,18,21,22,26,28,29	Conical Surface FAR Part 77 See Airspace Plan 6 of II	Request Permanent Waiver
2	2,4,10,12,13,14,19,20,23,24,25,27	Horizontal Surface FAR Part 77 See Airspace Plan 6 of II	Request Permanent Waiver
3	R/W 6 Approach Surface 1,2,3,4,5,6,7,8,9,11,13,15,16,17	20:1 Approach Surface FAR Part 77 See Approach Plan 7 of II	Request Permanent Waiver
4	R/W 20R Transitional Surface 5,6	7:1 Transitional Surface FAR Part 77 See Approach Plan 7 of II	Request Permanent Waiver
5	Terminal Building	750' BRL 50' Violation See Approach Plan 7 of II	Request Permanent Waiver



Scale (Miles) (1" = 2 MI.)

LOCATION MAP



Scale (Miles) (1" = 10 MI.)

AIRPORT DATA

ITEM	EXISTING	FUTURE
Airport Elevation (MSL)	483'	Same
Airport Reference Point	Lat. 39° 05' 29" North Long. 84° 25' 07.47" West	Same
Mean Max. Temp. Hottest Month	88°F	Same
Service Role	Reliever	Same
Terminal Nav Aids	ILS, TVOR, BEACON	Same
Combined Wind Coverage (A/W)	98.97	Same
Dist. & Dir. to Cincinnati	4.5 Miles - East	Same
Land Owned in Fee (Acres)	988.98	Same
Aviation Easement (Acres)	36.38	+20.65= 57.03
Owner	City of Cincinnati	Same
Magnetic Declination (1986)	2° 39' 27" W	Same
ARP Coordinates	LAT 39° 05' 29" LON 84° 25' 07.47"	Same
Helipad	-	Terminal Area
Aircraft Design Group	Class III	Same

TYPICAL CRITICAL AIRCRAFT
 Gulfstream III
 Approach Speed: 142 kts.
 Wing Span: 77.8 ft.
 Length: 62.7 ft.
 Tail Height: 23.2 ft.
 Max Takeoff Weight: 68,700 lbs.

Airport Data Summary

3 of 11

CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
 Cincinnati, Ohio

drawn: N.Z. checked: E.C. job no: C-67-1-1-6 date: March, 1989

AVIATION PLANNING ASSOCIATES, INC.
 Cincinnati, Ohio 45202

FUTURE STRUCTURES

Phase I

1-I Airport Commercial Development

Phase II

1-II Limited Service FBO Hangar Development

2-II Full Service FBO Hangar Expansion

Phase III

1-III Limited Service FBO Hangar Development

2-III Terminal Remodeling

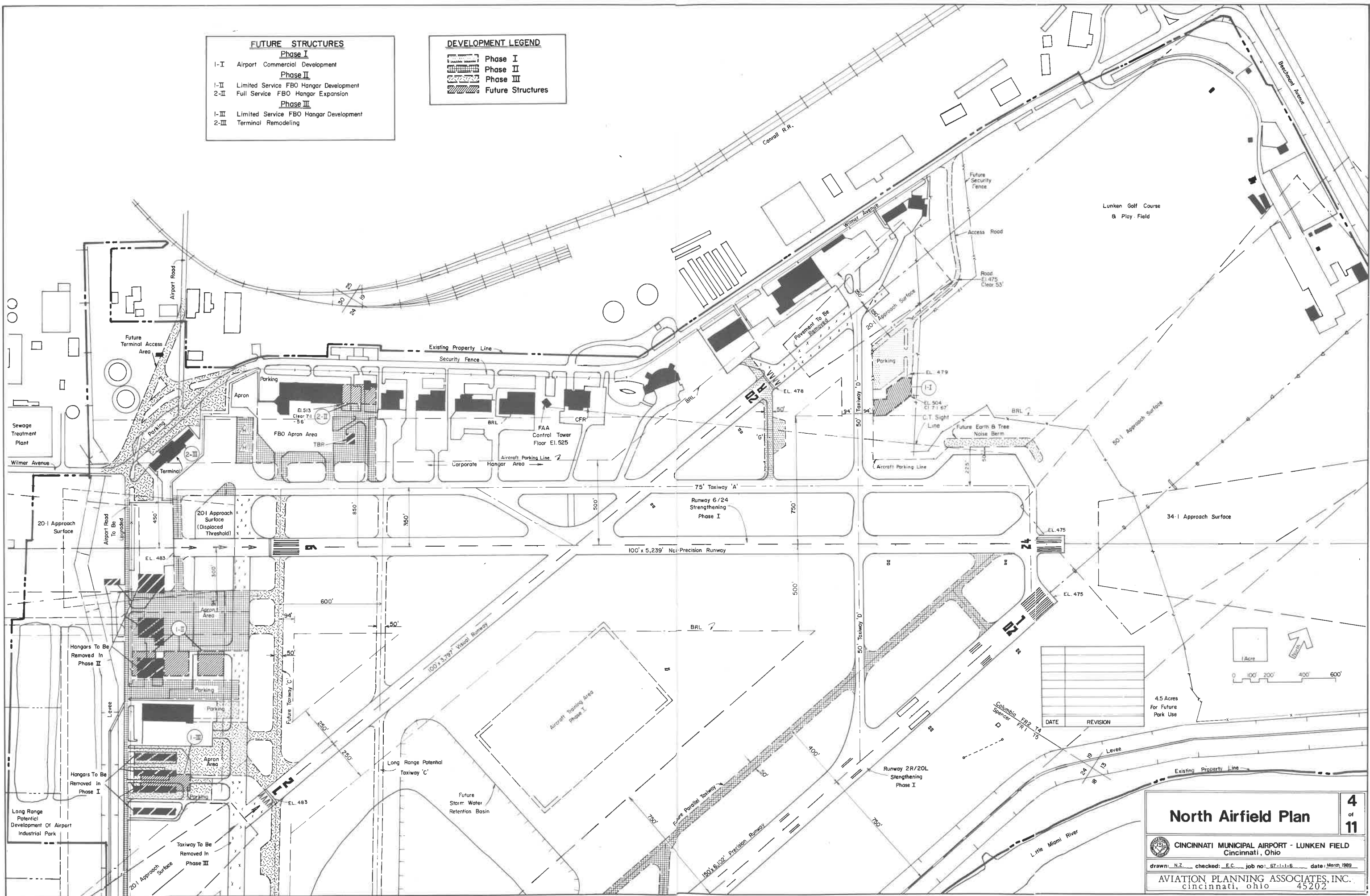
DEVELOPMENT LEGEND

[Pattern] Phase I

[Pattern] Phase II

[Pattern] Phase III

[Pattern] Future Structures



DATE	REVISION

0 100' 200' 400' 600'

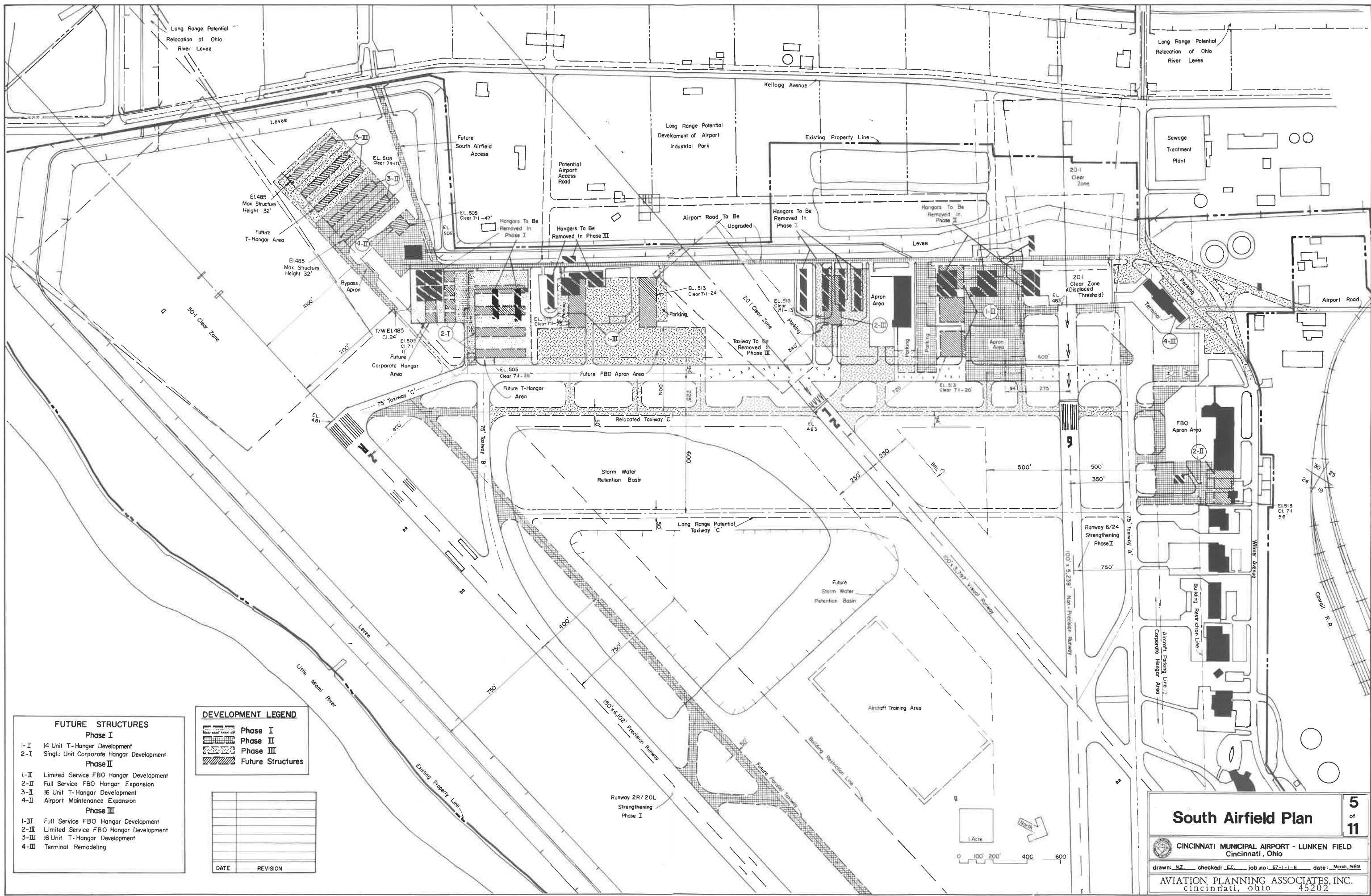
North Airfield Plan

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of
11

CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
Cincinnati, Ohio

drawn: N.Z. checked: E.C. job no: 57-1-1-6 date: March 1989

AVIATION PLANNING ASSOCIATES, INC.
cincinnati, ohio 45202



- FUTURE STRUCTURES**
- Phase I**
- 1-I 14 Unit T-Hanger Development
 - 2-I Singl. Unit Corporate Hangar Development
- Phase II**
- 1-II Limited Service FBO Hangar Development
 - 2-II Full Service FBO Hangar Expansion
 - 3-II 16 Unit T-Hanger Development
 - 4-II Airport Maintenance Expansion
- Phase III**
- 1-III Full Service FBO Hangar Development
 - 2-III Limited Service FBO Hangar Development
 - 3-III 16 Unit T-Hanger Development
 - 4-III Terminal Remodeling

DEVELOPMENT LEGEND

- Phase I
- Phase II
- Phase III
- Future Structures

DATE	REVISION

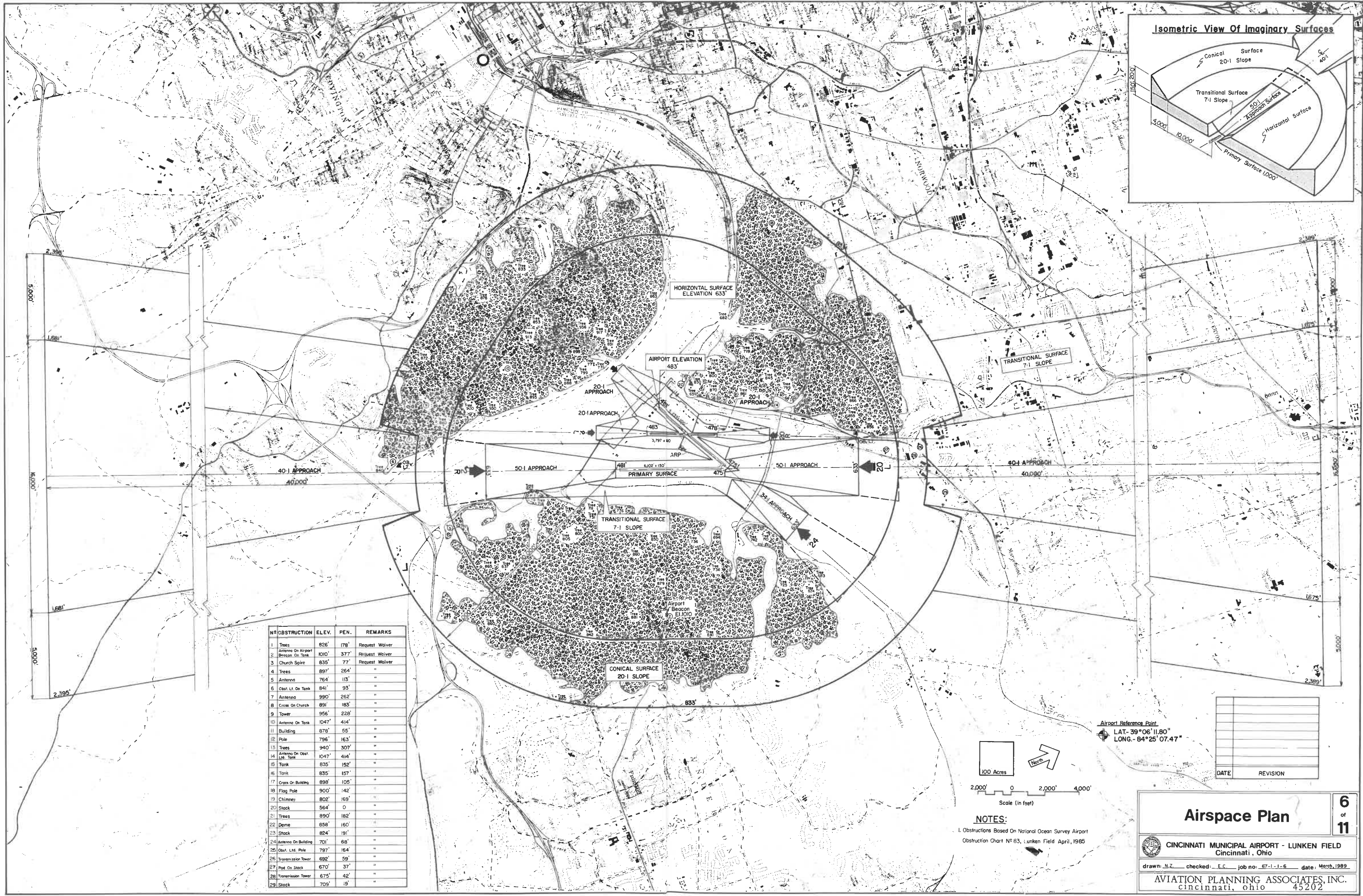
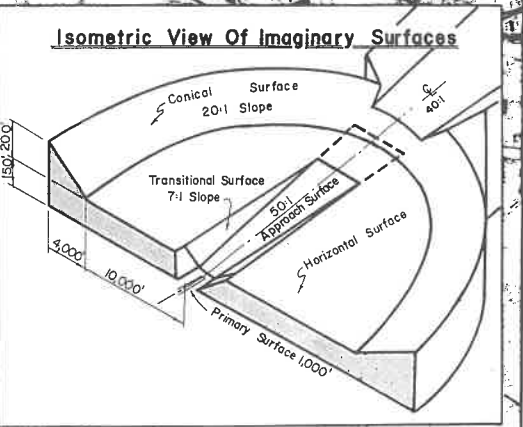
South Airfield Plan

5
of
11

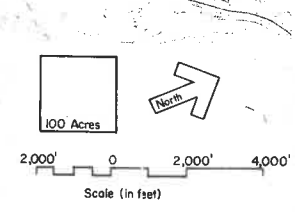
CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
Cincinnati, Ohio

drawn: N.Z. checked: E.C. job no: 67-1-1-6 date: March, 1989

AVIATION PLANNING ASSOCIATES, INC.
cincinnati, ohio 45202



Nº	OBSTRUCTION	ELEV.	PEN.	REMARKS
1	Trees	826'	178'	Request Waiver
2	Antenna On Airport Beacon On Tank	1010'	377'	Request Waiver
3	Church Spire	835'	77'	Request Waiver
4	Trees	897'	264'	"
5	Antenna	754'	113'	"
6	Obst. Lt. On Tank	841'	93'	"
7	Antenna	990'	262'	"
8	Crss On Church	891'	183'	"
9	Tower	956'	228'	"
10	Antenna On Tank	1047'	414'	"
11	Building	878'	55'	"
12	Pole	796'	163'	"
13	Trees	940'	307'	"
14	Antenna On Obst. Lt. Tank	1047'	414'	"
15	Tank	835'	152'	"
16	Tank	835'	157'	"
17	Crss On Building	898'	105'	"
18	Flag Pole	900'	142'	"
19	Chimney	802'	159'	"
20	Stack	564'	0	"
21	Trees	890'	182'	"
22	Dome	858'	160'	"
23	Stack	824'	191'	"
24	Antenna On Building	701'	68'	"
25	Obst. Lt. Pole	797'	164'	"
26	Transmission Tower	692'	59'	"
27	Pole On Stack	670'	37'	"
28	Transmission Tower	675'	42'	"
29	Stack	709'	19'	"



