
LOUISVILLE INTERNATIONAL AIRPORT MASTER PLAN UPDATE

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PREFACE

The Master Plan Update for Louisville International Airport was in the final stages of evaluating alternatives when the terrorist attacks occurred on September 11, 2001. The effects of this tragic event on the airline industry in conjunction with economic downturn of 2002-2003 have changed many of the assumptions used for the forecasts and facility requirements. Changing facility needs is necessary to meet emerging security requirements, should be kept in mind when reviewing the facility recommendations herein.

To the extent possible, the detailed alternatives analysis included security factors in the evaluation. Two points are important when considering the recommended alternative in light of the changing aviation environment: 1. the plan is flexible to allow for changes in security regulations; and 2. the new facilities that are recommended in the plan can be constructed as demand warrants without major investment in temporary facilities.

1.0 INTRODUCTION

After more than a decade of expansion, the Regional Airport Authority (RAA) of Louisville and Jefferson County is updating the Master Plan for Louisville International Airport. The updated Master Plan will set the course for future development at the Airport over the next 20 years. The Master Plan will provide the RAA with guidelines for developing new and expanded aviation facilities in a manner that satisfies projected aviation demand while remaining compatible with the environment, the community and other modes of transportation.

1.1 MASTER PLAN PROCESS

The update of the Master Plan for Louisville International Airport follows a series of steps:

- Visions for the Airport's future are established to guide the Master Plan's evaluations and analyses
- The Airport's facilities are inventoried to assess existing conditions
- Projections from the concurrent Part 150 Noise Compatibility Study are used to establish activity levels for the 5-, 10- and 20-year planning horizons
- The capacities of the Airport's facilities are evaluated with respect to their ability to accommodate existing and projected demands, and requirements (or needs) for additional facilities are established
- Alternatives for providing the needed facilities are examined and are progressively narrowed to a preferred alternative based on an evaluation of operational, environmental and cost factors
- An overview of the environmental implications of the preferred alternative is conducted
- A set of plans (Airport Layout Plan) is developed detailing the layout of future facilities
- A capital improvement program is prepared that incorporates the development and phasing of projects recommended in the Master Plan

Public participation is an important element of the Master Plan Update process. Three public meetings were conducted to present information and receive feedback from the community at large. Newsletters and a project website containing study data also served as communication tools during the study.

In order to provide technical guidance throughout the process, a Technical Work Group was formed. This 15-member group represents a cross-section of Airport management, Airport users, regional planners, and government and business representatives. The scope of the Technical Work Group was designed to facilitate the exchange of technical information. Technical Work Group members are responsible for reviewing Master Plan working papers, providing professional and technical input to the planning process, and ultimately implementing the recommendations of the plan. The Technical Work Group is not a policy or decision-making body.

The first public workshop was held on March 15, 2000 and included a polling station where participants were able to share their “visions” of the Airport’s future. To build on the information received at the workshop, an interactive visioning session was held with the Technical Work Group to describe the Airport’s position in the year 2020. As a first step, the Technical Work Group identified what it thought were the Airport’s strengths and weaknesses and the opportunities for, as well as threats to, future growth.

1.2 STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS

Through an interactive session the Technical Work Group identified the Airport’s:

- *Strengths – assets currently in place*
- *Weaknesses – items that need improvement*
- *Opportunities for future growth*
- *Threats to the Airport’s position and viability*

The individual responses for each category are listed below.

Strengths

- *United Parcel Service (UPS) air distribution hub presence*
- *Central location in the U.S.*

- *Existing capacity (all-weather instrument landing systems)*
- *Business community support*
- *Convenience, in terms of regional accessibility and modern facilities*
- *Expansion potential through compatible reuse of acquired land*
- *State and local political support*
- *Low fares that stimulate air travel*
- *Strong regional work ethic*
- *Availability of Bowman Field as a reliever airport to accommodate non-commercial aviation*
- *Proactive stance for airfield/airspace management improvements*

Weaknesses

- *Physical constraints (bounded by interstates and a railroad)*
- *Noise impacts*
- *Workforce shortage, low unemployment rate*
- *Dependence on governmental financial support*
- *Lack of nonstop passenger flights – most destinations require a transfer through a hub airport*
- *\$120 million commitment to current noise mitigation limits funding for other projects*
- *Traffic congestion on regional access roadways*
- *Lack of non-stop international passenger travel destinations*
- *Terminal design, in terms of space available for concessions and public space*
- *Lack of mass transit*
- *Majority-in-interest (MII) provisions in the airline agreement require a high level of user cooperation and approvals*

Opportunities

- *Attraction of e-commerce-related businesses in conjunction with the air cargo hub*
- *Mass transit connection to the Airport*
- *Availability of daytime airfield capacity*
- *Synergy with military flight activities*
- *Reuse of noise acquisition areas for industrial development*
- *Air Traffic Control (ATC) technology implementation at the Airport*
- *Open skies agreements and international air cargo business*
- *Air service improvements, becoming a “focus city” for Southwest Airlines*
- *Improved level of service with increasing regional jet activity*
- *Future bridge connections to Indiana*
- *Continued prominence as an air cargo distribution hub in concert with the interstate system*
- *Diversification of Airport users*

- *Charter passenger service potential*

Threats

- *Goods-in-transit tax*
- *Airspace encroachment*
- *Air quality regulations which could restrict future development*
- *Competition from other Airports*
- *Adverse public perception resulting from noise*
- *Exceeding nighttime airspace capacity*
- *Dependence on one or two large airport users*
- *Lack of funding for capital improvements*

1.3 VISIONS FOR THE AIRPORT

Both the public workshop participants and the Technical Work Group were asked to envision the Airport 20 years in the future and describe what the Airport will have done to capitalize on its strengths, improve its weaknesses, take advantage of opportunities, and minimize threats. The following visions describe that desired future state.

Louisville International Airport accommodates projected growth.

The challenge of the future is to improve services and facilities for all customers of the Airport. Adequate airside and landside capacity should be provided to accommodate projected passenger and cargo demand.

The Airport is the first and last impression that many travelers will have of Louisville. Providing a positive travel experience requires an ongoing program of monitoring, planning, and coordination in order to exceed level-of-service expectations.

A changing economy, along with shifts in demographics and travel patterns, will present new challenges for the Airport. Not only is it expected that people will travel more often, but their needs and destinations will change as well. Planning for new or

expanded facilities at the Airport should be flexible to accommodate the changing needs of the air traveler.

Louisville International Airport is financially independent.

Through sound fiscal policy and increased revenue generation, the Airport has positioned itself to take advantage of financing mechanisms and minimized reliance on federal grants. This is achieved by providing facilities for a diverse group of aviation-related enterprises that need to be located at the Airport. Correspondingly, the Airport has decreased its reliance on federal funds and minimized its debt exposure.

Louisville International Airport is efficient.

Efficiency is a very broad vision for the Airport. From terminal design to airfield capacity, the Master Plan extensively analyzes efficiency. However, the Technical Work Group and participants of the workshop identified, as part of this vision, the need for the Airport to be efficient within the regional transportation system as well. Growing highway congestion will require additional capacity, including alternative modes of transportation, such as light rail. The Technical Work Group identified the goal of 1.5 million people able to travel from home to boarding an airplane within 45 minutes. Achieving such a goal will require the Airport to provide seamless links in order to fulfill the “efficiency” vision.

Louisville International Airport has a competitive advantage.

Competition for air service, both passenger and cargo, is intense, and several airports are within a one- to two-hour drive of Louisville. Key factors for continued expansion of air service are reasonable operating costs and gate availability, which are essential elements of low-cost airline service. The Master Plan Study will examine facilities to accommodate air service improvements, including international destinations and increased activity by regional jet aircraft.

Louisville International Airport is an economic catalyst.