NOTES:
 1. Obstructions Based On National Ocean Survey Airport Obstruction Chart Nº 83, Lunken Field April, 1985

Airport Reference Point
 LAT - 39°06' 11.80"
 LONG - 84°25' 07.47"

DATE	REVISION

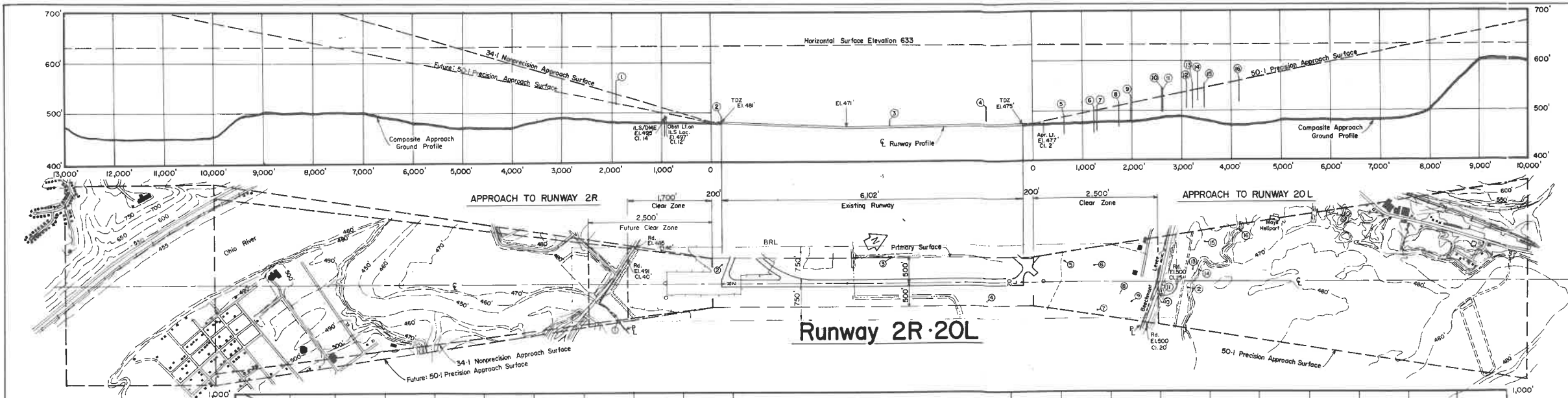
6 of 11

Airspace Plan

CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
 Cincinnati, Ohio

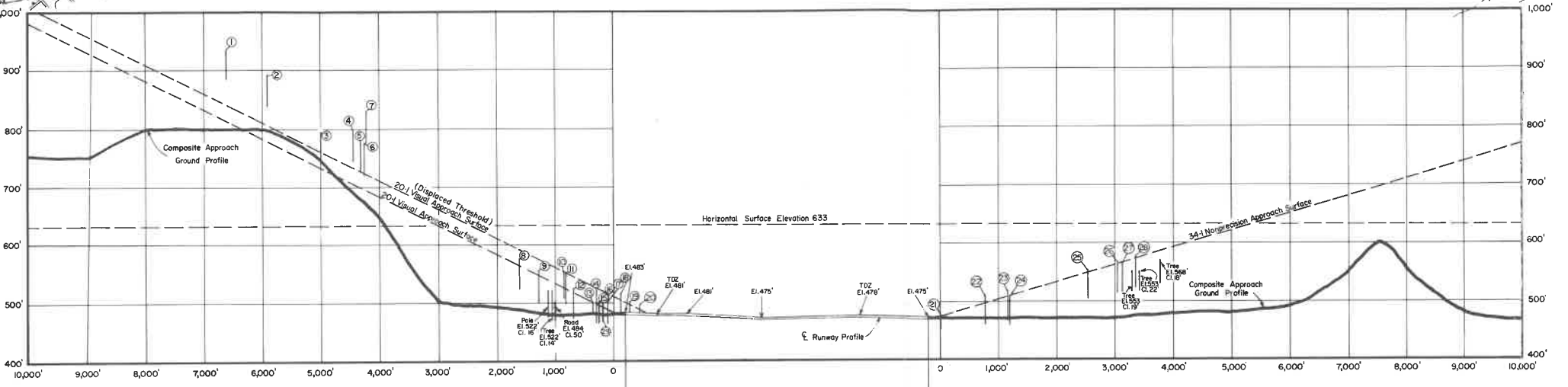
drawn: N.Z. checked: E.C. job no: 57-1-1-6 date: March, 1989

AVIATION PLANNING ASSOCIATES, INC.
 cincinnati, ohio 45202



NO	OBSTRUCTION	ELEV.	EXISTING	FUTURE	REMARKS
1	Tree	566'	29'	520'	To Be Lowered
2	Bush	494'	13'	481'	To Be Removed
3	Bush	486'	14'	471'	To Be Removed
4	Obst. Light	512'	36'	512'	Necessary NAVAID
5	Tree	491'	3'	455'	To Be Removed
6	Tree	509'	9'	475'	To Be Removed
7	Tree	511'	10'	475'	To Be Removed
8	Tree	519'	9'	475'	To Be Removed
9	Tree	531'	17'	475'	To Be Removed
10	Tree	548'	21'	520'	To Be Trimmed
11	Tree	542'	15'	520'	"
12	Tree	558'	21'	530'	"
13	Tree	556'	17'	530'	"
14	Tree	574'	33'	530'	"
15	Tree	554'	10'	540'	"
16	Tree	568'	10'	550'	"

(P) Primary Surface (ILS Loc) ILS Localizer
 (T) Transitional Surface (Apr. Lt.) Approach Light
 (A) Approach Surface

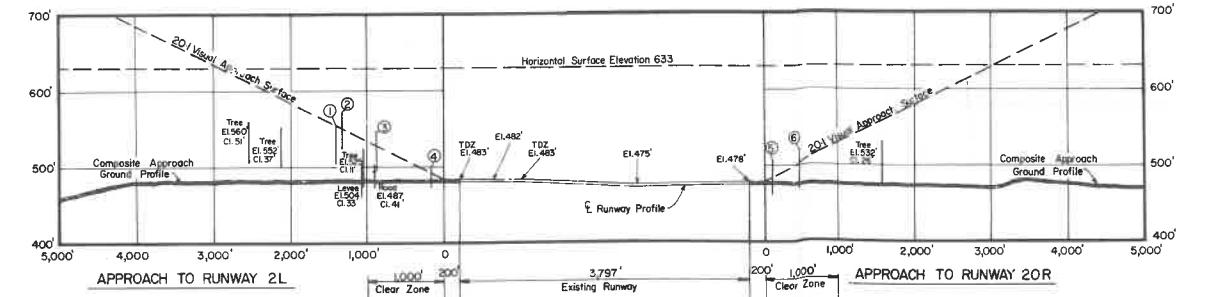


NO	OBSTRUCTION	ELEV.	EXISTING	FUTURE	REMARKS
1	Tree	936'	123'	936'	Request Waiver
2	Tree	895'	117'	895'	Request Waiver
3	Pole	796'	63'	796'	"
4	Tree	799'	94'	799'	"
5	Tree	777'	79'	777'	"
6	Tree	774'	78'	774'	"
7	Tree	831'	138'	831'	"
8	Tree	576'	13'	576'	"
9	Tree	557'	9'	557'	"
10	Tree	550'	27'	483'	To Be Removed
11	Tree	551'	28'	483'	To Be Removed
12	Tree	526'	8'	483'	To Be Removed
13	Levee	504'	3'	504'	Request Waiver
14	Bush	521'	23'	483'	To Be Removed
15	Obst. Light	504'	9'	504'	Request Waiver
16	Road	489'	16'	489'	Request Waiver
17	Road	484'	11'	484'	Request Waiver
18	Antenna on Obst. Light	518'	35'	518'	To Be Removed
19	Terminal	498'	50'	498'	Request Waiver
20	Parked Aircraft	499'	17'	499'	To Be Removed
21	Approach Light	477'	2'	477'	Necessary NAVAID
22	Tree	512'	13'	475'	To Be Removed
23	Tree	520'	11'	475'	To Be Removed
24	Tree	511'	1'	475'	To Be Removed
25	Tree	554'	6'	545'	To Be Trimmed
26	Tree	569'	4'	560'	"
27	Tree	568'	1'	560'	"
28	Tree	578'	5'	570'	"
29	Storage Building	514'	16'	486'	To Be Removed

(P) Primary Surface
 (T) Transitional Surface
 (A) Approach Surface
 (B) Building Restriction Line

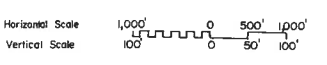
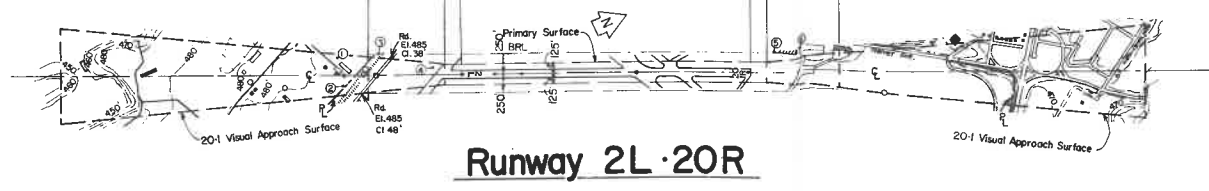
EXISTING	FUTURE	ITEM
---	---	Ground Contours
---	---	Surface Drainage
---	---	Buildings
---	---	Roads
---	---	Levee
---	---	River
---	---	Airport Property Line
○	○	Objects Penetrating Surfaces
○	○	Objects Falling Below Surfaces
---	---	Railroad
---	---	No Change

NOTES
 1 Obstructions Based On National Ocean Survey Airport Obstruction Chart N°83, Lunken Field May, 1982.



NO	OBSTRUCTION	ELEV.	EXISTING	FUTURE	REMARKS
1	Tree	556'	3'	540'	To Be Lowered
2	Tree	574'	26'	540'	To Be Lowered
3	Tree	548'	9'	510'	To Be Lowered
4	Parked Aircraft	499'	6'	483'	To Be Removed
5	Obst. Light on Building	506'	4'	506'	Request Waiver
6	Vent On Building	506'	4'	506'	Request Waiver

(P) Primary Surface
 (T) Transitional Surface
 (A) Approach Surface



Approach Plan		7 of 11
Runway 2R-20L, 6-24, 2L-20R		
CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD Cincinnati, Ohio		
drawn: N.Z. checked: E.C. job no: 67-1-1-6 date: March, 1989		
AVIATION PLANNING ASSOCIATES, INC. cincinnati, ohio 45202		

LAND USE LEGEND

Airfield

- Aircraft Operating Areas
- Clear Zone & Safety Areas
- NAVAID Critical Area

Terminal Area

- Terminal Facilities
- Public Parking
- Terminal Access
- Transient Apron

Park

- Golf Course
- Ball Fields
- Recreational Areas

Airfield Support Area

- Airport Maintenance
- FAA Facilities
- CFR Facilities
- Drainage Control

General Aviation Area

- Private Hangars
- T-Hangars
- Aircraft Tiedown Areas

Corporate Aviation

- Corporate Hangar Development Area

Full Service FBO

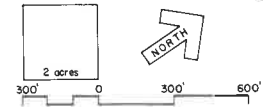
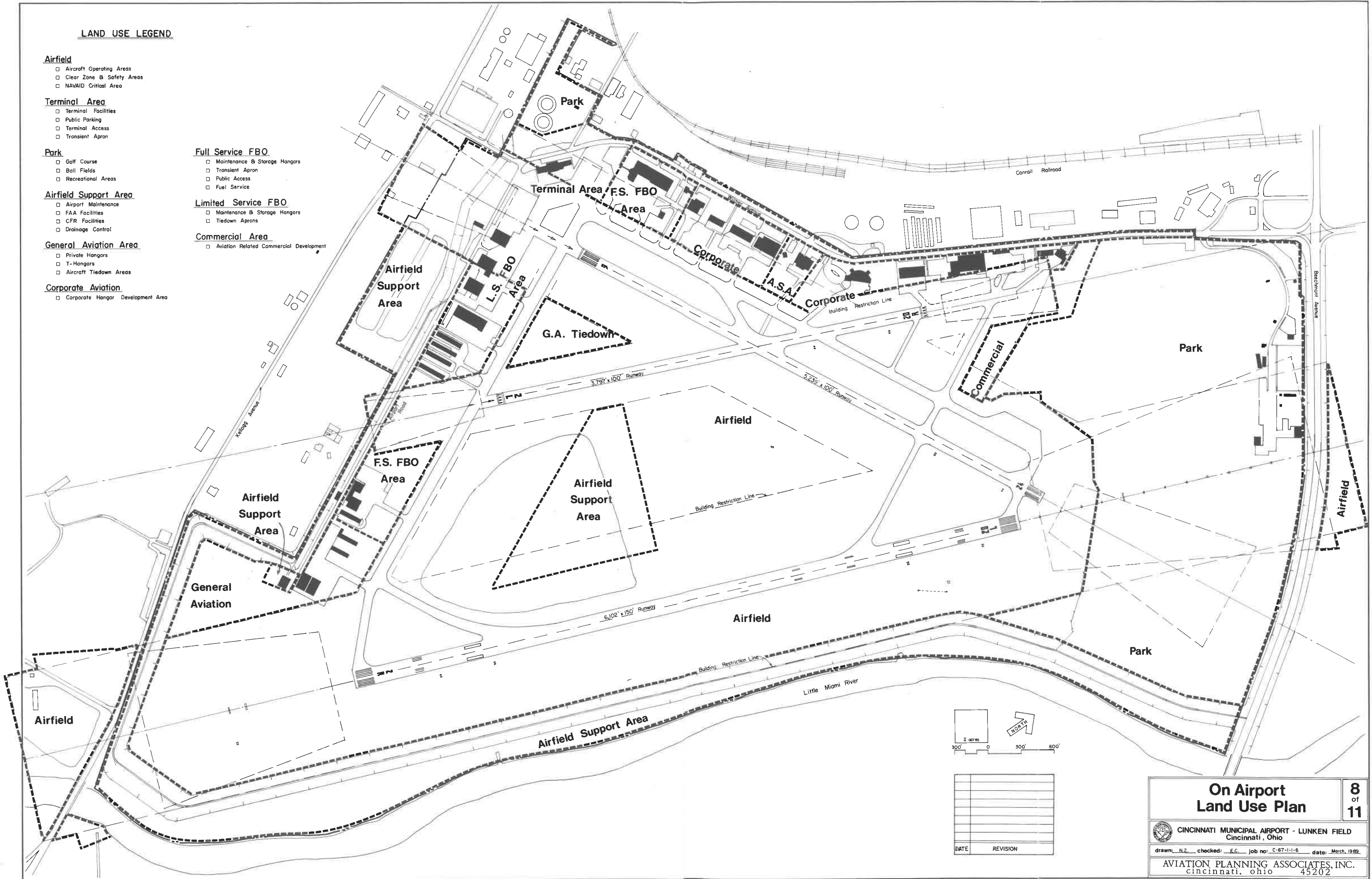
- Maintenance & Storage Hangars
- Transient Apron
- Public Access
- Fuel Service

Limited Service FBO

- Maintenance & Storage Hangars
- Tiedown Aprons

Commercial Area

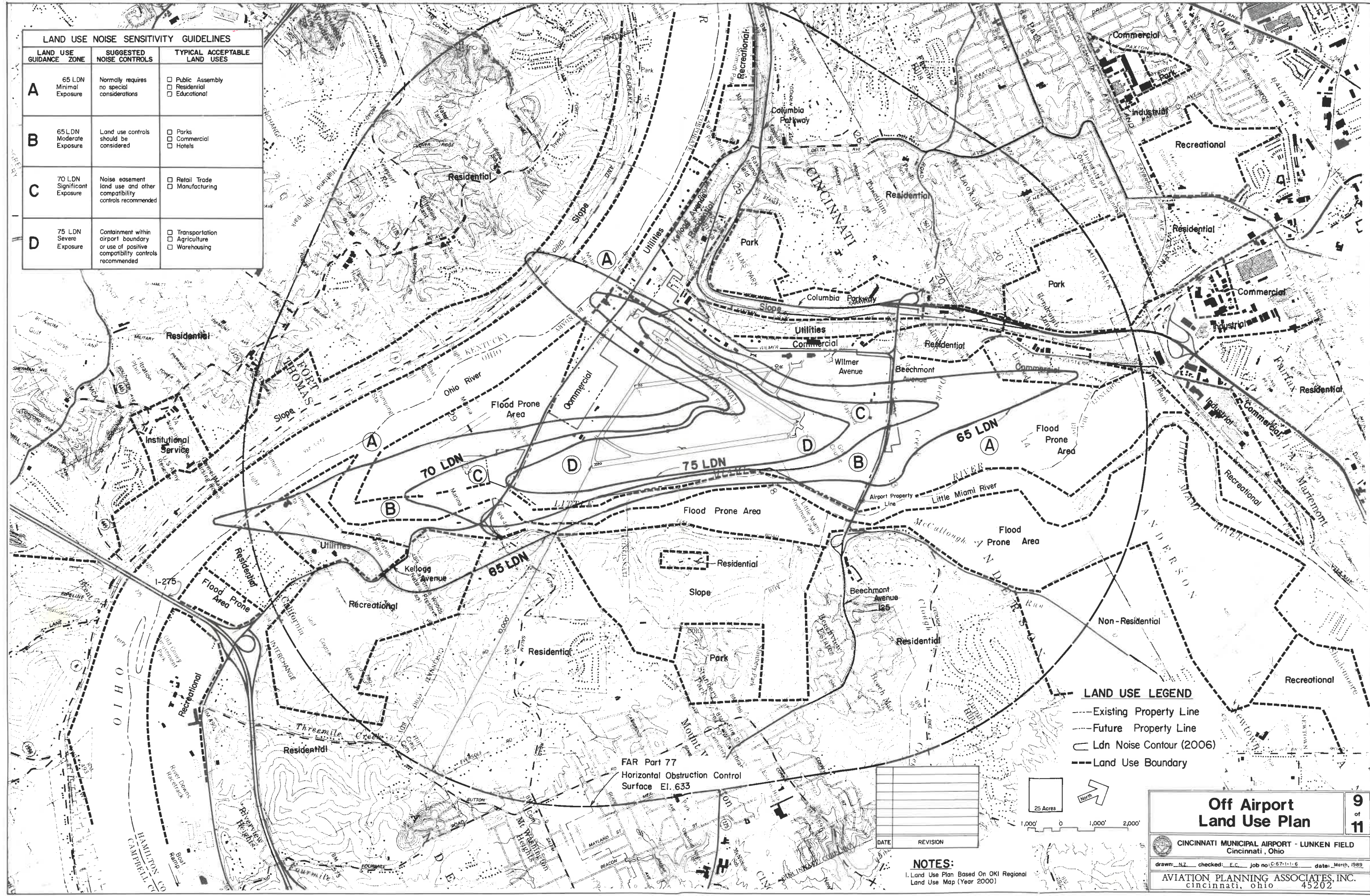
- Aviation Related Commercial Development



DATE	REVISION

On Airport Land Use Plan		8 of 11
CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD Cincinnati, Ohio		
drawn: N.Z. checked: E.C. job no: C-87-1-1-6 date: March, 1989		
AVIATION PLANNING ASSOCIATES, INC. cincinnati, ohio 45202		

LAND USE NOISE SENSITIVITY GUIDELINES		
LAND USE GUIDANCE ZONE	SUGGESTED NOISE CONTROLS	TYPICAL ACCEPTABLE LAND USES
A 65 LDN Minimal Exposure	Normally requires no special considerations	<input type="checkbox"/> Public Assembly <input type="checkbox"/> Residential <input type="checkbox"/> Educational
B 65 LDN Moderate Exposure	Land use controls should be considered	<input type="checkbox"/> Parks <input type="checkbox"/> Commercial <input type="checkbox"/> Hotels
C 70 LDN Significant Exposure	Noise easement land use and other compatibility controls recommended	<input type="checkbox"/> Retail Trade <input type="checkbox"/> Manufacturing
D 75 LDN Severe Exposure	Containment within airport boundary or use of positive compatibility controls recommended	<input type="checkbox"/> Transportation <input type="checkbox"/> Agriculture <input type="checkbox"/> Warehousing

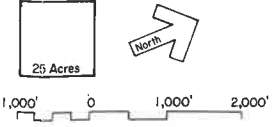


FAR Part 77
Horizontal Obstruction Control
Surface El. 633

DATE	REVISION

NOTES:
1. Land Use Plan Based On OKI Regional Land Use Map (Year 2000)

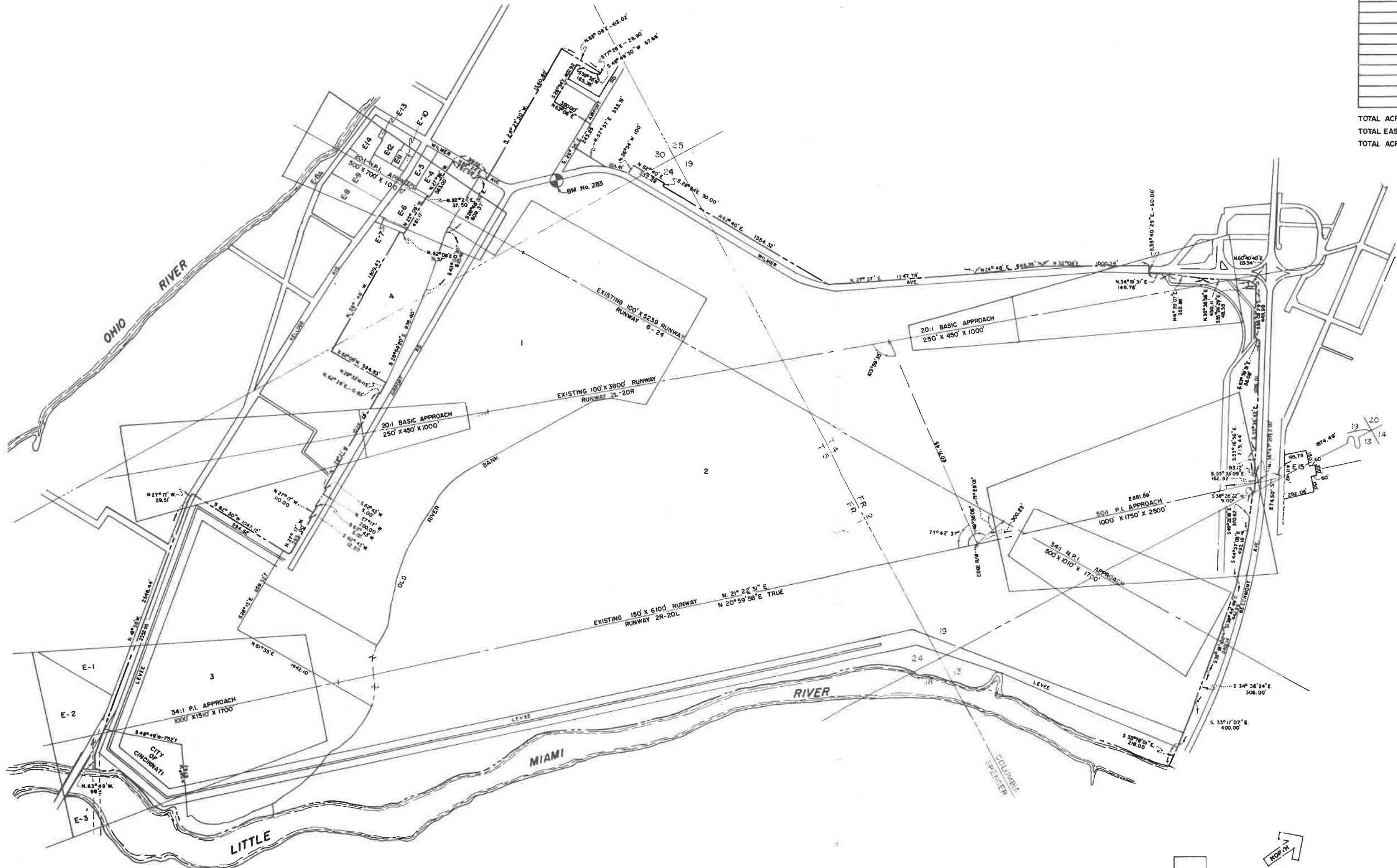
- LAND USE LEGEND**
- Existing Property Line
 - Future Property Line
 - ⊂ Ldn Noise Contour (2006)
 - Land Use Boundary



Off Airport Land Use Plan		9 of 11
CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD Cincinnati, Ohio		
drawn: N.Z.	checked: E.C.	job no: C-57-1-1-6 date: March, 1989
AVIATION PLANNING ASSOCIATES, INC. cincinnati, ohio 45202		

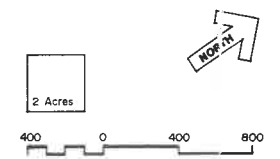
FEDERAL PROJECT NUMBER	PARCEL NO.	GRANTOR	INSTRUMENT OF TITLE	DEED BK & PAGE	DATE ACQ'ED	ACRES
	1	ORONAL AIRPORT	PERPETUAL LEASE		3-7-29	111
	2	ORON AIRPORT	FEE SIMPLE			72
5-39-008-D1	3	HAROLD & ALMA KUNTZ	WARRANTY DEED	3254-45	11-24-62	305
	4	ALLEN FEHL	WARRANTY DEED	3408-449	4-10-65	22-98
5-39-008-D1	E1	R. J. SEEBER	AVIATION EASEMENT	3478-886	4-23-65	4-366
	E2	KELLOG REALTY	DO	3368-648	9-1-64	10-342
	E3	J. B. E. FRANZ	DO	3281-478	11-13-62	1-489
	E4	AMERICAN LEGION POST 744	DO	3440-207	10-28-66	903
	E5	L. & W. MEIER	DO	3823-435	1-6-67	872
	E6	BRAY MARINE	DO	3889-319	6-7-69	2-474
	E7	DO	DO	DO	DO	
	E8	WESTONE CORR	DO	3734-22	3-20-70	2-41
	E9	HENDRICKSON INC.	DO	3894-326	7-23-69	2-97
	E8A	WESTONE CORR	DO	3734-22	3-20-70	4-60
	E10	CITY OF CINCINNATI	FEE	3600-138	2-29-68	0-23
	E11	R. CAM	AVIATION EASEMENT	3878-821	7-27-72	0-52
	E12	JESS L. TUCKER	DO	3705-81	9-3-69	1-18
	E13	T. JAGUES	DO	3483-897	2-7-66	0-13
	E14	HENDRICKSON INC.	DO	3894-326	7-23-69	1-988
	E15	JOSEPH F. BOVE	PERPETUAL EASEMENT	3426-98	8-6-65	2-38

TOTAL ACREAGE HELD IN PERPETUAL LEASE, FEE SIMPLE OR WARRANTY DEED = 988.98
TOTAL EASEMENT ACREAGE = 36.384
TOTAL ACREAGE = 1025.364



● BENCH MARK (BM) No. 283
COORDINATES ELEVATION
N 412,658.43: 504.307
E 1,449,657.96:

NOTES:
1. THIS DRAWING WAS DEVELOPED FROM DRAWINGS PREPARED BY THE CITY OF CINCINNATI, ACC. NO. 101518 DATED 3/84 AND ACC. NO. 101160 DATED 9/29/61 REVISED 11/72
2. BOUNDARY LENGTH ALONG THE LITTLE MIAMI RIVER IS APPROXIMATELY 10,680 FEET AS SCALED FROM THIS DRAWING



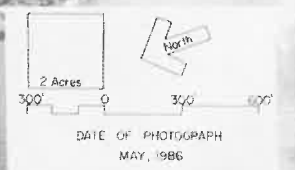
10
of
11

Exhibit - A
Property Map

CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
Cincinnati, Ohio

drawn: H.W. checked: E.C. job no.: C-67-1-1-6 date: March, 1989

HENRY WILSON & ASSOCIATES, INC.
CINCINNATI, OHIO



Airport Photograph 11 of 11

CINCINNATI MUNICIPAL AIRPORT - LUNKEN FIELD
Cincinnati, Ohio

drawn: NZ checked: E.C. job no: 67-1-1-6 date: March, 1982

AVIATION PLANNING ASSOCIATES, INC.
cincinnati, ohio 45202

VII.

Economic Feasibility and Financial Plans

VII. ECONOMIC FEASIBILITY AND FINANCIAL PLANS

The Master Plan Update examined existing Airport facilities and capacity and projected future demand for Airport facilities and the resulting need for increased capacity. These efforts culminated in a plan of 23 projects designed to increase and enhance Airport facilities to a level at which future demand and resulting capacity requirements can be satisfied. The purpose of this chapter is to present a feasible financial plan which provides for the development of those 23 projects.

1. METHODOLOGY AND ORGANIZATION

The financial plan was developed through a four-step process:

- . Each of the 23 Airport projects was examined with a view to determining the most beneficial and pragmatic means of obtaining the necessary financing. The alternative financing scenarios considered for each project included sponsor, tenant or developer investment in the Airport, project eligibility under federal and state grant programs, and any combination of the above.
- . Revenue and expense projections were developed under the constraints of the financing scenario selected for each project. This step involved projecting the Airport's existing revenue and expense base and enhancing the base with revenues derived from, and expenses incurred in, undertaking each project.
- . A projected operating statement and cash flow analysis was developed through utilization of the financial projections and analyzed to determine the plan's feasibility.
- . The process was repeated until the most beneficial and financially pragmatic plan emerged.

(1) Organization

The feasibility analyses include two distinct components. This chapter first sets forth the recommended financial means to obtain the facilities planned under each project. Recommendations are divided among the three phases of the Master Plan Update, and the projects planned for each phase are divided among airfield facilities and tenant facilities. (The reason for separating the airfield and tenant facilities is that airfield facilities are limited to sponsor investment and federal and state fund eligibility. Therefore, the only determination needed for airfield projects is the level of participation by the Sponsor, the FAA, and the state.) The alternative financial means available to obtain the tenant facilities planned under each project are more numerous, and are therefore explained in greater detail. For purposes of the feasibility analyses, tenant facilities refer to both the tenant facility and terminal area and Airport access development recommendations of the previous chapters.

The second component of the feasibility study consists of the financial projections developed under the constraints of each project's recommended financial means and the resulting operating statement. This component, because of the detail involved, is presented at the end of this chapter as Appendix VII-A. A careful review of Appendix VII-A is recommended, as it contains revenue and expense projection details not contained in this chapter.

Reference is made throughout this chapter to a number of policy issues that inevitably arise in a study of this magnitude. These issues are discussed in detail in Section 5, Policy Issues.

(2) Feasibility of Conclusions

The financial plan presented in this chapter represents the most feasible means of financing the 23 Master Plan Update projects. The plan results in an operating profit increase from \$198,000 in 1987 to over \$1,000,000 in 2006, and allows sponsor investment in planned facilities at the indicated levels of participation with a continuous positive cash flow. However, rapidly increasing depreciation expenses resulting from the acquisition of assets during the planning period will turn generous operating profits into intermittently positive and negative net results. This is because 100 percent of the cost of the assets acquired during the planning period are depreciated regardless of the sponsor's level of participation. This requires evaluation of the sponsor's ability to replace the assets acquired in the absence of federal and state grant programs. The assumption that Airport improvement grants will exist in the years following this 20-year planning period is not valid, and every attempt must be made to ensure the Airport's ability to replace assets without aid. The financial plan considers this requirement, allowing sponsor replacement of acquired assets with a maximum of three to five years deferment past the end of a particular asset's estimated useful life.

As the purpose of the financial plan is to provide for the development of all planned projects, it should be considered feasible if its cash flow permits sponsor participation in projects at the level required to complete all projects. The plan presented herein is therefore considered more than feasible, as it ensures the sponsor's ability to meet the financial responsibilities associated with its level of participation and allows the replacement of acquired assets as described above.

2. PHASE I DEVELOPMENT

Table VII-1, the project development schedule, outlines project phasing and recommended levels of participation for each project. Project funding is divided among federal Airport Improvement Program (AIP) and Facilities and Equipment (F&E) funds, state funds, sponsor funds, and tenant/developer funds. The indicated levels of participation conform to applicable federal and state eligibility requirements and grant criteria.

(1) Airfield Facilities

Projects 1, 2, 5, 6, and 7 on Table VII-1 represent the Phase I investments in Lunken Field's airfield facilities. The total cost of Phase I airfield improvements is \$4,789,417.

1. Project 1

Project 1, the strengthening of Runway 2R/20L, is estimated to cost \$2,644,200. Ninety percent of the cost of this project is targeted for FAA AIP funds, with the remainder normally split between state and sponsor funds. However, the State of Ohio has a maximum level of participation in any one project of \$75,000, raising the Sponsor's share to 7 percent.

2. Project 2

Project 2, the strengthening of Runway 6/24, is estimated to cost \$1,571,697. The cost distribution for this project is the same as that for Project 1. The maximum state participation criteria raises the sponsor's share of this project to 6 percent.