The Airport has become the center of the effort to reinvent economic growth in Louisville. This effort envisions Louisville, and particularly the Airport, as the point in e-commerce where the electronic signal translates into the physical shipment of goods. Successful enterprises require the shortest possible time in transit between manufacturing, storage and distribution. As the virtual economy grows, the Airport must capitalize on the actual opportunities that accompany it.

Louisville International Airport has a strong link with the convention industry.

Louisville ranks high among cities in the U.S. in number of convention visitors. The Airport is adjacent to the Kentucky State Fair and Exposition Center with its convention facilities, and is a short drive to downtown Louisville's recently expanded convention facilities. Also, the light rail proposals under consideration would provide a physical link between the Airport and convention facilities. This vision seeks a strengthening of the Airport-convention link by a mutually beneficial partnership to meet both the air travel and tourism needs of convention visitors.

Louisville International Airport balances expansion needs with environmental concerns.

The need for Airport expansion must be balanced with a concern for the potential impact on the human and natural environment. Compatible land use and environmental impact mitigation were frequently cited visions from the public workshop. The Master Plan's careful consideration of environmental impacts, in balance with any future need for expansion, results in a plan that minimizes environmental impacts while accommodating future aviation needs. The Master Plan's focus on environmental concerns during the identification and evaluation of alternatives places the Airport in a proactive stance, minimizing negative impacts and facilitating the development process.

Louisville International Airport provides opportunities for noise-compatible land development.

Through its aggressive noise mitigation program, the Airport has significantly reduced the number of houses and population within the 65 DNL noise contours. Much of the property acquired as part of the ongoing noise program will be reused as compatible land uses, which will further reduce noise impacts and support economic development.

Louisville International Airport protects its airspace.

Protecting the approaches of the Airport's runways from encroachment by tall structures and incompatible development is essential for the safety of airport operations. Airfield improvements evaluated in the Master Plan should consider the continued safety of existing approaches and the safety of any future or modified approaches. The proximity of Fort Knox to the Airport (11 miles between the Airport and the restricted airspace around Fort Knox) dictates that any changes to the airspace configuration of either facility will impact the other. Therefore, coordination will ensure compatibility between Fort Knox airspace requirements and Louisville International Airport airspace requirements. The interaction of these two aviation facilities should be carefully considered in all analyses.

Beyond the Master Plan, the RAA should continue its coordination with federal and state authorities to ensure that further encroachment of the Airport's airspace does not occur and that the airspace of any future runway improvements is protected. Also, proposed telecommunications tower regulations conflict with terminal airspace requirements around many U.S. airports, and Louisville is no exception. This vision prevents such encroachments through land use controls and coordination with federal agencies responsible for telecommunications regulations.

Louisville International Airport takes advantage of technology enhancements.

The Airport has been in an enviable position due to the latest air traffic control and management technologies being implemented by the FAA and UPS. These advancements improve operational efficiency and can lead to increased airspace capacity. It is in the best interest of the airlines, the FAA, and the RAA to maintain the Airport's position at the cutting edge of such technologies.

The RAA recognizes the importance of the “Airport System.”

The concentration of general aviation activity at Bowman Field provides capacity for passenger, cargo, and commercial general aviation at Louisville International Airport. Both airports must work in concert to mutually serve target user groups.

* * * * *

The visions established for Louisville International Airport provide a foundation for identifying alternatives for future aviation development and will guide the evaluation process that ultimately leads to the recommended plan. The next chapter examines existing facilities at the Airport and provides the framework for the Master Plan's analyses.

2.0 INVENTORY OF EXISTING CONDITIONS

Louisville International Airport (the Airport) is best known as being the primary air cargo hub for United Parcel Service (UPS). With 17 passenger airlines, the 123rd Wing of the Kentucky Air National Guard, and commercial general aviation, the Airport serves many facets of the Kentuckiana region's air transportation demands.

In 1999, the Airport handled approximately 1.8 million enplaned passengers, 1.5 million tons of air cargo, and 175,000 aircraft operations.

In order to establish a baseline for the Master Plan Study, an inventory was conducted through a review of Airport records, field interviews, telephone discussions, and an analysis of existing reports and studies. This information will be used throughout the Master Plan as the need for future aviation facilities is determined and alternative locations for those facilities are examined. The inventory is presented in the following sections:

- *Airport History*
- *Airport Profile*
- *Airport Activity*
- *Airport Facilities*
- *Airport Environs*
- *Socioeconomic Setting*

Due to the dynamic nature of the Airport, a "snapshot" of the facilities as they existed in February, 2000, is used and those facilities that were under construction at that time are identified.

2.1 AIRPORT HISTORY

Aviation in Louisville dates to 1919 when a local businessman A.H. Bowman leased 50 acres of land and formed a partnership with R.H. Gast to provide aviation services. In 1928, Bowman Field was placed in the hands of the newly formed

Louisville and Jefferson County Air Board (L&JCAB), which later became the Regional Airport Authority (RAA) of Louisville and Jefferson County. A \$750,000 bond issue was used to purchase Bowman Field, and a year later a predecessor to American Airlines began passenger service. In 1934, Eastern Airlines began passenger service to Louisville and was followed by TWA, which began service in 1947.

In 1947 airline operations were moved to the much larger Standiford Field, which included a 4,000 feet north/south runway that was constructed by the U.S. Army Corps of Engineers and included facilities used for the manufacture and conversion of military aircraft during World War II. The airfield was named for Elisha D. Standiford, a former U.S. Congressman and president of L&N Railroad, who at one time owned a portion of the airport property. Lee Terminal was named for Addison Lee, Jr., Airport Authority Chairman from 1929 to 1949, and was built by the L&JCAB at a cost of \$1 million. The first terminal was opened in May of 1950 with 16 major expansions between 1950 and 1980. The landside terminal opened in June 1985 and connected landside services to the existing Lee Terminal. The latest passenger terminal configuration, an 18-gate facility, became operational in April of 1989 at a cost of \$35 million.

The future of Standiford Field changed dramatically when in 1981, UPS initiated a new overnight package delivery business with hub operations at a UPS-owned site located on the south side of the airfield. UPS has access to the runway system under an access agreement with the RAA. UPS initially constructed a 35-acre aircraft parking apron and employed 135 people. Today, Louisville International Airport is the 5th largest air cargo airport in the U.S., and eighth largest in the world, in terms of air cargo handled. UPS has become Kentucky's largest private-sector employer. UPS estimates that after the completion of the on-going \$1 billion construction program in 2002, the company will employ 14,000 people at the Airport and an additional 8,000 in the City of Louisville.

To accommodate UPS's peak period aircraft arrival and departure demand, the RAA announced an ambitious expansion plan in 1988 which called for the construction

of two new north-south parallel runways. The airfield expansion program was completed in 1998 and the two new parallel north-south runways have lengths of 10,000 feet and 8,580 feet. Only one of the previous airfield's runways, the 7,250-ft. crosswind runway, Runway 11/29, was retained in the new runway system.

The runway development program also required the relocation of the Kentucky Air National Guard (KyANG) base, United States Postal Service (USPS) air mail facility, corporate hangars, Fixed Base Operator (FBO) terminal and hangars, rental car facilities, RAA maintenance facility, and FAA Air Traffic Control Tower.