3. Project 5

Project 5, the clearing of Runway 20R clear zone, is expected to cost \$397,700, including the alignment and strengthening of Taxiway G, construction of a holding apron, removal of pavement, and lighting and marking of Taxiway D. The funding distribution for this project is the same as the distribution for Projects 1 and 2, but the maximum state participation

TABLE VII-1

Lunken Field Master Plan Update

PHASE I (1986-1990)
(Page 1 of 5)

Project #	Item Description	Year	Units	Estimated Unit Cost	Quantity	Total Cost(1) Estimate	FAA/AIP (%)	FAA/F&E (%)	State(2) (%)	Sponsor (%)	Tenant/ Developer (%)
1.	Runway 2R/20L Strengthening	1987	Sq. Yards	\$ 26	101,700	\$2,644,200	\$2,379,780 (90)	\$ 0 (0)	\$ 75,000 (3)	\$ 189,420 (7)	\$ 0 (0)
2.	Runway 6/24 Strengthening	1988	Sq. Yards	\$ 27	58,211	\$1,571,697	\$1,414,527 (90)	\$ 0 (0)	\$ 75,000 (4)	\$ 82,170 (6)	\$ 0 (0)
3.	T-Hangar Development										
A	Grade, Drain & Pave Apron	1988	Sq. Yards	\$ 32	18,000	\$ 576,000	\$ 518,400 (90)	\$ 0 (0)	\$ 28,800 (5)	\$ 28,800 (5)	\$ 0 (0)
B	Construct Two 14-Unit T-Hangers	1988	Sq. Feet	\$ 22	30,000	\$ 660,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 660,000 (100)	\$ 0 (0)
C	Demolish T-Hangers 8 & 9	1989	Item	\$30,000	1	\$ 30,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 30,000 (100)	\$ 0 (0)
D	Grade, Drain & Pave Apron	1989	Sq. Yards	\$ 32	18,000	\$ 576,000	\$ 518,400 (90)	\$ 0 (0)	\$ 28,800 (5)	\$ 28,800 (5)	\$ 0 (0)
E	Construct Two 14-Unit T-Hangers	1989	Sq. Feet	\$ 22	30,000	\$ 660,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 660,000 (100)	\$ 0 (0)
4.	Single Unit Corporate Dev.										
A	Remove Hangars 6 & 7	1990	Item	\$30,000	1	\$ 30,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 30,000 (100)	\$ 0 (0)
B	Construct Eight Single Unit Hangars	1990	Sq. Feet	\$ 69	32,000	\$2,200,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$2,200,000 (100)
5.	Runway 20R Clear Zone Clearing										
A	Taxiway G Alignment & Strengthening	1990	Sq. Yards	\$ 29	7,460	\$ 216,340	\$ 194,706 (90)	\$ 0 (0)	\$ 10,817 (5)	\$ 10,817 (5)	\$ 0 (0)
B	Holding Apron Construction	1990	Sq. Yards	\$ 29	2,900	\$ 84,100	\$ 75,690 (90)	\$ 0 (0)	\$ 4,205 (5)	\$ 4,205 (5)	\$ 0 (0)
C	Runway 20R Pavement Removal	1990	Sq. Yards	\$ 6	7,800	\$ 46,800	\$ 42,120 (90)	\$ 0 (0)	\$ 2,340 (5)	\$ 2,340 (5)	\$ 0 (0)
D	Taxiway D Lighting & Marking	1990	Linear Ft.	\$ 29	1,740	\$ 50,460	\$ 45,414 (90)	\$ 0 (0)	\$ 2,523 (5)	\$ 2,523 (5)	\$ 0 (0)
6.	Miscellaneous NAVAIDS										
A	REIL For Runways 6/24 and 2L/20R	1991	Item	\$29,700	2	\$ 59,400	\$ 0 (0)	\$ 59,400 (100)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)
B	PAPI For Runways 6/24 and 2L/20R	1991	Item	\$53,450	2	\$ 106,900	\$ 0 (0)	\$ 106,900 (100)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)
C	Three Supplementary Wind Cones	1991	Item	\$ 1,190	3	\$ 3,570	\$ 3,213 (90)	\$ 0 (0)	\$ 179 (5)	\$ 179 (5)	\$ 0 (0)

TABLE VII-1

Lunken Field Master Plan Update

PHASE I (1986-1990)

(Page 2 of 5)

Project #	Item Description	Year	Units	Estimated Unit Cost	Quantity	Total Cost(1) Estimate	FAA/AIP (%)	FAA/FEE (%)	State(2) (%)	Sponsor (%)	Tenant/Developer (%)
7.	Mid-Field Aircraft Operating Area	1991	Item	\$ 5,950	1	\$ 5,950	5,355 (90)	\$ 0 (0)	\$ 298 (5)	\$ 298 (5)	\$ 0 (0)
8.	North Air Field Commercial Development	1991	Item	\$2,375,400	1	\$ 2,375,400	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$2,375,400 (0)
A.	Building, Parking & Access Road	1991	Acres	\$ 0	4.5	\$ 0	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (100)	\$ 0 (0)
B.	Land Swap	1991	Item	\$ 178,150	1	\$ 178,150	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 178,150 (0)	\$ 0 (0)
C.	Relocate Fairway	1991	Item	\$ 178,150	1	\$ 178,150	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 178,150 (0)	\$ 0 (0)
						\$12,074,967	\$5,197,605	\$166,300	\$227,962	\$1,907,702	\$4,575,400

PHASE I SUBTOTALS

June 25, 1987

TABLE VII-1
Lunken Field Master Plan Update

PHASE II (1991-1995)
(Page 3 of 5)

Project #	Item Description	Year	Units	Estimated Unit Cost	Quantity	Total Cost Estimate	FAA/AIP (%)	FAA/F&E (%)	State (%)	Sponsor (%)	Tenant/Developer (%)
9.	Runway 28/20L Parallel Taxiway	1991	Sq. Yards	\$ 61	28,440	\$1,734,840	\$1,561,356 (90)	\$ 0 (0)	\$ 75,000 (5)	\$ 98,484 (6)	\$ 0 (0)
10.	Precision Approach MLS For Runway 2R	1991	Item	\$600,000	1	\$ 600,000	\$ 0 (0)	\$600,000 (100)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)
11.	Non-Precision Approach MLS For 24	1992	Item	\$123,000	1	\$ 123,000	\$ 0 (0)	\$123,000 (100)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)
12.	Conventional Hangar Dev.										
A	Remove Four T-Hangars	1992	Item	\$ 40,000	1	\$ 40,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 40,000 (100)	\$ 0 (0)
B	Grade, Drain & Pave Apron	1992	Sq. Yards	\$ 37	16,600	\$ 614,200	\$ 552,780 (90)	\$ 0 (0)	\$ 30,710 (5)	\$ 30,710 (5)	\$ 0 (0)
C	Pave Auto Parking Area	1992	Sq. Yards	\$ 31	4,900	\$ 151,900	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 151,900 (100)
D	Construct Hangar	1992	Sq. Feet	\$ 74	30,000	\$2,220,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$2,220,000 (100)
13.	Redevelop Hangar Area										
A	Construct Apron Areas and Access Road	1992	Sq. Yards	\$ 37	25,000	\$ 925,000	\$ 832,500 (90)	\$ 0 (0)	\$ 46,250 (5)	\$ 46,250 (5)	\$ 0 (0)
B	Construct Hangar 3 Replacement	1993	Sq. Feet	\$ 74	22,500	\$1,665,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$1,665,000 (100)	\$ 0 (0)
C	Remove Hangar 3	1993	Item	\$ 30,000	1	\$ 30,000	\$ 30,000 (100)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)
D	Construct Hangars 1 & 2 Replacements	1994	Sq. Feet	\$ 75	45,000	\$3,375,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$3,375,000 (100)
E	Construct Parking Areas	1994	Sq. Yards	\$ 37	5,000	\$ 185,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 185,000 (100)
F	Remove Hangars 1 & 2	1994	Item	\$ 30,000	2	\$ 60,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 60,000 (100)	\$ 0 (0)
14.	FBO Expansion										
A	Hangar Expansion	1994	Sq. Feet	\$ 76	24,000	\$1,824,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$1,824,000 (100)
B	Grade, Drain & Pave Apron	1994	Sq. Yards	\$ 38	14,730	\$ 559,740	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 559,740 (100)

TABLE VII-1

Lunken Field Master Plan Update

PHASE II (1991-1995)

(Page 4 of 5)

Project #	Item Description	Year	Units	Estimated Unit Cost	Quantity	Total Cost Estimate	FAA/AIP (%)	FAA/F&E (%)	State (%)	Sponsor (%)	Tenant/Developer (%)
15.	T-Hanger Development										
A	Grade, Drain & Pave Apron	1995	Sq. Yards	\$ 40	15,000	\$ 600,000	\$ 540,000 (90)	\$ 0 (0)	\$ 30,000 (5)	\$ 30,000 (5)	\$ 0 (0)
B	Construct Two 16-Unit T-Hangers	1995	Sq. Feet	\$ 28	35,000	\$ 980,000	\$ 0 (0)	\$ 0 (0)	\$ 0 (0)	\$ 980,000 (100)	\$ 0 (0)
C	Construct Taxiway Connector	1995	Sq. Yards	\$ 40	3,100	\$ 124,000	\$ 111,600 (90)	\$ 0 (0)	\$ 6,200 (5)	\$ 6,200 (5)	\$ 0 (0)
16.	Airport Maintenance										
A	Grade, Drain & Pave Apron	1996	Sq. Yards	\$ 41	3,760	\$ 154,160	\$ 138,744 (90)	\$ 0 (0)	\$ 7,708 (5)	\$ 7,708 (5)	\$ 0 (0)
B	Construct Maintenance Building	1996	Item	\$400,000	1	\$ 400,000	\$ 360,000 (90)	\$ 0 (0)	\$ 20,000 (5)	\$ 20,000 (5)	\$ 0 (0)
17.	Airport Road - Keillogg Avenue Connector										
A	Roadway Connection	1996	Sq. Yards	\$ 35	3,760	\$ 131,600	\$ 118,440 (90)	\$ 0 (0)	\$ 6,580 (5)	\$ 6,580 (5)	\$ 0 (0)
B	Levee Modification	1996	Item	\$135,000	1	\$ 135,000	\$ 121,500 (90)	\$ 0 (0)	\$ 6,750 (5)	\$ 6,750 (5)	\$ 0 (0)
C	Airport Road Upgrade	1996	Sq. Yards	\$ 25	10,600	\$ 265,000	\$ 238,500 (90)	\$ 0 (0)	\$ 13,250 (5)	\$ 13,250 (5)	\$ 0 (0)
PHASE II SUBTOTALS						\$16,897,440	\$4,605,420	\$723,000	\$242,448	\$3,010,932	\$8,315,640

TABLE VII-1

Lunken Field Master Plan Update

PHASE III (1996-2006)
(Page 5 of 5)

Project #	Item Description	Year	Units	Estimated Unit Cost	Quantity	Total Cost(1)		FAA/FAE (%)	State(2) (%)	Sponsor (%)	Tenant/Developer (%)
						Estimate	FAA/AIP (%)				
18.	Construct New Taxiway C	1997	Sq. Yards	\$ 44	25,000	\$ 1,100,000	990,000 (90)	0	55,000 (5)	55,000 (6)	0 (0)
19.	Redevelop So. Airfield F80	1998	Sq. Yards	\$ 44	36,000	\$ 1,584,000	0 (0)	0	0 (0)	0 (0)	1,584,000 (100)
B	Construct One Conventional Hangar	1998	Sq. Feet	\$ 90	28,000	\$ 2,520,000	0 (0)	0	0 (0)	0 (0)	2,520,000 (100)
C	Remove Three Hangars	1999	Item	\$ 150,000	1	\$ 150,000	0 (0)	0	0 (0)	0 (0)	150,000 (100)
D	Construct One Conventional Hangar	1999	Sq. Feet	\$ 90	28,000	\$ 2,520,000	0 (0)	0	0 (0)	0 (0)	2,520,000 (100)
20.	Remodel Terminal Building	1999	Sq. Yards	\$ 45	11,170	\$ 502,650	0 (0)	0	0 (0)	502,650 (100)	0 (0)
B	Realign Wilmer Avenue	1999	Sq. Yards	\$ 45	7,800	\$ 351,000	0 (0)	0	0 (0)	351,000 (100)	0 (0)
C	Terminal Building Renovation	2000	Item	\$ 2,250,000	1	\$ 2,250,000	0 (0)	0	0 (0)	0 (0)	2,250,000 (100)
21.	Noise Barrier	2000	Cubic Yds.	\$ 10	12,300	\$ 125,000	112,500 (90)	0	6,250 (5)	6,250 (5)	0 (0)
22.	T-Hangar Development	2000	Sq. Yards	\$ 46	10,000	\$ 460,000	414,000 (90)	0	23,000 (5)	23,000 (5)	0 (0)
B	Construct One 16-Unit T-Hangar	2000	Sq. Feet	\$ 33	17,500	\$ 577,500	0 (0)	0	0 (0)	577,500 (100)	0 (0)
C	Construct One 16-Unit T-Hangar	2001	Sq. Feet	\$ 33	17,500	\$ 577,500	0 (0)	0	0 (0)	577,500 (100)	0 (0)
D	Construct One 16-Unit T-Hangar	2002	Sq. Feet	\$ 33	17,500	\$ 577,500	0 (0)	0	0 (0)	577,500 (100)	0 (0)
23.	Acquire 2R/20L Clear Zones	2003	Acres	8,000	17.9	\$ 142,200	127,980 (0)	0	7,110 (5)	7,110 (5)	0 (0)
PHASE III SUBTOTALS						\$13,437,350	\$ 1,644,480	0	\$ 91,360	\$ 2,677,510	\$ 9,024,000
TOTAL						\$42,409,757	\$11,447,505	\$ 889,300	\$561,770	\$7,596,144	\$21,915,040

Note: (1) Based on 1986 figures obtained from AvPlan Data Base and escalated at 3.5% annually.
(2) Maximum State participation for any one project is \$75,000.

criteria is not a factor.

4. Project 6

Project 6, the installation of REILs and PAPIs on Runways 6/24 and 2L/20R, is estimated to cost \$166,300. Because the FAA will assume the control, operation, and maintenance of the equipment, it will be 100 percent funded by FAA F&E grants. Total cost for the wind cones is estimated at \$3,570, 90 percent of which is distributed to AIP funds, with the remainder split between the state and sponsor.

5. Project 7

Project 7, the redevelopment of the midfield aircraft operating area where helicopter and banner towing operations are performed, is estimated at \$5,950, with funding distribution the same as that for Projects 1 and 2. (The maintenance and operation of the midfield aircraft operating area raises the issue of individual commercial operators. The recommended policy for managing this area is discussed in Section 5 of this chapter.)

(2) Tenant Facilities

The funding of Phase I tenant facilities, shown as projects 3, 4, and 8 on Table VII-1, involve a more complex funding plan than the airfield improvements. The following subsections discuss the funding of each Phase I tenant facility project.

1. Project 3

Two recommendations were developed regarding the T-hangar development planned under Project 3:

- . The sponsor should construct, manage and maintain the entire complex.
- . Two 14-unit T-hangars should be constructed prior to removing the two T-hangars currently on the site.

There are a number of reasons for the first recommendation. First, it will allow the sponsor to

ensure that a high quality, durable, and appealing facility is constructed. This will set the standard for future development on the Airport and help to attract quality private developers. Second, the existing facilities cannot be expected to last more than one or two years, resulting in a capacity constraint that will require action in the immediate future. Third, the complex is expected to enhance the Airport's revenue base by approximately \$70,000 annually in 1990, which is expected to increase to \$150,000 annually in 2006. This additional revenue impacts the plan's feasibility. Construction of the two 14-unit T-hangars prior to removal of the two existing T-hangars is recommended for capacity reasons.

The phasing and cost distribution of Project 3 was developed consistent with these recommendations. As shown on Table VII-1, the sponsor is recommended to fund 100 percent of the cost of constructing the new T-hangars and removing the existing facilities. FAA or state aid is not expected for these aspects of the project. However, 90 percent of the cost of grading, draining, and paving the common apron areas is targeted for AIP funding, with the remainder split between the sponsor and the state. The T-hangar construction costs, as distributed 100 percent to the sponsor, include grading, draining, and paving the apron areas not considered as common use areas by the FAA.

2. Project 4

The feasibility analyses resulted in the recommendation that the single unit corporate hangar development planned under Project 4 be undertaken by private developers. This participation should be solicited through a proposal or other bidding process. There are two options for achieving this recommendation. First, the entire site could be put up for bid with the successful bidder developing the single-unit hangars and subletting them to individual corporations. Second, the site could be divided into parcels, with bids for each accepted by the sponsor directly from the corporations interested in specific parcels.

The ability to sublet single-unit corporate hangars versus the ability to sublet in a T-hangar complex, is highly speculative and best left to a developer. Therefore, market interest in the site at the time of development will determine the method used to develop the site. If market interest is high, the level of speculation decreases, and a bidding process

for development of the entire site would draw qualified responses. If market interest is low, a developer's level of speculation would be high, and bids should be accepted from individual corporations for the development of each parcel. In the case of individual development of each parcel, the lease term should be determined as a function of investment made by the individual (this is explained in greater detail in Appendix VII-A). The funding distribution for Project 3, as shown on Table VII-1, is consistent with this recommendation. One hundred percent of construction costs are distributed to the tenant/developer and 100 percent of the costs to remove Hangars 6 and 7 (required as site preparation to effectively market the site) is distributed to the sponsor.

3. Project 8

The north airfield commercial development planned under Project 8 should be undertaken by a single developer through an RFP, response and selection, or other bidding process.

The estimated total cost of this project exceeds \$2.5 million, and the sponsor will not be in a financial position to assume an investment of this magnitude, nor should the sponsor consider making an investment in the nonaviation commercial development contemplated. Sponsor funds should be reserved to enhance the aviation use of the Airport.

The funding distribution shown on Table VII-1 is consistent with the recommendation for developer funding. The total cost of constructing buildings, parking areas, and access road is distributed to the tenant/developer. However, the sponsor will be expected to bear the cost of relocating the golf course's fairway in site preparation for the successful bidder.

3. PHASE II DEVELOPMENT

In contrast to Phase I development, which is comprised primarily of airfield projects, the majority of Phase II development investments are in tenant facilities. Table VII-1 outlines the recommended funding distribution for Phase II projects.

(1) Airfield Projects

Projects 9, 10, and 11 on Table VII-1 represent Phase II investments in the airfield. The total cost of Phase II airfield investments is estimated at \$2,457,840. The assets acquired under these projects must eventually be replaced, and the vehicle for ensuring the sponsor's ability to do so, without aid, is discussed in Section 5 of this chapter.

1. Project 9

Project 9, the construction of a taxiway parallel to Runway 2R/20L, is estimated at \$1,734,840. As the only alternative, 90 percent of the cost is targeted for AIP funding, with the remainder split between the sponsor and the state. However, the \$75,000 maximum state participation criteria increases the sponsor's share to 6 percent.

2. Project 10 and 11

Project 10 is the installation of a precision approach MLS on Runway 2R. Project 11 is the installation of a nonprecision approach MLS for Runway 24. Total cost for both of these projects is estimated at \$723,000, 100 percent of which is targeted for FAA F&E funds. Again, this is the most favorable situation, as the FAA would also assume the control, operation and maintenance of the equipment in Projects 10 and 11. If they were AIP funded, those responsibilities would rest with the sponsor.

(2) Tenant Facilities

Projects 12, 13, 14, 15, 16, and 17 represent Phase II investments in tenant facilities.

1. Project 12

Three recommendations were developed regarding the Project 12 conventional hangar development:

- . Construction of the hangar should be undertaken by developers through an RFP, response and selection or other bidding process.
- . The sponsor should undertake the removal of the existing T-hangars in site preparation for the successful bidder.
- . The FAA, the state, and the sponsor should each participate in funding the apron areas associated with this project.

The first recommendation is made on the basis of the estimated total cost of the investment. As indicated in Table VII-1, the total cost of this project exceeds \$3.0 million, and the sponsor will not be in a financial position to make this investment. The second recommendation is made on the basis of normal business practices associated with bidding a site. A site should be clear and of level grade when given over to a developer. Finally, the third recommendation is made on the basis that no exclusive ramp or apron rights will be granted to the successful bidder. The land lease for this project will consist of the hangar footprint and the ramp and apron areas will be designated as common use and administered by the sponsor or its designee.

One hundred percent of the cost to remove the existing T-hangars is distributed to the Sponsor. The cost to grade, drain and pave the apron is distributed 90 percent to FAA AIP funds, with the remainder split between the sponsor and the state. The successful bidder is expected to bear construction costs for the hangar and parking areas.

2. Project 13

Three recommendations were made regarding the redevelopment of the pre-World War II hangar complex south of Runway end 6 planned under Project 13:

- . The sponsor should construct and manage the Hangar 3 replacement, saving construction of the Hangar 1 and 2 replacements for developers through an RFP, response and selection or other bidding process.
- . The Hangar 3 replacement should be constructed prior to demolition of existing Hangar 3 and it should be the first hangar

demolished under the project. The Hangar 3 replacement should be the first hangar constructed under the project.

- . The FAA, the sponsor, and the state should participate in the construction of apron areas and access roads associated with this project.

There are a number of reasons for making the first recommendation. First, it will allow the sponsor to set the standard for future development of the Hangar 1 and 2 replacements. Second, it will spur developer interest in the site and, third, it will increase the Airport's revenue base by an estimated \$80,000 annually in 1994 and an estimated \$225,000 annually by 2006 (See Appendix VII-A for further details). The Hangar 3 replacement should be constructed prior to demolishing the existing Hangar 3 to satisfy demand for the hangar. This should also be the case for the Hangar 1 and 2 replacements. Hangar 3 should be the first hangar demolished, and under an AIP project as it lies in the Runway 6 clear zone. Finally, the third recommendation is made on the basis that no exclusive ramp or apron rights will be granted for any of the three hangars. Again, the sponsor or its designee should administer the common use of these ramp and apron areas.

3. Project 15

The FBO expansion planned under Project 15 should be undertaken by the FBO existing on the site planned for expansion, or this FBO's successor in interest.

This is the only alternative for the project as the existing FBO's leasehold includes the area planned for the development and the term of the lease agreement runs through the planning period. One hundred percent of the cost of this project is shown in the tenant/developer column of Table VII-1.

4. Project 15

The entire complex planned for development in the landfill area east of Runway end 2R (Project 15) should be constructed, operated and maintained by the sponsor.

This is a completely underdeveloped area of the Airport and the costs associated with developing the required infrastructure will be high. One hundred percent of these costs would have to be paid by the developer if this were the recommendation and the

revenue associated with the project would not be sufficient to entice developer investment in the site. However, with the sponsor undertaking the project, certain aspects of it will become eligible for FAA and state aid. Specifically, 90 percent of the cost of grading, draining, and paving the apron areas is expected to be paid through FAA AIP funds, with the remainder split between the sponsor and the state. The cost of constructing the taxiway connector is expected to be distributed in the same manner, and the sponsor is expected to pay 100 percent of the T-hangar construction costs. Again, the T-hangar construction costs are intended to include the cost of constructing ramp and apron areas not considered as common use by the FAA. Sponsor development is the only feasible means to obtain these T-hangars.

5. Projects 16 and 17

Projects 16 and 17 call for the construction of an airport maintenance building and an Airport Road-Kellogg Avenue connector. Both projects are expected to be eligible for FAA and state aid. Therefore, the distribution of costs is 90 percent to FAA AIP funds, with the remainder split between the sponsor and the state.

4. PHASE III DEVELOPMENT

Recommended Phase III developments are also outlined on Table VII-1.

(1) Airfield Projects

Projects 18, 21, and 23 represent the Phase III investments in the airfield. These investments are expected to total \$1,367,200. Again, the assets acquired under these projects must eventually be replaced, and the vehicle for ensuring the sponsor's ability to do so, without aid, is discussed in Section 5 of this chapter. Project 18, the construction of a new Taxiway C, is expected to cost a total of \$1,100,000. Project 21, the construction of a noise barrier, is expected to cost a total of \$125,000. Project

23, the purchase of land for the Runway 2R/20L clear zones, is estimated at \$142,200.

Ninety percent of the costs of all three projects is targeted for FAA AIP funds and the remainder is split between the sponsor and the state.

(2) Tenant Facilities

Projects 19, 20, and 22 represent the Phase III investments in tenant facilities.

1. Project 19

The redevelopment of the south airfield FBO planned under Project 19 should be undertaken by the FBO existing on the site planned for development. As with Project 14, this is the only alternative available, as the existing FBO's leasehold includes the area planned for development and the term of the lease agreement runs through the planning period. Therefore, 100 percent of the cost of this project is shown in the tenant/developer column of Table VII-1.

Current economics at the Airport preclude tenant investment of this magnitude. Specifically, the corporate self-fueling along Wilmer Avenue and the existence of limited service FBOs along Airport Road greatly reduce the full service FBO's fuel sale. Fuel sales are the greatest revenue center for most FBOs. Additionally, the existence of corporate self-fueling greatly inhibits the Airport's ability to draw another competitive FBO. Therefore, development of the site by the existing FBO is critical, and a number of events recommended prior to this project will contribute to the existing FBO's ability to do so.

First, the sponsor will develop the T-hangars discussed in Project 3, and the conventional hangar development is undertaken as noted in Project 12. This solves the problem of the south airfield limited service FBOs. Second, as noted in Section 5 of this chapter and explained in detail in Appendix VII-A, no additional self-fueling rights should be granted at the Airport. Fueling rights should only be granted to full service FBOs. Further, the single-unit corporate

hangar development planned under Project 4 will attract corporate aircraft to the south airfield, and the Project 15 T-hangar development will attract additional general aviation aircraft to the south airfield.

These events should help to transition the Airport from its current scenario of one with one full service FBO and three limited service FBOs to a situation involving two financially healthy and competitive FBOs with improved levels of service.

2. Project 20

Two recommendations were developed regarding the terminal building renovation planned under Project 20.

- . The terminal building should be leased to a developer on a long-term basis and renovated by the developer.
- . The sponsor should undertake construction of the parking areas and the realignment of Wilmer Avenue.

As shown in Table VII-1, the total cost of this project is expected to exceed \$3.1 million, which prevents the entire project from being undertaken solely by a developer or the sponsor. This approach minimizes the sponsor's cost, allows the project to occur, relieves the sponsor of terminal building administrative responsibilities, and therefore conserves the Airport's net revenue from the terminal building.

3. Project 22

Project 22 is an extension of the Project 13 T-hangar development in the landfill area east of Runway end 2R. For the same reasons stated under Project 13, the sponsor should undertake this project. The Table VII-1 funding distribution reflects this recommendation.

5. POLICY ISSUES

This section addresses policy issues relevant to the Airport's airfield and tenant facilities projects.

(1) Commercial Operating Permits

Helicopter training and banner towing operations are performed in the midfield aircraft operating area by individual commercial operators. These operations should be administered by the sponsor through commercial operating permits, and the issuance and execution of the permits should be a condition precedent to commencement of operations.

The commercial operating permit is an administrative and legal vehicle that can be used to protect the sponsor, Airport tenants, and the operator from the risks inherent in such operations. It should specify all authorized uses of the Airport to be made by the permittee and require the permittee to submit to the sponsor copies of licenses and certificates required by law for the operations authorized by the Permit. It should provide the sponsor consideration for the granting of operating rights in the form of an operating fee and should provide for penalties in the event of noncompliance with the permit. Further, the permit should require minimum insurance coverage and contain language by which the sponsor is indemnified and saved harmless from all cost, liability, and expense resulting from the operator's use of the Airport.

The midfield aircraft operating area should not be used without institution of the commercial operating permit, and the permit should be required of all other commercial operators operating or rendering a service at the Airport unless they are operating as a prime lessee of the Airport.

(2) Fuel Flowage Fees

Total airfield investments throughout the planning period are estimated at \$8.5 million. Due to the excessively long term of the majority of Airport leases, and barring the implementation of a substantial landing fee program, fuel flowage fee increases are the only means available to recoup investments in the airfield and to position the sponsor to take full responsibility for replacing the acquired airfield assets. The fee structure recommended in Appendix VII-A is based on the historical 60 percent to 40 percent distribution of total corporate and FBO fueling and a recognition of the Airport's need to be provide competitive retail fuel prices. The fee structure results in a cumulative increase in fuel flowage revenue of approximately \$8.5 million.

The Master Plan Update reinforces the recommendation made by Pan Am World Services in its 1980 Report on Lunken Airport that no additional corporate self-fueling rights be granted at the Airport for the following reasons:

1. FBO Service Obligations

FBOs are the "front door" of the community to the transient aircraft arriving at any airport. This means that Ohio Aviation (recently assigned to Stephens Beechcraft), is the community host or community front door through which the City of Cincinnati is viewed in terms of a level of service provided to the transient corporate jet operators visiting the City. It is, indeed, an important aspect of service to be rendered. Typically, however, an airport the size of Lunken would have and would be able to support at least one and, more likely, two additional operators of the size and caliber of the Stephens Beechcraft operation. While that should be the circumstance at Lunken Airport, it is not for one reason. The Airport has permitted corporate self-fueling, and as a result, profits that would normally go to an FBO, as well as funds the FBO would use to construct and support its facility, are

being siphoned off to the corporate operators themselves. They are buying their fuel in bulk and, therefore, do not have to deal with the FBO.

While this may be an advantage to the corporate operator, it is most likely not a "make-it or break-it" concern to the high caliber firms based at Lunken.

On the other hand, the lack of a second or a third "first class FBO" reflects negatively upon both the community and the Airport.

Within the last five years, two major FBO chains were introduced to the Airport with a view to encouraging them to acquire one of the other existing FBOs and build a new facility and compete with Stephens Beechcraft or its predecessors. Both firms were extremely interested in the project based on the fuel volumes pumped at the Airport. However, once they became aware that the Airport had permitted, by virtue of previous agreements, corporate self-fueling, both operators had no further interest. Thus, it may be concluded that corporate self-fueling at Lunken Airport discourages potential FBOs from locating on the Airport. The result of the corporate self-fueling is that the Airport has a single FBO, an arrangement tantamount to an exclusive on services.

2. Environmental Concerns

There are approximately 20 fuel tanks on the Airport at this time. Most are in the range of 15 to 25 years old, and some may even be older. To the best of the consultant's knowledge, no testing of any of these tanks for leaks has been undertaken by the Airport or owners/operators of the tanks and the results passed to the Airport for assurance on the quality and safety of the tanks.

New Environmental Protection Agency (EPA) standards on airport and other fuel tanks are being promulgated by the federal government. These could have a serious impact on the Airport and the operators currently owning and utilizing the various tanks. A 50- to 100-gallon spill of JP4 at another facility is expected to cost well into six figures to cure. The cost for removing this small spill (over 20 years old and therefore not of significant consequence and embedded in clay so that it cannot move or spread to any significant degree), may reach as high as \$1 million. This incident highlights the potential liability involved with corporate self-fueling if each

of the operations over the period of their existence, has contaminated the ground with as little as 50 to 100 gallons of fuel, either through an actual fuel spill or through a leak in the underground tank.

The environmental and general liability concerns of self-fueling are severe, and the Airport should eliminate corporate self-fueling on a timed and orderly basis. The Airport should require all the corporate operators to remove their tanks within a set period of time and comply with all environmental requirements in the interim for testing contamination of groundwater contamination, spills, etc. In the interim, the operators of these fuel tanks should provide Lunken Field with representations and certificates of coverage demonstrating that they possess sufficient environmental and general liability insurance to be able to indemnify and hold harmless the Airport against any environmental contamination and cleanup and that they have the financial resources to see that such cleanup assignments can be carried out. This is recommended only as an interim measure with the ultimate operational and environmental goal for the Airport being to eliminate this multiplicity of nontested aging tanks on the Airport.

3. Month-to-Month Leases

The Airport has approximately eight month-to-month leases on the Airport. These arrangements exist because the Airport has a number of old and deteriorating facilities, and wants to remain flexible as to the timeframe within which the facilities can be removed. This is a valid position. However, this matter should be discussed at some length by Airport management with its counsel, so that these do not become perpetual month-to-month tenancies which are institutionalized and become a recognized way of life on the Airport.

The Airport should formulate, with guidance from Counsel, a definitive policy statement as to how, and in what timeframe, the Airport should deal with these parcels. Data from the Master Plan Update can be used for that purpose. Upon completion, the policy should be enunciated to the general public and particularly to the Airport tenants that fall into this category, so that there is absolutely no question about the Airport's posture, the action it intends to take, and the approximate timing of that action. This will ease the Airport's way in moving on new projects on these current month-to-month parcels.

One aspect of the approach the Airport should take is to eliminate the month-to-month leases altogether and restructure them as some type of permit or use and occupancy agreement, so that it is clear that the entity occupying the space has absolutely no leasehold interest in the space occupied whatsoever.

APPENDIX VII-A

APPENDIX VII-A
FINANCIAL PROJECTIONS

The projections component of the financial analyses was conducted in three phases:

- I. A 20-Year Revenue Projection was developed. This assumed that all planned projects were undertaken in the recommended manner, and provides for increases or decreases in revenue resulting from such projects.
- II. A 20-Year Expense Projection was also developed assuming that all planned projects were undertaken in the recommended manner, and providing for the increases or decreases in expenses resulting from such projects.
- III. A 20-Year Operating Budget was developed through a utilization of the above projections.

1. PHASE I: 20-YEAR REVENUE PROJECTION

To project the Airport's revenue, the sources of revenue must first be identified and categorized. The Airport's seven distinct sources of revenue include:

- . Fuel Flowage Revenue
- . Terminal Building Rents
- . Month-to-Month Leases
- . Long-Term Leases
- . Investment Income
- . Percent of Gross Payments
- . Field Use Fees, Permits, and Other Revenue

The following sections provide a detailed examination of these categories and the effects of planned projects on them.