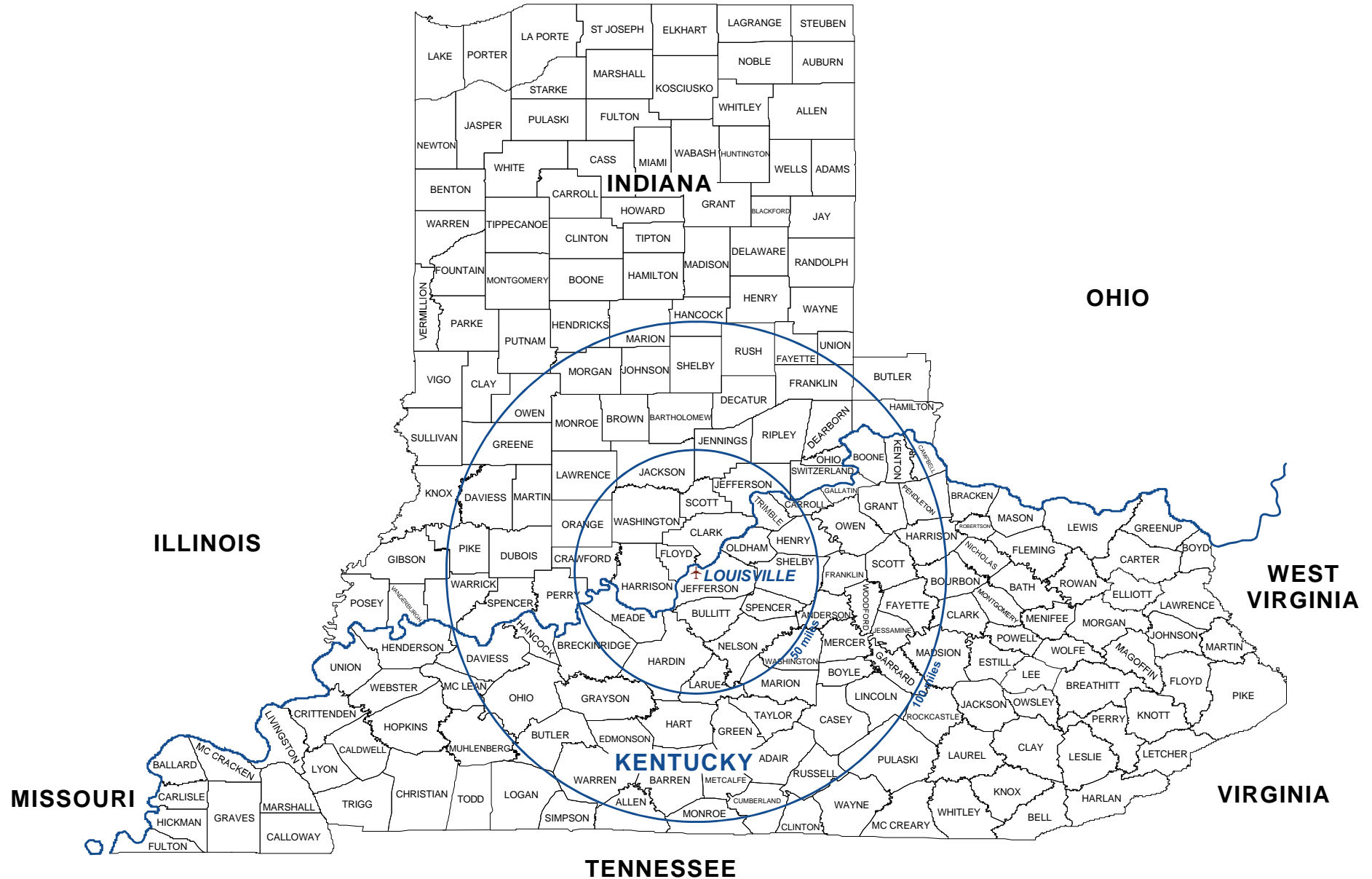
Increased passenger activity, which includes international passenger flights combined with development of the UPS international air cargo hubbing complex, prompted the RAA in 1995 to expand the name to Louisville International Airport at Standiford Field. The three-letter identifier remains SDF.

2.2 AIRPORT PROFILE

Louisville International Airport serves the primary commercial air transportation requirements of Louisville, the central portions of Kentucky and southern Indiana. As shown in **Exhibit 2.2-1**, the Airport is located partially within the city limits of Louisville and entirely within Jefferson County. It is approximately four miles south of downtown Louisville.

The Airport encompasses approximately 1,200 acres of relatively flat land within a built-up urban environment. The official elevation of the Airport, based on the highest runway elevation point, is 500 feet above mean sea level (MSL).

The Airport is bounded on the north by I-264 (Watterson Expressway), which provides the major ground transportation link between the Airport and metropolitan Louisville. On the east, the Airport is bounded by I-65; to the south, the Airport is bounded by UPS and the Ford Motor Company plant, with the main south airfield



Louisville International Airport Master Plan Update

LOCATION MAP

EXHIBIT

2.2-1

access via Ky. Highway 1631 (Fern Valley Road); and to the west, the Airport is bounded by Crittenden Drive and the CSX railroad line and yard. **Exhibit 2.2-2** depicts the Airport's setting within the regional roadway network.

The RAA Board of Directors consists of 11 voting members appointed by the Mayor of Louisville, the Jefferson County Judge Executive and the Governor of Kentucky. The General Manager of the Airport supervises the staff of approximately 175 employees who implement the RAA's policies and conduct the day-to-day operations and maintenance of both Louisville International and Bowman Field.