(1) Fuel Flowage Revenue

To project fuel flowage revenue, a realistic projection of volume and an equitable projected fee structure was developed as follows:

Fuel is pumped both by corporations and Airport FBO's, each operating under individual flowage fee structures. Therefore, the flowage volume projections must be broken down accordingly and then further broken down between Jet A and AvGas, as the two are used at different rates. Based on six years of historical data, FAA Forecasts, and the consultant's expertise, flowage volume is projected to increase (or decrease) at the following annual percentages:

	<u>Jet A</u>	<u>AvGas</u>
Corporate	1%	(4%)
FBO	2%	1%

It is important to note that the projection assumes, and it has been recommended, that no additional corporate self-fueling rights will be granted and that the 1% annual increase in corporate jet fueling will be attributable only to increases in aircraft utilization. This leaves FBO jet fueling the greatest potential area for growth. Table 1 depicts the projected shift in flowage volume:

TABLE 1

<u>Year</u>	<u>Corporate Gallons</u>			<u>FBO Gallons</u>			<u>Airport Total</u>
	<u>Jet A</u>	<u>AvGas</u>	<u>Total</u>	<u>Jet A</u>	<u>AvGas</u>	<u>Total</u>	
1987	3,490,445	7,305	3,497,750	1,964,754	493,350	2,458,104	5,955,854
2006	4,216,838	3,363	4,220,201	2,862,276	596,021	3,458,297	7,678,498

<u>Year</u>	<u>Corporate Gallons</u>			<u>FBO Percentage</u>			<u>Airport Total</u>
	<u>Jet A</u>	<u>AvGas</u>	<u>Total</u>	<u>Jet A</u>	<u>AvGas</u>	<u>Total</u>	
1987	58.88%	.12%	59%	32.9%	8.1%	41%	100%
2006	54.96%	.04%	55%	37.3%	7.7%	45%	100%

The detailed projection of flowage volume is presented in Exhibit A.

The second half of the fuel flowage revenue projection is the fee structure. The corporations currently pay \$.06 per gallon. The FBOs pay \$.04 per gallon. At this point, two recommendations and assumptions must be made:

- . Both the Corporate and FBO flowage rates should be increased to support Master Plan Update improvements.
- . The differential between the Corporate and FBO rates should also be increased because due to the excessively long term of the Airport leases, the flowage fee is the primary vehicle for generating additional Airport revenue (barring the implementation of a substantial landing fee program). Further, by virtue of corporate self-fueling, the corporate operators enjoy a unique fuel price, vis a vis the market, while the FBO, with much greater public service obligations, must remain competitive especially in the transient market environment. Further, the Airport fuel flowage fee is a type of use fee, and as shown on Table 1, corporate jet fuel consumption exceeds FBO consumption by 77 percent.

The projected fee structure shown in Table 2 is recommended on the basis of planned Airfield improvement expenditures, the historical 60/40 percent distribution of total Corporate and FBO fueling, and a recognition of the Airport's need to be competitive with other airports on the basis of retail fuel prices:

TABLE 2

<u>Year</u>	<u>Increase Corporate Rate To</u>	<u>Increase FBO Rate To</u>	<u>Rate Differential</u>
1987	\$.06/gallon*	\$.04/gallon*	\$.02/gallon
1988	\$.10/gallon	\$.06/gallon	\$.04/gallon
1991	\$.13/gallon	\$.08/gallon	\$.05/gallon
1995	\$.15/gallon	\$.10/gallon	\$.05/gallon

*Current rates

It is important to note that the recommended fee structure represents minimum recommended increases in the corporate and FBO flowage rates. The frequency and/or timing of the increases is flexible beyond the point of the minimum recommended increases. For example, if the corporate and FBO rates were increased to \$.13 and \$.08 per gallon respectively in 1988, a second increase in the rates would not be required until 1995.

Combining the projected flowage volume with the projected fee structure results in the projection of fuel flowage revenue shown in Exhibit B. As indicated, revenue is expected to increase from \$300,000 annually to over \$900,000 annually during the 20-year planning period, assuming the above fee structure is implemented.

(2) Terminal Building Rents

The Terminal Building currently houses 10 tenants, as shown in Exhibit C. The Sky Galley Restaurant entered into a five-year lease agreement commencing March 30, 1987, for its space in the Terminal Building. The Sky Galley's rent was projected under the terms of this agreement assuming the agreement is renewed at five-year intervals with rent escalated by the increase in the Consumer Price Index (CPI). The Flight Service Station lease agreement expires September 30, 1987, at which time the current annual rent is expected to increase by 15 percent. Thereafter, the Flight Service Station lease is assumed to renew at three-year intervals with rent escalated by the increase in the CPI.

The remaining eight tenants are on a month-to-month basis and require additional assumptions and recommendations, as follows:

- . It is assumed that the CPI for the greater Cincinnati area will rise at an average annual rate of 3.5 percent over the 20-year planning period.
- . It is recommended that rent on the month-to-month tenants is increased annually by at least 75 percent of the increase in the CPI.
- . It is assumed that each office in the Terminal Building will be occupied throughout the planning period.

Combining the Sky Galley Restaurant and Flight Service Station lease provisions with the above assumptions and recommendations for the month-to-month tenants, results in the projected Terminal Building revenue shown in Exhibit C.

The Terminal Building revenue projection is further impacted by the Phase III Terminal Renovation Project. Exhibit C shows that the sum of the Terminal Building rents is zero beginning in 2000 because the recommended approach to the Terminal Building Renovation Project was that the entire structure be leased to a developer on a long-term basis. Terminal Building revenue would then be derived from a single, long-term lease and thus appears under the long-term lease revenue section in 2000. Consideration was given to the following in making this recommendation:

- . Administrative overhead associated with operating the Terminal Building
- . Insurance and maintenance costs
- . Renovation costs and resulting revenue increases

(3) Month-to-Month Leases

There are currently eight month-to-month tenants other

than those in the Terminal Building. These are shown in Exhibit D. Of the eight month-to-month tenancies, the six listed below will terminate as a result of facility demolition planned under the following projects:

<u>Project No.</u>	<u>Facility Affected</u>	<u>Assumed Demolition Year</u>
3	T-Hangars 8, 9	1989
4	Hangar 6	1990
4	Hangar 7	1990
12	T-Hangars 10, 11, 24, 26	1992
13	Hangar 2	1994
13	Hangar 1	1995

Hangar 3 is also scheduled for demolition under Project 13, but its tenant (Avionics Inc.) has a long-term lease and thus appears under the long-term lease revenue section. Hangar 3 is recommended to be the first facility demolished under Project 13, as it lies within the Runway 6 clear zone.

Exhibit D depicts the associated losses in revenue and accounts for the following assumptions and recommendations:

- . It is assumed that the tenants will remain in occupancy up to the date of demolition, and it is recommended that rent for the tenants is increased annually by at least 75 percent of the increase in the CPI.
- . It is assumed that Mole Construction and H.C. Nutting, as the two unaffected tenants, will remain in occupancy throughout the planning period with the above rental increases applied.

Project 3 will result in additional month-to-month tenancies, as the recommended approach to it was that the Sponsor undertake construction of the four 14-unit T-Hangars planned. The Sponsor would then directly lease the units to tenants on a month-to-month basis. It was also recommended

that the first two T-Hangars be constructed prior to demolishing T-Hangars 8 and 9. The same approach was then recommended for the T-Hangars planned under Projects 15 and 22, resulting in the projected T-Hangar lease revenue depicted in Exhibit D-1.

As Exhibit D indicates, while the majority of month-to-month tenants are lost as a result of facility demolition, month-to-month lease revenue increases dramatically through a shift to T-Hangar leases.

(4) Long-Term Lease Revenue

To project long-term lease revenue, a comprehensive review of the existing leases was undertaken and enhanced by the long-term leases that result from completed Master Plan Update Projects (Project Generated Leases).

As depicted in Exhibit E, there are 14 existing long-term leases with the following tenants:

- . The Kroger Co.
- . The Great American Insurance Co.
- . Federated Department Stores
- . Cintas
- . Eagle-Picher Industries
- . Cincinnati Contractors Aviation
- . Cincinnati United Contractors
- . Ohio Aviation
- . Aero Marine
- . Condor
- . Procter & Gamble
- . Farmers Produce Market
- . FAA Control Tower
- . Avionics, Inc.

Exhibit E also depicts the expiration of the Hangar 3 lease and the resulting loss in revenue. The lease expires in 1991, at which time it is assumed and recommended that

the facilities be leased on a month-to-month basis until demolished under Project 13.

Of the remaining 13 existing leases, the following eight contain term and option provisions that extend the life of each through the planning period:

- . Condor
- . The Kroger Co.
- . The Great American Insurance Co.
- . Cincinnati United Contractors
- . Cintas
- . Eagle-Picher Industries
- . Ohio Aviation
- . Aero Marine

Exhibit E depicts revenue from the above leases as projected under the rent and escalation provisions of each, assuming that all options are exercised. Additionally, Project 19 calls for the redevelopment of the South Airfield FBO area. As this lease runs through the Planning Period, it must be assumed that this project will only take place if undertaken by the tenant.

It should be noted at this point that there are three basic rent escalation provisions used among the 14 existing long-term leases. They are:

- . Type A) 75 percent of the increase in the CPI
- . Type B) Fair market rental value as determined by an appraiser
- . Type C) 10 percent of the unimproved land value as determined by an appraiser

The CPI is assumed to increase 3.5 percent annually. Therefore, Type A leases are assumed to be controlled by an annual 2.625 percent increase with rent adjustments at five-

year intervals per lease provisions (13.125 percent increase each five years). Types B and C leases are assumed to be controlled by 3.5 percent annual increases with rent adjustments at five-year intervals per lease provisions (17.5 percent increase each five years).

The remaining five existing leases expire during the planning period and require additional assumptions:

- . The Lease Agreements for Hangars 27 and 28 expire in 2003 and 2004, respectively, at which time title to all structures and improvements vests with the Sponsor. It is assumed and recommended that upon lease expiration, the facilities will be leased on the basis of land and building rent. Land rent should be at 10 percent of the then current market value (estimated at .42/square foot or a 10-year return on \$183,000 per acre in 2003 and 2004), and building rent should be based on a 10-year return on the residual value of the building (estimated at .31/square foot in 2003 and 2004).
- . The Hangar 4 lease expires in 1999, at which time title to all structures and improvements vests with the Sponsor. It is assumed and recommended that upon lease expiration, the facilities will be leased on the basis of land and building rents. Land rent should be at 10 percent of the then current market value (estimated at .36/square foot or a 10-year return on \$157,000 per acre in 1999) and building rent should be based on a 10-year return on the residual value of the building (estimated at .26/square foot in 1999).
- . The Farmers Produce Market lease expires in 1997, at which time it is assumed that no development will occur, as 80 percent of the leased area lies within the Runway 6 clear zone. It is also assumed that the Farmers Produce Market will continue to occupy the land at rental rates increased with the CPI at five-year intervals.
- . The FAA Tower lease expires September 30, 1987, at which time the current annual rent of \$26,900 is expected to increase by 15 percent. Thereafter, the Tenant lease is assumed to renew at three-year intervals with rent escalated by 100 percent of

the increase in the CPI.

Revenue from the five expiring leases was projected under the rent and escalation provisions of each lease to the point of expiration, at which time the above assumptions and recommendations were applied. Estimates on the future value of Airport land are based on a five percent annual increase in land values.

Long-term lease revenue must now be enhanced by the long-term leases that result from completed Master Plan Update projects. There are seven such projects, as follows:

- A. The single unit corporate hangar complex planned under Project 4. ^{1/}
- B. The Conventional Hangar Development planned under Project 12. ^{1/}
- C. The new Hangar 1 planned under Project 13. ^{1/}
- D. The new Hangar 2 planned under Project 13. ^{1/}
- E. The renovated Terminal Building planned under Project 20.
- F. The North Airfield Commercial Development planned under Project 8.
- G. The new Hangar 3 planned under Project 13.

It was recommended that A, B, C and D be undertaken by developers through an RFP response and selection or other bidding process with the following specific assumptions and recommendations applied:

- . The Sponsor should undertake the demolition of Hangars 6 and 7 in site preparation for Project 4, T-Hangars 10, 11, 24 and 26 in site preparation

^{1/} Resulting from month-to-month tenant facility demolition.

for Project 12, and Hangars 1 and 2 should not be demolished until their replacements under Project 13 are complete. All usable landfill from the above demolition should be dumped in the area planned for T-Hangar development under Projects 15 and 22, reducing hauling costs for the demolition and site preparation costs for those projects.

- . The successful bidders for A, B, C and D should be offered 20-year land leases with one, five-year option.
- . Rent for A, B, C and D should be negotiated on the basis of the current market value of the land and should escalate with the CPI at five-year intervals for the 20-year term. Rent for the option term should be based on 10 percent of the appraised value of the land under its highest and best use, but should not be less than the last CPI increase.
- . One additional note is required regarding the single-unit corporate hangar development (Project A above). There are two alternatives to the same end with this project. First, development of the entire site can be put out to bid resulting in the developers leasing of the five, single-unit hangars contemplated. Second, the site can be divided into parcels and bids accepted on each parcel directly from the interested corporation, in which case the lease term should be reduced as a function of investment. A 10-year term with no option is recommended for the second alternative.

Exhibit E-1 depicts the estimated revenue from A, B, C and D assuming the current value of Airport land (\$.19 per square foot or a 10-year return on \$83,000 per acre) escalates at an annual rate of five percent.

E, F and G are unique projects that require separate attention:

- . Project E, the Terminal Building, should be put up for bid in the same manner as the above projects, but rental negotiations must be treated differently. The rent should be based on the current value of the land plus a 10-year return on

the residual value of the Building and should be sensitive to the office rental revenue stream that will be taken over by the successful bidder. The lease term, option and rent escalation provisions stated above should also be applied to the Terminal Building.

- . Project F, the North Airfield Commercial Development, should also be put up for bid in the same manner as the above projects, but rental negotiations must be treated differently. The rent should be based on the current value of the land plus a percent of gross revenue. The commercial development contemplated may not be covered under Cincinnati Municipal Code 402-23, which provides for the payment of one percent of gross revenue as an operating fee. Therefore, percent of gross payments should be required under the lease agreement.
- . With reference to Project G, it was recommended that the Sponsor undertake construction of the new Hangar 3 and that the FAA undertake the demolition of the old Hangar 3 as it lies in the Runway 6 clear zone. The new Hangar 3 should be completed before demolition of the old Hangar 3 and this should be the first phase of Project 13. Five-year terms with no options should be offered. Rent should be based on the then current value of the land and a 10-year return on construction costs, and should escalate with the CPI every five years.

Exhibit E-1 also depicts the estimated revenue from E, F and G under the stated assumptions. Summing the existing and project generated lease projections results in the long-term lease revenue line item on Exhibit G.

(5) Investment Income

Cash results from the operation of the Airport and any State or Federal appropriations for the Airport are held in trust with the City of Cincinnati. These funds are then invested by the City and the results are credited quarterly and reported as nonoperating revenue on the Airport's

Statement of Revenue, Expenses and Charges in Retained Earnings.

To project this revenue, it is necessary to know the balance held in trust with the City, the investment options exercised by the City, and the estimated cash results in each year of the planning period.

- . The balance held in trust with the City was \$1,542,000 as of December 1, 1986.
- . The City primarily invests in Treasury Notes, Treasury Bills, and Certificates of Deposit, and enters into repurchase agreements on a daily basis.
- . Estimated cash results are based on total revenue and expense projections.

The City has recently yielded the following returns through the investments described above:

<u>Period</u>	<u>Return</u>
1st Qtr, 1986	9.88%
2nd Qtr, 1986	7.18%
3rd Qtr, 1986	6.46%
4th Qtr, 1986	5.98%

The decline in the City's return is due to the recent declines in interest on Treasury Notes and Bills.

Assuming an average annual yield of 6.0% and an average cash balance equal to the prior year's balance plus or minus the current year's cash results produces the investment income line item shown on Exhibit G.

(6) Percent of Gross Payments

Cincinnati Municipal Code Section 402-23 provides that:

"Any person having a permit issued under Section 402-22 shall pay as an operating fee to the City of Cincinnati the sum of one percent of gross revenue received from operations, excepting such revenue as may be derived from the carrying of United States mail, passengers or cargo on scheduled air routes, the sale of airplanes, the sale of gasoline, and excepting revenue received from storage of aircraft in City-owned hangars."

These payments have historically ranged as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$47,303	\$59,267	\$67,466	\$50,934	\$90,620

It is important to note that the considerable growth shown in 1986 is partially due to late payments that were actually attributable to 1985 percent of gross payments as airport revenue is reported on a cash basis.

To project this revenue, its contribution centers must be identified and then assumptions made on the continuance of contributions. The following is a list of contribution centers with their respective estimated percentage of contribution:

<u>Contribution Centers</u> ^{1/}	<u>Estimated Percentage</u>
Air Freight/Charter and Flight Management Organizations	30%
Hangars 1, 2 and 3 Service Organizations	30%
Corporate Row ^{2/}	15%
Limited Service FBOs	15%
Other	10%
1/ Ohio Aviation is not a major contributor, as fuel and aircraft sales are exempt from percent of gross payments.	
2/ Corporate Row derives revenue from the subletting of hangar space. Corporate Row hangars are not "City owned."	

The facilities utilized by the Air Freight/Charter and Flight Management Organizations are not affected by the Project Development Schedule and, therefore, this 30 percent contribution is assumed to remain. Further, while Hangars 1, 2, and 3 are scheduled for demolition under Project 13, it must be assumed that the Service Organizations located therein will relocate (possibly among the replacements for Hangars 1, 2 and 3) or other Service Organizations of the same nature will take place as demand for such services is strong and expected to grow. Therefore, this 30 percent contribution is also assumed to remain. Corporate Row is not affected by the Project Development schedule and its 15 percent is assumed to remain.

The Limited Service FBO percentage is assumed to reduce as a result of facility demolition planned under the Project Development Schedule. Percent of gross from T-Hangars 8 and 9 is lost completely, as it was recommended that the Sponsor construct and manage the T-Hangar complex planned for their replacement. Percent of gross from T-Hangars 10, 11, 24,

and 26 is not lost completely, as Conventional Hangar Development is planned as their replacement. There will, however, be a one- to two-year time lag in revenue production resulting from the time it takes to demolish a facility, bid the site and construct the new facility. This time lag is also expected to slow the growth in percent of gross revenue for the 10 percent of other contributors.

For the reasons stated above, the historical 10 to 13 percent annual increase in percent of gross revenue is not expected to continue. In an effort to be conservative, a four percent annual growth was assumed, resulting in the percent of gross line item shown in Exhibit G. Actual 1986 revenue was assumed at \$74,000 due to late payments made on 1985 billings.

(7) Field Use Fees, Permits, and Other Revenue

This is the "catch all" category used to project revenue from sources that do not fall into any other category. To project this revenue, it was necessary to define its sources and examine the revenue streams historically associated with it.

Field use fees are defined as the Lunken Airport landing fees and aircraft parking fees described in Cincinnati Municipal Code 402-24. Annual revenues from the above sources have historically ranged as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$1,212	\$1,003	\$ 972	\$1,396	\$ 758

Averaging the five-year history and accounting for annual CPI increases, estimated at 3.5 percent, results in the projected revenue from field use fees depicted in

Exhibit F.

Permits are defined as the Lunken Airport permit fees described in Cincinnati Municipal Code 402-22. The cost of a permit ranges from \$100 to \$500 annually depending on the tenant's type of operation or use of the Airport, and the annual revenue historically associated with permits is presented below:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$5,650	\$5,630	\$5,350	\$6,400	\$5,800

Averaging the five-year history and accounting for CPI increases at five-year intervals results in the projected revenue from permits depicted in Exhibit F. Again, the CPI is estimated to increase by 3.5 percent annually.

Finally, the Airport generates other revenue that cannot be classified as field use fees or permit fees. A further breakdown of this revenue source is beyond the scope of this analysis, and is merely presented in recognition of its existence. Other revenue has historically ranged as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$1,351	\$ 771	\$ 633	\$ 808	\$ 660

Disregarding the extreme 1982 value, averaging the four-year history, and accounting for annual CPI increases results in the projected revenue from other sources depicted in Exhibit F.

Finally, summing the three columns of Exhibit F results in the field use fees, permits and other revenue line item

on Exhibit G.

2. PHASE II: 20-YEAR EXPENSE PROJECTION

The expense projection requires two tasks:

- I. Project operating and nonoperating expenses as enhanced by the effects of the Project Development Schedule.
- II. Increase projected expenses by the Sponsor's share in planned projects.

Projected Operating and Non-Operating Expenses:

The first task under Phase II requires identification of the Airport's expense categories and an examination of the components of each. Category identification was accomplished through an examination of City expense codes used in the Airport accounting process and discussions with the Airport Manager to ensure budget compatibility, resulting in the following categorization of Airport expenses:

- . Personal Services
- . Contractual Services
 - Basic Services
 - Utilities
 - Maintenance and Repairs
- . Materials and Supplies
- . Fixed Charges
 - Insurance
 - Taxes
 - Rent, bad debt and other
- . Depreciation

The Contractual Services and Fixed Charges categories were broken down further to better deal with the major line item

expenses indicated.

The following sections discuss the components of each category, the assumptions used to project each category, and the effects of the Project Development Schedule on each category. The recommended approach to planned projects is the controlling factor in determining the project development effects on expense categories. The recommended approach to T-hangar Projects 3, 15 and 22, and the new Hangar 3 was Sponsor development and management. This recommendation directly affects the projection of expenses.

(1) Personal Service

The Personal Services line item on Exhibit H represents the Airport's payroll. Positions on the payroll include the Airport Manager, Secretary/Bookkeeper, Maintenance Supervisor, two Maintenance Workers, an Electrician, and three Janitors. The Airport's payroll has historically ranged as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$257,113	\$269,484	\$269,348	\$279,424	\$291,000

The following subcategories are representative of the cumulative personal services expense category:

- . Regular hours
- . Sick Pay
- . Vacation Pay
- . Overtime
- . Shift Differential
- . City Pension System
- . Employee Hospital Care
- . Health and Welfare
- . Dental and Vision

As the CPI has been assumed to rise at an annual rate

of 3.5% throughout the study, the payroll is assumed to rise at an annual rate of 4.0% to account for "real pay" increases in addition to cost of living increases. As evidenced above, the Airports' benefits package is complete and no additional benefit packages are recommended.

To complete the projection of Personal Services expense, the affect of the Project Development Schedule must be examined to determine the sufficiency of the current staffing level.

In doing so, the only identified areas of concern are the T-hangar Projects 3, 15 and 22, and the new Hangar 3 under Project 13 recommended to be undertaken by the Sponsor. Two points need to be made:

- . All maintenance work on the T-hangars will be the responsibility of the Sponsor, as it is not normally passed through to T-hangar tenants, and structural maintenance on the new Hangar 3 will be the responsibility of the Sponsor with routine maintenance passed through to the tenant.

It has been determined that the increase in Airport maintenance resulting from the construction of the T-hangars and the new Hangar 3 warrants an increase in the maintenance staff. As the first T-hangar project is scheduled to commence in 1988 and is expected to reach 90% of capacity in 1995, and the new Hangar 3 is expected to be completed in 1993, one additional maintenance worker is recommended to be added in 1993, with the existing staff handling increased responsibilities up to that point. Estimated salary for this position in 1993 is \$25,000.

- . The increase in bookkeeping functions resulting from the accounting requirements of tracking the T-hangar and Hangar 3 tenants will put an additional strain on the administrative staff.

One additional administrative staff member will also be required to ease the burden of the existing workload and handle the increased workload resulting from an increase in the number of Airport tenants. Again, as the first T-hangar project is scheduled to commence in 1988 and is expected to reach 90% of capacity in 1995, and the new Hangar 3 is expected to be completed in 1993, the additional staff member is recommended to be added in 1990.

The administrative staff member is added prior to the maintenance worker because the administrative staff is currently near peak performance and has little room for additional responsibilities. Estimated salary for this position in 1990 is \$22,000.

The Personal Services line item on Exhibit H depicts the current expense escalated at 4.0% annually with additional personnel added in the time frames noted above.

(2) Contractual Services

Contractual Services are broken down into basic services, utilities and maintenance and repair expenses and discussed in the following three sections.

1. Basic Services

The Basic Services line item on Exhibit H represents payments made by the Airport for its security guard service, printing and reproduction services, contract negotiating services, testing services, postage, travel, city overhead charges, and other services that include disinfecting, exterminating, cleaning, court reporting, and consulting services.

Payments for the above have historically ranges as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$108,000	\$67,802	\$51,032	\$54,100	\$50,000

It has been determined that the base figure for basic services is approximately \$55,000. This figure accounts for the essential annual basic services listed above and should be increased with the CPI.

In completing this projection it must be recognized that the Project Development Schedule will generate a need for services above and beyond the \$55,000 base. Such services would include engineering services, RFP consultations, additional contract and lease negotiations, surveys, appraisals and project design and planning services, and will be needed for all projects, as such services are mostly indeterminate of the Sponsor or developer recommended approach.

To account for these costs, \$30,000 is added to the base figure of \$55,000 and the sum is increased by the 3.5% annual CPI assumption.

The Basic Services line item on Exhibit H is representative of the above assumptions.

2. Utilities

The utilities line item on Exhibit H represents the Airport's payments for telephone service, gas, electric lighting and sewerage. Payments for utilities have historically ranges as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$89,732	\$96,723	\$99,872	\$105,385	\$107,000

The cost for the current level of utility service is assumed to increase at 3.5% annually with the CPI.

The level of service will, however, be impacted to some degree by the Project Development Schedule. For example, the Sponsor will have to pay for electric service to the planned T-hangar areas and electric lighting for the various runway lighting projects in Phase I.

Because the level of service is impacted, utilities expense is increased at an annual rate of 4.0%, as reflected in Exhibit H.

3. Maintenance and Repairs

The maintenance and repairs line item on Exhibit H represents Airport payments made for municipal garage auto repairs, building and equipment repairs and other maintenance and repair expenses related to Airport facilities and equipment. Payments for the above have historically ranged as follows:

<u>1984</u>	<u>1985</u>	<u>1986</u>
\$38,326	\$42,389	\$40,000

The above represents maintenance and repair expenses attributable to the existing Airport facilities and equipment and must be increased with the CPI, and further impacted by the maintenance and repair expenses attributable to planned facilities.

In considering the recommended approach to all planned buildings and structures and the effects of same on maintenance and repair expenses, the T-hangar projects and the new Hangar 3 again stand out. As noted in the Personal Services Expense section, maintenance work on T-hangars is not normally passed through to T-hangar tenants, and will therefore be the responsibility of the Sponsor. Routine maintenance on the new Hangar 3 is recommended to be the responsibility of the Lessee, saving major structural maintenance and repairs for the Sponsor. As the new Hangar 3 is scheduled for completion in 1993, few major structural maintenance or repairs are expected during the remaining 13 years of the planned period. This leaves the T-hangar complexes the greatest area of concern in projecting maintenance and repair expense.

Therefore, \$10,000 is added in 1991 as an annual maintenance and repair expense for the Project 3 T-hangar complex and \$13,500 is added in 2000 for the Projects 15 and 22 T-hangar complex.

It is assumed that the \$10,000 and \$13,500 expenses included in this section for the T-hangar complexes is sufficient to cover the additional materials and supplies expense also attributable to the T-hangar complexes. Again, Exhibit H represents all of the above assumptions.

(3) Materials and Supplies

The Materials and Supplies line item represents Airport payments made for building and equipment parts and fittings, tools, apparel, office supplies, cleaning supplies, books, lubricants, paints, oils, glass, pesticides, petroleum, masonry and road repair material and other materials and supplies. Payments for the above have historically ranged as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$14,633	\$14,941	\$6,699	\$17,876	\$12,000

As the above data appear to have been impacted by the cash basis reporting system and show no steady growth or decline, the five-year average expenditure of \$13,230 was used as the base expense figure and then escalated with the CPI.

As noted above, additional materials and supplies expense attributable to the Project Development Schedule are included with maintenance and repairs expense.

(4) Fixed Charges

Fixed Charges are broken down into insurance, taxes and rent, bad debt and other expenses and discussed in the following three sections.

1. Insurance

The insurance line item on Exhibit H represents payments for the Airport's insurance coverage, which have historically ranged as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$3,559	\$3,481	\$9,566	\$11,525	\$26,000

While the dramatic premium increases depicted above are industrywide, the 1986 \$27,000 premium is comparatively low when examined against airports with similar types of operations. This prompted discussions with the Cincinnati Risk Management Office, the key points of which are listed below:

- . The Airports general liability policy was recently renewed for a period of one year commencing March 1, 1987, whereupon the general liability coverage limit was increased from \$5,000,000 to \$10,000,000 and the associated premium rose to \$32,000.
- . Auto liability for the Airport's motorized fleet is included under the general liability coverage, but damage to the motorized fleet is not covered.
- . Included in the general liability policy is a separate \$1,000,000 coverage limit for hangarkeepers liability.
- . There is no fire and extended coverage insurance on City owned buildings and structures.

Three recommendations must be made at this point. First, property damage coverage for the motorized fleet should be obtained. While the Airport and the city may be able to absorb a loss, such a loss, if absorbed through the Airport's Trust Fund, would inhibit the Airport's ability to undertake planned projects and possibly result in insufficient facilities and capacity. Second, fire and extended coverage insurance should be obtained for Airport owned buildings and structures for the same reason. However, some of these structures are scheduled for demolition and should not be insured, as the Project Development Schedule is flexible enough to allow early replacement. These buildings and structures include Hangars 1, 2, 3, 6 and 7. All other Airport-owned buildings and structures not scheduled for demolition should be insured for 100% of the replacement value of each, the cost of which should be passed through to the tenant wherever possible. Additionally, the T-hangar complexes and the new Hangar 3 should be insured for 100% of the replacement value of each. The cost of this insurance should be included in the monthly rental for the T-hangars and passed through on a proportionate basis for the tenants in the new Hangar 3. Third, general

liability coverage should be increased from the current \$10,000,000 limit to a \$50,000,000 limit as a modest award of \$15,000,000 could wipe out the Airport's trust fund.

Therefore, in projecting insurance costs under the above assumptions and recommendations, the following steps were taken:

- . The 1987 premium of \$32,000 was increased to \$60,000 to allow for the increased coverage on the motorized fleet, Airport owned buildings and structures not scheduled for demolition and increased liability coverage.
- . The current premium for fire and extended coverage insurance is \$.38 per \$100 of replacement value. Therefore, \$6,500 was added in 1991 to insure the Project 3 T-hangar complex, \$8,000 was added in 1993 to insure the new Hangar 3, and \$15,700 was added in 2000 to insure the Projects 15 and 22 T-hangar complex.
- . The sum of the above is also escalated by 3.5% annually.

Note: Revenue estimates for the T-Hangar complexes and the new Hangar 3 include payments for insurance. As the Sponsor will be the named insured and policy holder for coverage on these structures, the excess costs must be included in this section with recognition of the fact that the costs will be passed through to the tenant.

Exhibit H depicts projected insurance expense.

2. Taxes

The Airport currently pays taxes on all Airport owned income producing property, and these payments have historically ranged as follows:

<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
\$14,330	\$14,831	\$15,492	\$17,753	\$17,000

The data indicate an average annual increase of 5% and an average annual expenditure of \$15,845. However, in projecting property tax payments, consideration must be given to the fact that of all Airport owned income producing property, Hangars 1, 2, 6 and 7 are scheduled

for demolition and replacement by non-Sponsor development shifting the tax burden from Sponsor to developer and the Terminal Building is to be leased to a developer, also shifting the tax burden from Sponsor to developer.

This leaves the new Hangar 3 and the T-hangars planned for Sponsor development the majority of Airport owned income producing properties. Therefore, the only offset for the loss of Hangars 1, 2, 6, 7 and the Terminal Building is the construction of the T-hangars and the new Hangar 3, leading to the assumption that property taxes on buildings will remain a constant. To be conservative, the constant was set at \$19,000.

As with the insurance, taxes should be included with the monthly rental on the T-hangars and passed through on a proportionate basis for the tenants in the new Hangar 3. Revenue estimates for the T-hangars and hangar 3 also include payments for taxes. Additionally, taxes on the existing Airport owned income producing property should be passed through to the tenant wherever possible.

3. Rent, Bad Debt and Other

This is the "catch all" category used to project fixed charges that do not fall into the other two fixed charges categories. The rent represents approximately \$1,000 paid annually for rent on office machines. Bad debt represents unpaid charges for Airport services or facilities that were written off as uncollectible. 1984 bad debt expense was \$680 and stands alone in a five-year history. Other expense represents payments made for subscriptions and memberships and was \$309 in 1985 representing the greatest payment in a five-year history.

To be conservative and recognizing that other expenses may arise in the 20-year projection, rent, bad debt and other expenses were set at a constant of \$3,000.

(5) Depreciation

A comprehensive review of the Airport's fixed asset and depreciation schedule was undertaken with the view of projecting depreciation expense. The review focussed on four key areas:

- . Surviving Assets
- . Retiring Assets
- . Derived Capital Budget
- . Planned Project Depreciation

1. Surviving Assets

Existing Airport assets whose useful life runs through the planning period are presented below, along with the annual depreciation expense of each:

- . Terminal Building Roof - \$378.63
- . Building 22 Improvements - \$78.00
- . Administrative Lobby Improvements - \$2,071.62
- . A/C Installation Cost - \$152.24
- . Fire Station - \$8,950.00
- . Hangar 14 Roof - \$80.72
- . Hangar 1 Roof - \$379.62
- . Code Violations - \$2,423.43
- . Obstruction Lighting - \$2,987.44
- . Airport Fire Apparatus - \$921.13
- . North Ramp Extension - \$2,000
- . Taxiway G - \$2,080.61
- . Flood Control Relief Wells - \$2,156.09
- . Runway 6/24 Relighting - \$478.44
- . Clear Zone for Runway - \$2,648.02
- . Visual Approach Slope - \$129.49
- . Runway 15/33 Taxiway Conversion - \$8,901.87
- . Runway 6/24 Improvements - \$67,804.95
- . Runway 2R/20L Improvements - \$11,417.50

Total depreciation expense for surviving assets is \$116,294.35 annually and is held constant throughout the planning period as shown in Table 3.