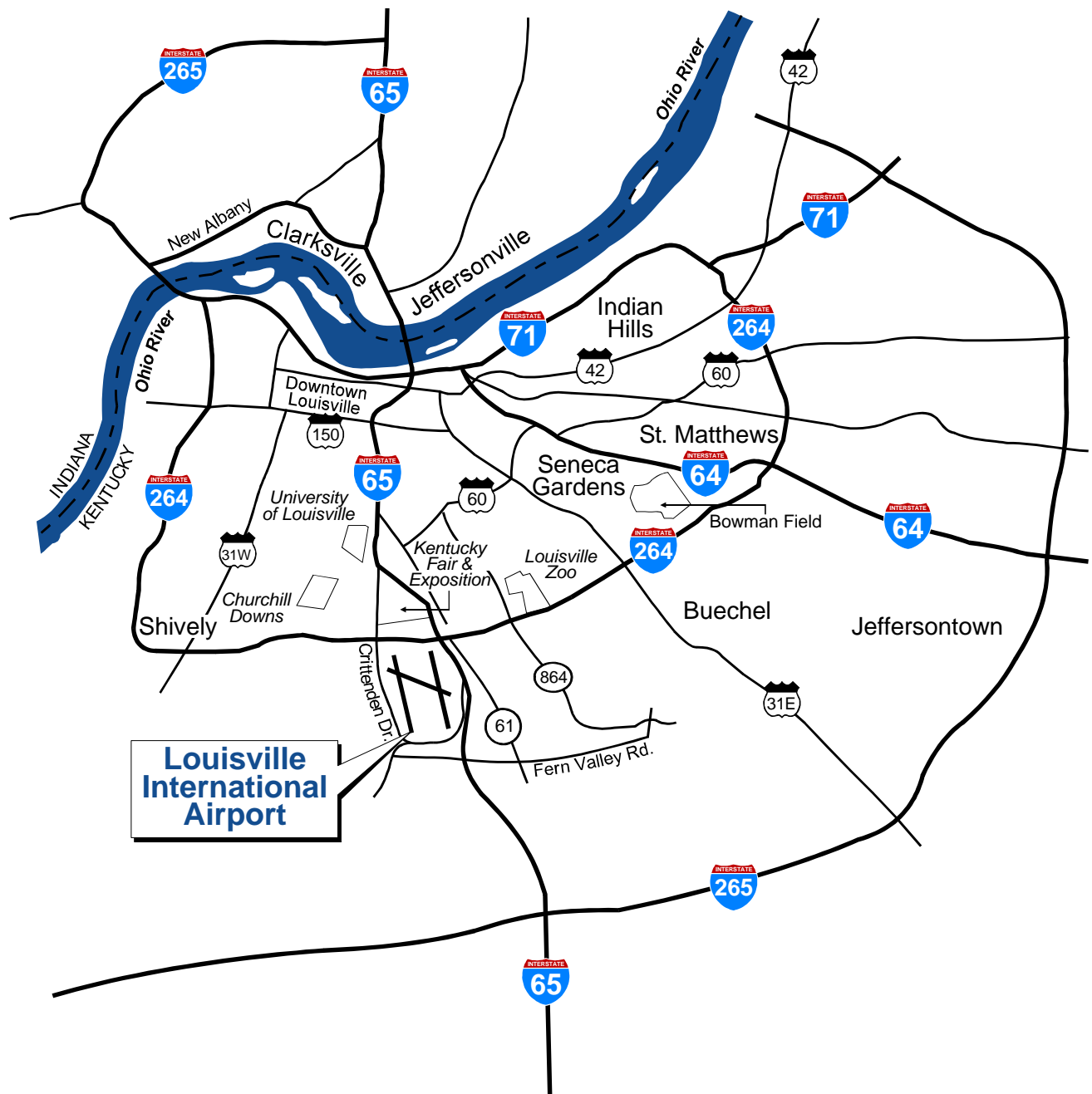
2.3 AIRPORT ACTIVITY

Louisville International Airport averages 90 scheduled passenger flights per day and is served by 18 major/national and regional/commuter airlines. These include Air Canada, AirTran, American, Atlantic Southeast Airlines (ASA, Delta Connection), COMAIR (Delta Connection), Continental, Continental Express, Delta, Delta Express, Midway, Northwest, Northwest AirlinK/Mesaba, Skyway (Midwest Express), Southwest, TWA, United Express, US Airways, and US Airways Express. UPS has approximately 115 flights per day in the operation of its primary package sort facility at the Airport.

A summary of key airport activity indicators is provided in **Table 2.3-1**. Between 1989 and 1998, passenger enplanements increased from approximately 1.0 million to 1.8 million, representing an average annual growth rate of 9.3 percent. Air cargo tonnage increased during this time period, from approximately 771,000 (short) tons in 1989 to 1.5 million tons in 1998, representing an average annual growth rate of 10.5 percent.

2.4 AIRPORT FACILITIES

The Airport's existing facilities were identified and documented in the inventory in order to form a database for the airfield, terminal, air cargo, airport support, general



0 1 2
Scale in Nautical Miles



**Louisville International Airport
Master Plan Update**

VICINITY MAP

**EXHIBIT
2.2-2**

TABLE 2.3-1

Louisville International Airport

HISTORICAL ACTIVITY

Year	Freight and mail			Passenger Enplanements			Aircraft Operations					
	Enplaned	Deplaned	Total	Air Carrier	Regional Carrier	Charter	Airport Total	Air Cargo	Passenger	General Aviation	Military	Total
1989	405,328	365,359	770,687	914,433	87,520	-	1,001,953	40,884	65,678	39,926	4,605	151,093
1990	432,371	412,178	844,548	943,659	98,125	-	1,041,784	43,382	65,872	45,443	5,112	159,809
1991	429,739	404,341	834,080	891,117	110,661	1,892	1,003,670	44,448	69,370	39,917	5,123	158,858
1992	434,731	409,192	843,923	915,591	118,936	380	1,034,907	47,626	62,005	37,224	6,265	153,120
1993	469,840	443,457	913,297	1,067,981	134,068	-	1,202,049	52,160	65,571	38,532	5,108	161,371
1994	827,945	791,689	1,619,633	1,524,876	120,912	-	1,645,788	54,812	85,589	39,119	5,133	184,653
1995	760,869	728,725	1,489,594	1,675,756	84,244	68	1,760,068	53,964	83,661	32,374	4,424	174,423
1996	772,820	736,021	1,508,841	1,681,771	93,139	1,760	1,776,670	54,978	80,851	35,029	4,428	175,286
1997	749,471	734,203	1,483,674	1,726,442	101,444	4,757	1,832,643	53,608	86,670	33,105	4,240	177,623
1998	784,809	753,228	1,538,037	1,678,652	150,203	15,645	1,844,500	55,444	81,951	29,991	4,617	172,003

Source: Louisville International Airport Noise Compatibility Study, Airport Activity Forecasts Technical Report

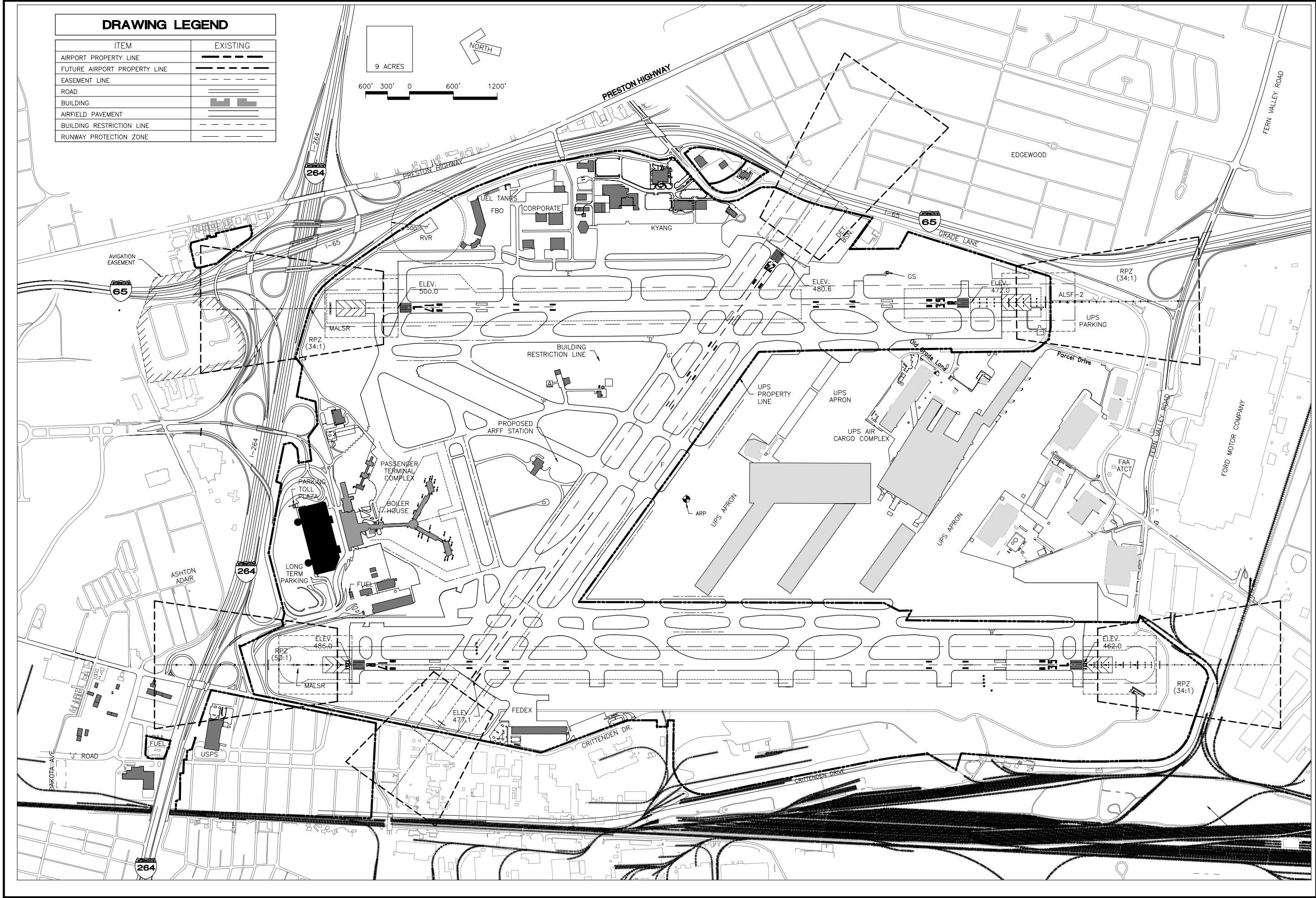
aviation and military components of the Master Plan Update. Due to the size and complexity of the Airport's facilities, the inventory effort distinguishes between airside facilities directly related to the landing and takeoff of aircraft and landside facilities, which are classified by their function (e.g., passenger terminal, air cargo, and support).

The Airport's facilities with all existing and planned structures that are under engineering design as of February 2000 are shown in **Exhibit 2.4-1**. The Federal Express air cargo facility became operational February 16, 2000; the UPS sorting facility and apron expansion became operational in 2002; and the new hotel is scheduled to become operational in 2003. Each of the major airport structures that are on the RAA and UPS properties are labeled on **Exhibit 2.4-2** and the profiles of their functional use, tenant and building area are shown in **Exhibit 2.4-3**.

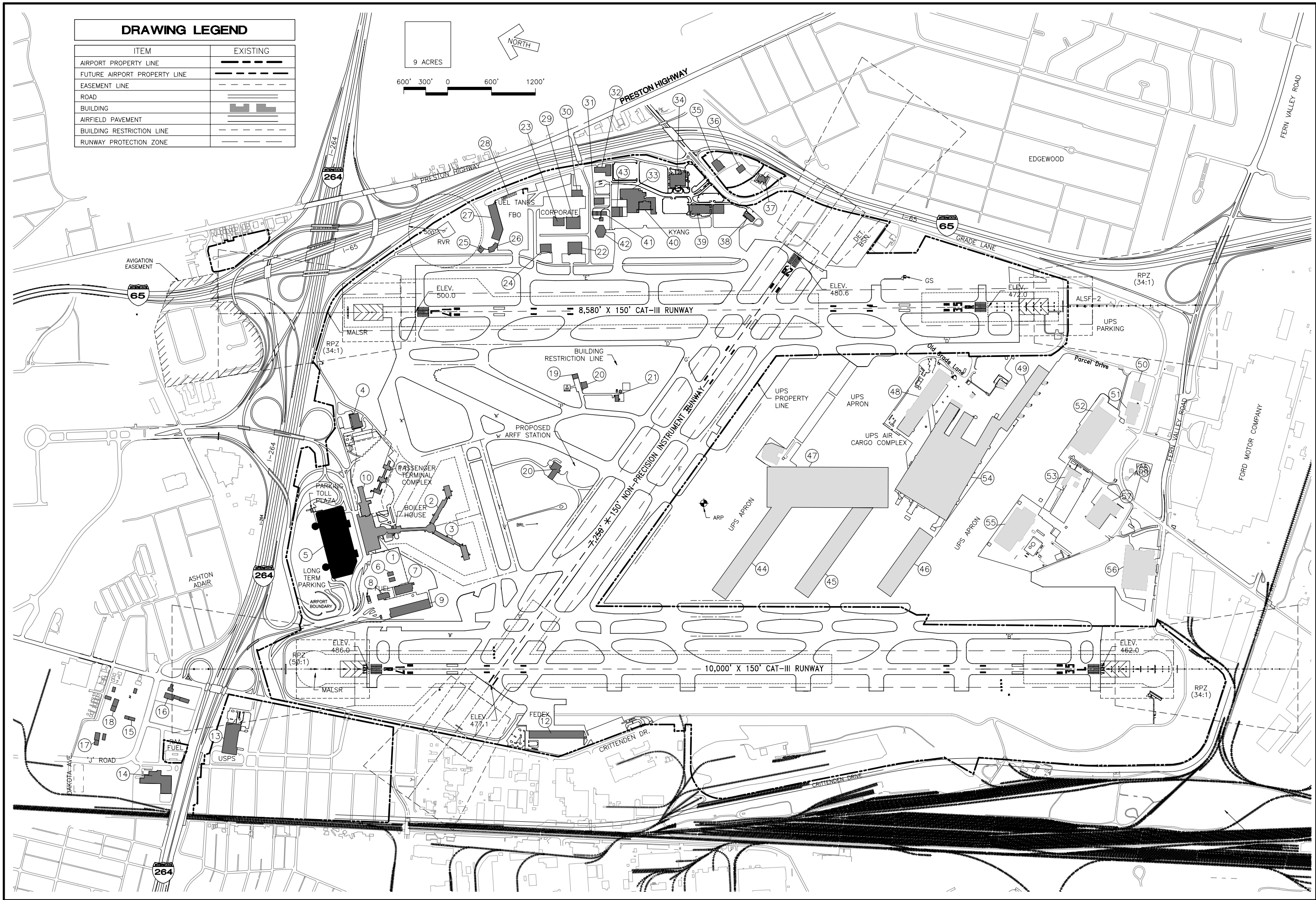
The more significant airport ground leases of Airport property are also shown in **Exhibit 2.4-4**. Profiles of the ground leases describing the land area and type of lease for each major Airport tenant are presented in **Exhibit 2.4-5**. (The numerous FAA NAVAID leases, other minor ground leases, and ground access easements have not been depicted.)

2.4.1 Airfield

The Airport's airside facilities include runways, taxiways and aprons, and continue to change. The development of additional parallel taxiways, holding aprons, deicing aprons and engine run-up pad are being planned as part of the ongoing facilities improvement program. The passenger terminal apron is changing to accommodate a proposed airport hotel and the reuse of a portion of the Delta concourse as a U.S. Customs facility.



DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	---
FUTURE AIRPORT PROPERTY LINE	---
EASEMENT LINE	---
ROAD	---
BUILDING	---
AIRFIELD PAVEMENT	---
BUILDING RESTRICTION LINE	---
RUNWAY PROTECTION ZONE	---