2. Retiring Assets

Existing Airport assets whose useful life terminates during the planning period are presented below, along with the annual depreciation expense and scheduled retirement date of each:

- . Administrative Building Roof - \$342.17, 2005
- . Building 18 - \$1,200.00, 2005
- . Control Tower - \$4,506.70, 2003
- . Control Tower Window Replacement - \$414.34, 1988

- . Flood Control Pump House - \$7,900.00, 2005
- . Relief Well Filling Tubes - \$7,000.00, 2005
- . Road Reconstruction - \$2,237.79, 2005
- . Original Runway 2R/20L - \$30,000.00, 2004
- . Taxiway A - \$6,720.00, 2004
- . Taxiway B - \$2,250.00, 2004
- . Taxiway C - \$1,750.00, 2004
- . Lighting - \$2,750.00, 2004
- . Water Tower Painting - \$1,044.00, 1987
- . Runway Drainage - \$587.34, 1988
- . Erosion Repair - \$5,757.68, 1988
- . Radios - \$260.20, 1989
- . Floor Polisher - \$143.91, 1988
- . Water Heater - \$472.64, 1988
- . Radio Equipment - \$268.09, 1987
- . Dodge Accessories - \$123.00, 1988
- . Runway Striper - \$2,627.03, 1988
- . Dodge Pick-up - \$2,060.00, 1988
- . Sweepster - \$24,820.00, 1989
- . Cavalier - \$2,206.80, 1989

Retiring assets are separated from surviving assets to aid in the preparation of the derived capital budget. When an asset is retired, an assumption must be made as to whether or not it will be replaced.

Carrying the annual depreciation expense through the retirement date for each of the above retiring assets and summing the matrix yields the retiring asset depreciation expense shown on Table 3.

TABLE VII-A-3

Lunken Field Master Plan Update

PROJECTED DEPRECIATION EXPENSE

YEAR	Existing Airport Assets		Future Airport Assets		Total
	Surviving Assets	Retiring Assets	Derived Capital	Planned Projects	
1987	\$116,294	\$107,502	\$ 600	\$ 0	\$224,396
1988	116,294	106,122	3,448	66,105	291,969
1989	116,294	93,943	12,848	105,397	328,482
1990	116,294	66,657	27,968	230,447	441,416
1991	116,294	66,657	27,968	267,964	478,883
1992	116,294	66,657	28,088	267,964	479,003
1993	116,294	66,657	28,288	352,960	564,199
1994	116,294	66,657	57,848	425,260	660,059
1995	116,294	66,657	46,103	425,260	654,314
1996	116,294	66,657	46,103	550,894	779,948
1997	116,294	66,657	61,447	550,894	795,292
1998	116,294	66,657	62,429	578,394	823,774
1999	116,294	66,657	37,221	578,394	798,566
2000	116,294	66,657	37,896	578,394	799,241
2001	116,294	66,657	37,896	676,687	897,534
2002	116,294	66,657	22,870	676,687	882,508
2003	116,294	66,657	36,658	676,687	896,296
2004	116,294	62,150	82,948	604,387	865,779
2005	116,294	18,680	83,638	604,387	822,999
2006	\$116,294	\$ 0	\$ 83,638	\$604,387	\$804,199

3. Derived Capital Budget

A capital budget can now be derived through an examination of the retiring assets listed above and an examination of fully depreciated assets that remain on the Airport's books.

The examination of retiring assets must conclude with one of three assumptions:

- . The asset will be replaced immediately upon retirement and require a line item on the derived capital budget.
- . The asset will continue to be useful after retirement, but eventually replaced, also requiring a line item on the derived capital budget.
- . The asset will not be replaced during the planning period and will not require a line item on the derived capital budget.

To arrive at one of the above conclusions, each retiring asset was examined with respect to its acquisition date, assigned useful life and retire date and its need for replacement considering planned projects. Runways, taxiways, roadways, ramps, lighting and buildings were all eliminated from replacement consideration as a result of planned projects. The remainder of retiring assets were split among the first two assumptions and renamed in some cases for budget flexibility purposes as follows:

- . Immediate Replacement (Line Item)
 - Cavalier (Airport Car)
 - Dodge Pick-up (Pick-up with plow)
 - Water Tower Painting (Same)
 - Radios (Same)
 - Radio Equipment (Same)
 - Floor Polisher (Cleaning Equipment)
 - Water Heater (Building Equipment)
- . Eventual Replacement (Line Item)
 - Sweepster (Same)
 - Runway Stripper (Same)

The second half to the derived capital budget is an examination of fully depreciated assets that remain on the Airport's books. These assets continue to be

useful after retirement and require a determination on whether or not they should be replaced and, if so, when. Fully depreciated assets are listed below:

- . Terminal Building
- . Maintenance Storage Building
- . Hangar #1
- . Hangar #2
- . Hangar #3
- . Hangar #6
- . Hangar #7
- . Hangar #11
- . Original Runway 15/33
- . Runway 6/24
- . Runway 20L/2R
- . Ramp
- . M.B. Sweeper
- . John Deere Tractor
- . Woods Mower
- . Ford Tractor with Mower
- . Broiler Replacement (Admin. Bldg.)
- . Electric Typewriter
- . Radio #1
- . Radio #2
- . Radio #3
- . Radio #4
- . Ford Tractor - Heavy Rig
- . International Dump Truck
- . Snow Plow Blade
- . Volk Snow Plow
- . International Dump Truck with Plow
- . Ford Agriculture Tractor
- . Stake Truck
- . Dodge Window Van
- . AMC Concord 4-Door

Each fully depreciated asset was also reviewed with respect to its acquisition date, assigned useful life and retirement date and its need for replacement considering planned projects. Again, runways, taxiways, roadways, ramps, lighting and buildings were all eliminated from replacement consideration as a result of planned projects. In reviewing the remainder of fully depreciated assets, it becomes evident that they are representative of the Airport's fleet of motorized equipment, radio equipment for same and some office equipment.

To support the motorized fleet as it ages, three line items were added to the derived capital budget:

- . Tractor/Mower Equipment
- . Dump Truck with Plow
- . Accessories

The motorized fleet is also supported by the purchase of an Airport car and a pick-up truck every five years and a runway sweeper every ten years.

To support the radio equipment required for the motorized fleet, the retiring radios and radio equipment are replaced immediately upon retirement as indicated in the previous section.

Finally, a line item for office equipment was included in recognition of the need to replace existing equipment. The derived capital budget depreciation expense is shown in Table 3 and supported by the derived capital budget and its line item depreciation in Exhibits I and I-1, respectively. Exhibit H contains the line items for Depreciation Expense and Capital Purchases.

4. Planned Project Depreciation

The final step in projecting depreciation expense is an examination of the planned projects. Runways, taxiways, roadways, ramps, lighting and buildings were eliminated from replacement consideration under both the retiring assets and derived capital budget sections as a result of planned projects. Those projects are the focus of this section.

The following projects were eliminated from consideration under projected depreciation expense because they are planned to be undertaken by developers rather than the Sponsor:

<u>Project #</u>	<u>Description</u>
4	Single Unit Corporate Hangar Development
8	North Airfield Commercial Development
12	Conventional Hangar Development
13	New Hangars 1 and 2 Only
14	FBO Expansion
19	South Airfield FBO Redevelopment

The following projects are planned Sponsor development and are included:

Project #	Description	Initial Cost	Est. Compl.	Useful Life	Depre.
1	2R/20L strengthening	\$2,644,200	1988	40 years	\$ 66,105
2	6/24 strengthening	\$1,571,697	1989	40 years	\$ 39,292
3	T-hangar development	\$2,502,000	1990	20 years	\$125,100
5	20R Clear zone clearing	\$ 397,700	1991	20 years	\$ 19,885
6	NAVAIDS	\$ 169,870	1991	10 years	\$ 16,987
7	Midfield Oper. Area	\$ 5,950	1991	10 years	\$ 595
9	2R/20L parallel T/W	\$1,734,840	1993	40 years	\$ 43,371
10	2R Precision approach	\$ 600,000	1994	10 years	\$ 60,000
11	24 Non-precision	\$ 123,000	1994	10 years	\$ 12,300
13	New Hangar 3	\$1,665,000	1993	40 years	\$ 41,625
15	T-Hangar development	\$1,704,300	1996	20 years	\$ 85,200
16	Airport Maint. Bldg.	\$ 554,160	1996	40 years	\$ 13,854
17	Kellogg Ave. Connector	\$ 531,600	1996	20 years	\$ 26,580
18	Taxiway C	\$1,100,000	1998	40 years	\$ 27,300
21	Noise Barrier	\$ 125,000	2001	20 years	\$ 6,250
22	T-Hangar development	\$2,192,500	2001	20 years	\$109,625

Carrying the depreciation expense from the estimated completion year through each assets useful life (of the end of the planning period) and summing the matrix yields the planned project depreciation expense shown on Table 3.

It is important to note that while the full cost of each project was depreciated, the Sponsor is expected only to pay the amounts indicated in the Sponsor's column on the Project Development Schedule. The rationale behind this methodology is that should the Federal and State Grant Programs be discontinued, the Sponsor will be responsible for replacing the planned development assets in the absence of such Programs and the feasibility of this must be considered.

Sponsor's Share in Planned Projects

The second task under Phase II requires an estimate of the total cost of each of the 23 planned projects and a determination of and Summary discussions on the distribution of those costs (the cost distribution is explained in detail

in Chapter VI.)

First, the total cost estimates indicated on the Project Development Schedule are based on 1986 dollar cost estimates. 1986 dollars are then increased at a rate of 3.5% annually to the year in which the project is contemplated to begin being consistent with the CPI assumptions used throughout the revenue and expense projections.

Second, the total cost estimates are distributed among FAA AIP, FAA F&E, State, Sponsor and Developer funds. Controlling the cost distribution are Federal and State Grant criteria and the recommended approach to certain of the planned projects.

In reviewing the Project Development Schedule, note that Projects 1, 2, 5, 7, 9, 16, 17, 18, 21 and 23 are all eligible for Federal aid and 90 percent of the costs are distributed to FAA AIP funds, five percent to State funds and five percent to Sponsor funds. However, a \$75,000 maximum State participation for any one project criteria is activated for Projects 1 and 2, boosting Sponsor participation to seven percent and six percent for the projects, respectively.

Projects 6, 10 and 11 are also eligible for Federal aid, but 100% of the costs are targeted for FAA F&E funds with the exception of the supplementary wind cones planned as a segment of Project 6, which are targeted for a 90%/5%/5% distribution, as indicated. The remainder of planned projects are split among Sponsor and Developer investment as follows:

<u>Sponsor Investment</u>	<u>Developer Investment</u>
Projects 3, 13*, 15, 20*, 22	4, 8, 12, 13*, 14, 19, 20*

* Joint Sponsor and Developer projects.

It is important to note the following when reviewing the cost distribution for projects planned as Sponsor or Developer investment:

- . It was recommended that the ramp and apron areas planned under such projects be considered common areas, making them eligible for Federal assistance under the AIP Program. This will cut costs for the Sponsor or Developer, allow the Airport control over the ramp and apron areas, and create additional ramp and apron space for use by the general public as no exclusive rights to same will be granted.
- . With the exception of Projects 13 and 19, it is assumed that the Sponsor will bear 100% of demolition costs for projects requiring the removal of existing facilities. This should be considered common practice in preparing a site for a Developer and would naturally be the Sponsor's responsibility under projects planned for its development. The Project 13 exception is the demolition of Hangar 3, as it lies within a clear zone, and the Project 19 exception is the demolition of the Aero Marine facilities which are under lease through the planning period.

Summing the Sponsor's column for each year of the planning period results in the project development costs line item shown on Exhibit H. A 20% contingency expense on the project development costs is also included in Exhibit H.

3. PHASE III: 20-YEAR OPERATING STATEMENT

To determine the feasibility of undertaking Master Plan Update projects in the order and under the recommended approaches previously indicated, an operating statement must be developed

that takes into account all projected Airport revenues and expenses as enhanced by the effects of the planned projects. To accomplish this, the results of the Phase I revenue and Phase II expense projections must be compiled into an appropriate presentation format that reveals the Airport's projected operating profit/(loss), cash results and net profit/(loss).

The Projected Operating Statement is shown in Exhibit J. As shown on Exhibit J, projected operating profits range from \$198,812 in 1987 to \$1,190,857 in 2006, an increase nearing tenfold. The dramatic increases in operating profits are a result of fuel flowage fee increases and an increase in the number of month-to-month and long-term tenants.

Exhibit J also shows that the cash results, determined by adding investment income to and subtracting project development and contingency costs, capital purchases and taxes from the operating profit, differ dramatically from the operating profit/(loss) results. Negative cash results are shown in 1988 and 1989 as a result of Sponsor investment in the Project 3 T-hangar complex, in 1993 as a result of Sponsor investment in the Hangar 3 replacement, and in 1995 as a result of Sponsor investment in the Project 15 T-hangar complex.

At this point, a notable change occurs. Sponsor investment continues with such projects as the construction of parking areas and the realignment of Wilmer Avenue in connection with the Terminal Building renovation in 1999 and investment in the Project 22 T-hangar complex in 2000, 2001 and 2002, but cash results turn positive. This is because the initial Sponsor investments provide revenue benefits sufficient to fund future investments directly from the operating profits of the Airport. The only question remaining is the availability of cash for the initial investments. To answer this question, it is sufficient to say that cash flow analysis indicates that the initial

investments can be made with minimum cash on hand balances estimated at \$550,000 in 1989, \$370,000 in 1993 and \$530,000 in 1995. It is also important to note that cash flow will not permit construction of the Hangar 3 replacement until 1993.

Therefore, undertaking Master Plan Update projects in the order and under the recommended approaches previously indicated is feasible from a cash flow standpoint. However, net profit/(loss) must also be examined to determine feasibility. Exhibit J shows that new profit/(loss) is the result of subtracting depreciation from the cash results. The concern with net profits and losses deals with the Sponsor's ability to replace the assets acquired during the planning period in the absence of Federal and State Grant Programs.

Project 6 NAVAIDs and the Project 7 Midfield operating area assets retire in 2001. Escalating the costs of these assets at 3.5% annually reveals a replacement expense of \$237,350 in 2001. Additionally, the Project 10 precision approach and Project 11 nonprecision approach assets retire in 2004. Escalating the cost of these assets at 3.5% annually reveals a replacement expense of \$976,050 in 2004. No other planned project assets retire during the planning period and cash flow analysis permits immediate replacement of the above assets. Therefore, the Sponsor will be able to meet all of its responsibilities and remain on the positive side of the cash flow during the planning period.

However, all of the other assets acquired during the planning period will retire and have to be replaced in the years following the planning period. To determine the feasibility of this, the long-term trend of cumulative net profits must be determined. For the Sponsor to be able to replace assets acquired during the planning period at the original acquisition cost of each, cumulative net profits must be at least zero at the retirement date of each asset.

To make this determination, it is important to note the following:

- . That the net profit/(loss) bottom line on Exhibit J is the result of subtracting depreciation from cash results.
- . That the depreciation line item on Exhibit J represents total depreciation per Table 3 in the Phase II Section 5 discussion on depreciation.
- . That the Capital Budget and Capital Purchases line item on Exhibit J is intended to cover replacement of the retiring assets and fully depreciated assets as described in Section 5 of Phase II.

Therefore, while the depreciation line item on Exhibit J is an accurate representation of future depreciation expense, to determine the feasibility of replacing assets acquired during the planning, the retiring assets and derived capital depreciation must be backed out of the equation as replacement of these assets is accounted for in the Capital Budget and Resulting Capital Purchases line item. In doing so, the \$3.5 million net loss for the planning period indicated by the Operating Statement is reduced to \$1.6 million. Finally, as annual net results turn strongly positive in 2003 and are expected to continue in that direction, the \$1.6 million cumulative net loss is expected to turn positive by 2010 and the \$3.5 million cumulative net loss is expected to turn positive by 2013. Refer to the Planned Project Depreciation Schedule again and note that with the exception of the four projects previously discussed, the next retiring facility is the Project 3 T-hangar complex which retires in 2010. This leads to the conclusion that planned project assets will be able to be replaced by the Sponsor with a maximum of three to five years deferment past the retirement date of each.

In conclusion, the Master Plan Update is feasible in the order and under the recommended approaches previously indicated,

with three important points to note:

- . Sponsor participation in all 23 projects is feasible at the levels indicated on the Project Development Schedule.
- . Cash flow permits Sponsor replacement of the new project assets that retire during the planning period.
- . The bottom line permits replacement of the assets acquired during the planning period with a maximum three to five year deferment.

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