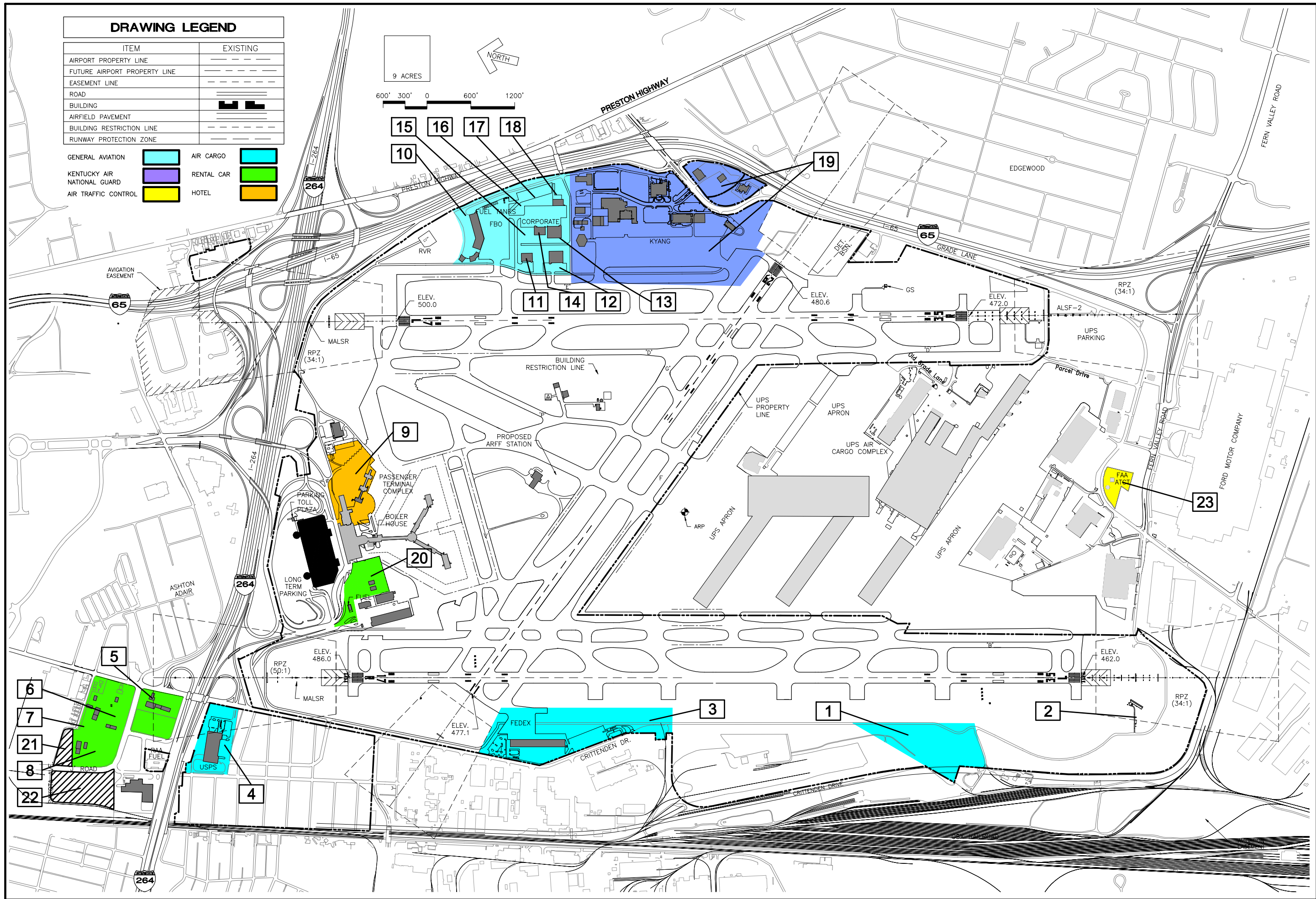


DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	---
FUTURE AIRPORT PROPERTY LINE	---
EASEMENT LINE	---
ROAD	---
BUILDING	■
AIRFIELD PAVEMENT	---
BUILDING RESTRICTION LINE	---
RUNWAY PROTECTION ZONE	---

EXISTING FACILITY LEGEND						
FACILITY No.	FACILITY DESCRIPTION	BUILDING AREA (S.F.)	EXTERIOR CONSTRUCTION	TOP ELEVATION (ESTIMATE)(MSL)	APRON AREA (SQUARE YARDS)	REMARKS
1	LANDSIDE AIR CARRIER TERMINAL	185,485	METAL/GLASS	520	---	172,000 SF OF LEASEABLE SPACE
2	AIRSIDE CONCOURSE A	79,594	CONCRETE TILT-UP PANELS	510	121,000	11 AIRCRAFT GATES, 86,101 SF/LEASEABLE SPACE
3	AIRSIDE CONCOURSE B	79,594	CONCRETE TILT-UP PANELS	510	121,000	9 AIRCRAFT GATES, 86,101 SF/LEASEABLE SPACE
4	RAA OFFICES	22,000	BRICK/GLASS	---	---	---
5	PARKING STRUCTURE	1,520,000	CONCRETE/GLASS	520	---	1,442 GRADE LEVEL SPACES (4 LEVEL GARAGE)
6	RAC FUEL STORAGE/CAR WASH	1,000	METAL SIDING	500	---	20,000 GALS
7	GSE SERVICES	30,000	METAL SIDING	505	---	AA, AV SR, DELTA, FEDEX, SW, USA - 11 BAYS
8	CATERING KITCHEN	13,600	METAL SIDING	505	---	
9	AIR CARGO BUILDING	74,100	METAL SIDING	500	13,000	DELTA, MURPHY, SW, SURF, TYME (23 BAYS)
10	MARRIOTT HOTEL (PROPOSED)	110,000	STONE/GLASS	530	---	---
11	U.S. CUSTOMS GATES (PROPOSED)	16,500	BRICK/GLASS	510	---	2 AIRCRAFT GATES
12	FEDERAL EXPRESS SORTING BLDG.	82,500	METAL SIDING	510	17,000	OPERATIONAL FEBRUARY 16, 2000
13	U.S.P.S.	90,000	METAL SIDING	520	---	---
14	RAA MAINTENANCE FACILITY	76,500	METAL SIDING	500	---	---
15	NATIONAL REMOTE SERVICE CENTER	8,500	METAL SIDING	495	76,000	---
16	BUDGET REMOTE SERVICE CENTER	20,000	METAL SIDING	495	---	---
17	AVIS REMOTE SERVICE CENTER	12,500	METAL SIDING	495	---	---
18	HERTZ REMOTE SERVICE CENTER	14,000	METAL SIDING	495	---	---
19	KyANG ENGINE TEST FACILITY	1,000	METAL SIDING	500	---	---
20	RAA ARFF	10,000	METAL SIDING	510	---	---
21	AIRFIELD ELECTRICAL VAULT	4,000	METAL SIDING	500	---	---
22	CORPORATE HANGAR	40,000	METAL SIDING	520	6,000	HUMANA, INC.
23	CORPORATE HANGAR	18,000	METAL SIDING	520	6,000	VACANT
24	CORPORATE HANGAR	18,000	METAL SIDING	520	6,000	VACANT
25	FBO EQUIPMENT MAINT.	10,000	METAL SIDING	525	---	---
26	F.B.O. TERMINAL	20,000	METAL SIDING	525	---	---
27	F.B.O. HANGAR	70,000	METAL SIDING	530	35,500	---
	F.B.O. FUEL FARM	10,000		520	---	96,000 GAL JET, 12,000 GAL AG,
28			METAL SIDING			5,000 GAL D, 5,000 GAL MO GAS
29	CORPORATE HANGAR	30,000	METAL SIDING	520	6,000	LCC
30	CORPORATE HANGAR	15,000	METAL SIDING	520	6,000	KFC NATIONAL MANAGEMENT CO.
31	KyANG MOTOR POOL (600)	14,400	METAL SIDING	490	---	---
32	KyANG BASE ENGINEERING (700)	20,300	BRICK/GLASS	490	---	---

SOURCE: RAA AIRPORT PROPERTY RECORDS - FEBRUARY 2000

EXISTING FACILITY LEGEND						
FACILITY No.	FACILITY DESCRIPTION	BUILDING AREA (S.F.)	EXTERIOR CONSTRUCTION	TOP ELEVATION (ESTIMATE)(MSL)	APRON AREA (SQUARE YARDS)	REMARKS
33	KyANG RESOURCES FACILITY (500)	80,000	BRICK/GLASS	490	----	----
34	KyANG HEADQUARTERS (100)	35,200	BRICK/GLASS	510	----	----
35	KyANG (800)	16,000	BRICK	520	----	----
36	KyANG FATS (810)	8,000	BRICK/GLASS	500	----	----
37	CITY OF LOUISVILLE FIRE STATION	13,000	BRICK	500	----	OFF AIRPORT PROPERTY
38	KyANG ARFF (200)	10,200	BRICK/GLASS	510	----	----
39	KyANG SQUADRON OPERATIONS (400)	22,000	BRICK/GLASS	490	76,000	10 C-130 PARKING POSITIONS
40	KyANG MAINTENANCE HANGAR (500)	18,700	METAL SIDING	520	----	----
41	KyANG MOTOR POOL (610)(530)	4,500	METAL SIDING	490	----	----
42	KyANG PORTABLE HANGAR (520)	18,000	CLOTH	520	----	----
43	KyANG CORROSION CONTROL HANGAR (510)	23,800	METAL SIDING	520	----	----
44	UPS CARGO WING 3	375,000	METAL SIDING	510	----	----
45	UPS CARGO WING 2	375,000	METAL SIDING	510	----	----
47	UPS CARGO WING 1	250,000	METAL SIDING	510	----	----
48	UPS CARGO SORTING WING	200,000	METAL SIDING	510	17,000	----
46	UPS CARGO SORTING WING	180,000	METAL SIDING	510	----	----
49	UPS CARGO SORTING FACILITY	935,000	METAL SIDING	530	----	----
50	UPS WAREHOUSE	37,500	METAL SIDING	510	----	----
51	UPS WAREHOUSE	50,000	METAL SIDING	500	6,000	----
52	UPS MAINTENANCE HANGAR	227,500	METAL SIDING	555	35,500	----
53	SALVAGE YARD	30,000	METAL SIDING	490	----	BEING ACQUIRED BY UPS
54	UPS CARGO SORTING FACILITY	1,100,000	METAL SIDING	510	13,000	----
55	UPS PERSONNEL TRAINING	195,000	METAL SIDING	490	----	----
56	UPS WAREHOUSE	220,000	METAL SIDING	500	----	----
57	UPS WAREHOUSE	112,500	METAL SIDING	500	----	----
58	FAA-ATCT	15,000	CONCRETE	740	----	----



LAND LEASE LEGEND						
LAND LEASE No.	LEASSEE	GROUND LEASE TYPE	LAND AREA (+OPTIONS)	COMMENCEMENT DATE	TERMINATION DATE	REMARKS
1	UNITED PARCEL SERVICE	CONSTRUCTION SUPPORT	16.45 AC.	05/02/84	07/31/99	
2	UNITED PARCEL SERVICE	WEIR FACILITY	1.46 AC.	07/01/97	---	
3	FEDERAL EXPRESS	AIR CARGO	24.8 AC.	---	---	
4	U.S. POSTAL SERVICE	AIR MAIL	10.0 AC.	03/01/95	12/04/25	
5	BUDGET CAR & TRUCK RENTAL	REMOTE SERVICE CENTER	152,460 sf	06/01/97	08/31/15	
6	AVIS RENT-A-CAR	REMOTE SERVICE CENTER	196,891 sf	12/11/96	08/31/15	
7	THE HERTZ CORPORATION	REMOTE SERVICE CENTER	172,062 sf	11/13/96	08/31/15	
8	NATIONAL CAR RENTAL SYSTEM	REMOTE SERVICE CENTER	152,460 sf	08/14/96	08/31/15	
9	MARRIOTT HOTEL (PROPOSED)	AIRPORT HOTEL	6 AC.	---	---	
10	AMERICAN PORT SERVICES	FBO & FUEL FARM	5.5 AC.	04/01/96	03/31/01	
11	VACANT	CORPORATE HANGAR	3.78 AC.	---	---	
12	HUMANA, INC.	CORPORATE HANGAR	174,236 sf	11/01/96	03/31/17	
13	CORPORATE HANGAR (NTS)	CORPORATE HANGAR	83,032 sf	10/18/95	02/28/15	
14	ANDALEX RESOURCES	CORPORATE HANGAR	66,454 sf	12/12/95	02/28/15	
15	VACANT	CORPORATE HANGAR	2.0 AC.	---	---	
16	VACANT	CORPORATE HANGAR	2.0 AC.	---	---	
17	VACANT	CORPORATE HANGAR	2.0 AC.	---	---	
18	KFC NATIONAL MANAGEMENT COMPANY	CORPORATE HANGAR	65,105 sf	03/25/96	03/24/15	
19	KENTUCKY AIR NATIONAL GUARD	MILITARY BASE	81.4 AC.	04/01/56	08/01/46	LEASE NO. Da-15-029-ENG-3642
20	QTA COMMON FACILITIES	RENTAL CAR RETURN	6.9 AC.	09/01/95	08/31/00	ALAMO, AVIS, BUDGET, DOLLAR, HERTZ, NATIONAL, THIRTY (467 SPS)
21	N/A	RAA STORAGE AREA	1.82 AC.	---	---	
22	VACANT	VACANT LOT (GRASS)	7.0 AC.	---	---	
23	FEDERAL AVIATION ADMIN.	AIR TRAFFIC CONTROL TOWER	1.6 AC.	10/01/95	09/30/35	DTFA-06-95-L-13557(AUTO RENEWAL) PROPERTY OWNED BY UPS, LEASED TO RAA, THEN LEASED TO FAA
24	FEDERAL AVIATION ADMIN.	MASTER FACILITY LEASE	-	-	-	NOT DEPICTED



2.4.1.1 Runways

Table 2.4-1 presents a profile of the runway system. The Airport currently has three runways. The single crosswind runway, Runway 11/29, is oriented northwest/southeast. The new parallel north/south runways, 17R/35L and 17L/35R, are separated by approximately 4,900 feet and have full Instrument Landing System (ILS) capability. Under normal weather conditions the runway system can accommodate typical international stage lengths to Europe and South America. All three runways have sufficient length and pavement strength to accommodate Class V (i.e., B-747) air carrier aircraft. The new parallel runways, Runway 17R/35L and Runway 17L/35R, have lengths of 10,000 feet and 8,580 feet, respectively. The crosswind Runway 11/29 has a length of 7,250 feet. All three runways are 150 feet wide.

For effective runway length takeoff requirements, Runway 17L has a paved overrun of 330 feet and Runway 35R has a paved overrun of 450 feet. None of the six Runway Protection Zones (RPZs) are totally on Airport property.

Runway utilization is determined by wind velocity and direction. When winds are not a factor, noise abatement policies establish preferred runway usage. Based on data collected during the Part 150 Noise Compatibility Study, daytime runway usage is approximately 16.21 percent north flow, 83.22 percent south flow, and 0.57 percent west flow.

When the new north/south runways became operational, a noise-abatement air traffic control program was instituted, calling for contra-flow operations during the night hours. Preference will be given to landings from the south on Runways 35R and 35L and departures to the south on Runways 17R and 17L. At night, contraflow is used approximately 78.26 percent of the time followed by south flow (12.47 percent), north flow (9.25 percent) and west flow (0.02 percent).

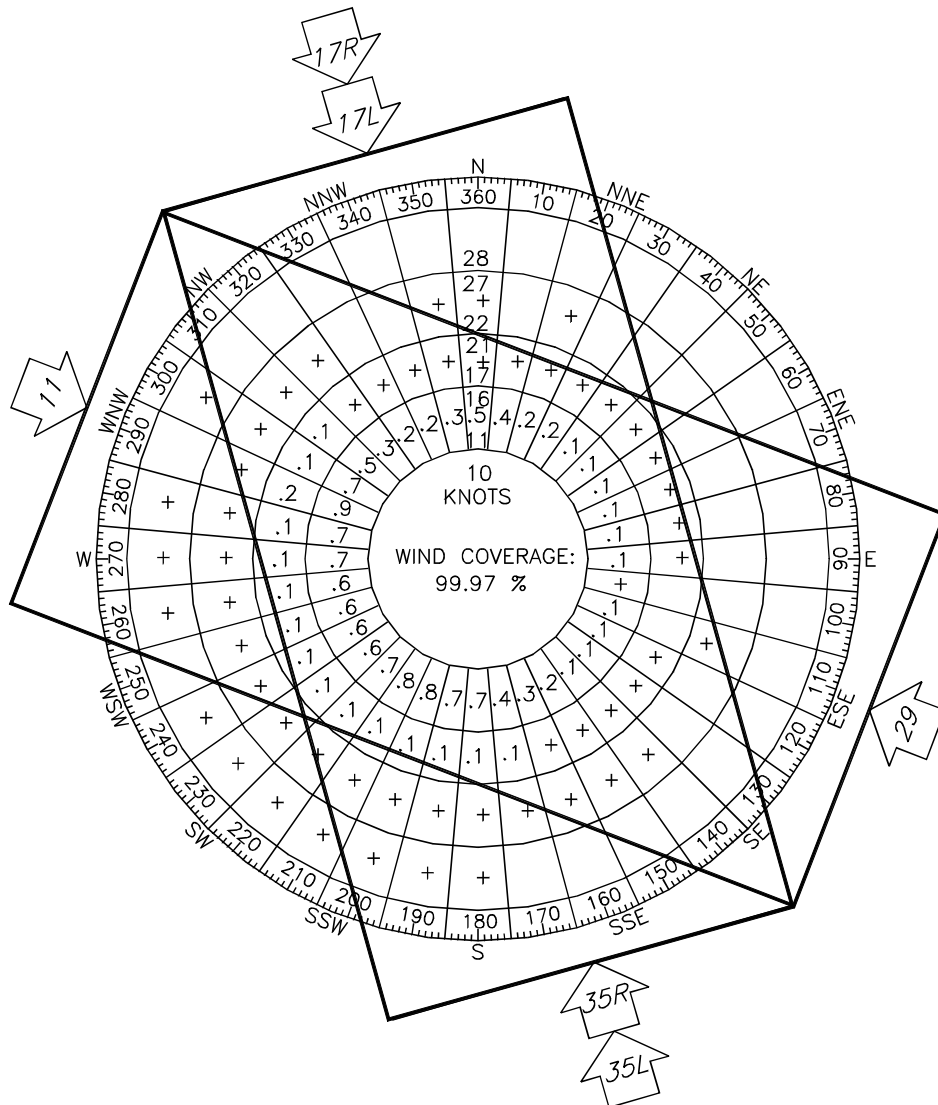
Exhibit 2.4-6 depicts the most recent 10-year annual wind summary for the Airport. The Airport's existing runway configuration provides 96.76 percent coverage with a 10-knot crosswind and 99.97 percent coverage with a 20-knot crosswind. This wind information will form the basis for analyzing future runway orientations in conjunction with future runway utilizations and airfield system development needs.

2.4.1.2 Taxiways

There are approximately 62,000 linear feet of existing taxiways. All three runways have parallel taxiways, with Runway 17R/35L having a

TABLE 2.4-1 Louisville International Airport EXISTING RUNWAY DATA						
Item	11	29	17R	35L	17L	35R
Runway Length	7,250'	7,250'	10,000'	10,000'	8,580'	8,580'
Paved Overruns	-	-	-	-	330'	450'
Declared Distances	-	-	-	-	-	-
Takeoff Run Available (TORA)	-	-	-	-	8,580'	8,580'
Takeoff Distance Available (TODA)	-	-	-	-	8,580'	8,580'
Accelerate Stop Distance Available (ASDA)	-	-	-	-	8,130'	8,250'
Landing Distance Available	-	-	-	-	7,800'	7,800'
Runway Width	150'	150'	150'	150'	150'	150'
Unobstructed Approach Ratio	21:1	50:1	50:1	34:1	34:1	34:1
Pavement Strength (x 1000 lbs)	SW 75	SW 75	SW 75	SW 75	SW 75	SW 75
	DW 170	DW 170	DW 207	DW 207	DW 207	DW 207
	DTW 360	DTW 360	DTW 360	DTW 360	DTW 360	DTW 360
	DDTW 850	DDTW 850	DDTW 850	DDTW 850	DDTW 850	DDTW 850
Approach/Design Category	Non-Precision/D-V	Non-Precision/D-V	CAT I ILS/D-V	CAT III ILS/D-V	CAT I ILS/D-V	CAT III ILS/D-V
Azimuth/Elevation	113.9°/477.1	293.9°/480.6	168.2°/486.0	348.2°/462.0	167.7°/500.0	347.7°/472.0
Surface Composition	Concrete	Concrete	Concrete (grooved)	Concrete (grooved)	Concrete (grooved)	Concrete (grooved)
Runway Lighting	HIRL, REIL	HIRL, MALSR, LOC	HIRL, CL, TDZ	HIRL, CL, TDZ	HIRL, CL, TDZ	HIRL, CL, TDZ
NAVAIDS	-	NDB, VOR, LOC	ALSF, P4L	MALSR, P4R	MALSR, P4L	ALSF-2, P4R
All Weather Wind Coverage (10 knots)	-	-	GS, LOC, RVR	GS, LOC, RVR	GS, LOC, RVR	GS, LOC, RVR
	90.32%	91.60%	91.59%	91.60%	91.59%	91.59%

Source: Regional Airport Authority Records
FAA 5010 Forms



ALL WEATHER WIND ROSE - WIND COVERAGE

<u>RUNWAY</u>	<u>10 KNOTS</u>	<u>13 KNOTS</u>	<u>20 KNOTS</u>
17L/35R	91.59%	96.24%	99.77%
17R/35L	91.60%	96.24%	99.77%
11/29	90.32%	95.38%	99.73%
Combined Runways	96.76%	99.12%	99.97%

Source: National Climatic Data Center
Federal Building, Asheville, NC

Weather Station No.: 93821

Station Location: Standiford Field, Louisville, KY

Data Period: May 1989 to April 1999

Wind Observations Recorded 24 Hours a Day

Total Annual Observations: 87,358

Note: Refer to FAA Advisory Circular 150/5300-13, Change 5 *Airport Design* for a Detailed Discussion of Windrose Terminology (Appendix 1).



**Louisville International Airport
Master Plan Update**

WIND DATA

EXHIBIT

2.4-6

partial, dual, parallel taxiway. Parallel taxiways are planned on the outside of the runway system.

All airfield taxiways, with the exception of the passenger terminal apron, are designed for Class V (B-747) aircraft. The terminal apron area taxilanes are designed for Class IV (B-767) aircraft.

With the development of the new air traffic control tower (tower cab floor at 240 feet above ground level (AGL) and total tower height of 276 feet AGL), nearly all of the airfield and terminal area aircraft operating areas are visible from the control tower. The construction of Wing 3 of the new UPS air cargo building blocks ATC's view of a 2,600 linear foot section of the west portion of Taxiway G.

The Airport has an approved Surface Movement Guidance and Control System (SMGCS) Plan in place that outlines procedures for operations of aircraft and vehicles during low visibility conditions. The SMGCS Plan prescribes airfield lighting and marking requirements and taxi routes for low visibility operations. As operational needs and technologies evolve, the SMGCS Plan is updated and resubmitted for approval.

2.4.1.3 Aprons

The Airport's passenger terminal apron area consists of approximately 50 acres of concrete, and the UPS apron consists of approximately 243 acres of concrete.

At this time all deicing activities at the passenger terminal occur at the aircraft gates, and no runway end deicing stations exist.

Other apron areas include the eight-acre FBO apron, the 16-acre KyANG apron, the four-acre Federal Express apron, and the four-acre corporate hangar apron.

2.4.1.4 Lighting and NAVAIDs

Lighting and NAVAIDs for each of the six runway ends are listed in Table 2.4.1. Currently, each runway has high intensity runway lighting (HIRL) and the two parallel runways have touchdown zone (TDZ) and centerline (CL) lighting. In addition, all three runways are equipped with fixed distance markers.

A VHF Omni-Directional Range/Tactical Air navigation (VORTAC) facility, the Louisville VORTAC, is located nine miles southeast of the Airport. The VORTAC emits very high frequency navigational signals and

provides suitably equipped aircraft a continuous indication of the aircraft's bearing and distance.

All four approaches to the north/south parallel runways are equipped with Instrument Landing Systems (ILS) which consist of a glide slope (GS), a localizer (LOC) unit with distance measuring equipment (DME), and an approach lighting system. Runway 35R and 35L are certified for Category III operations, which allow landings with cloud ceilings as low as zero feet. Runway approaches to 17R and 17L are certified for Category I approaches, which allow a decision height of 200 feet. Runway 29 is equipped with a non-precision LOC approach, and Runway 11 has only visual approach capability. For airspace obstruction control purposes, Runways 17R and 29 have 50:1 approach slopes, and Runways 17R, 35L and 35R have 34:1 approach slopes. The approach to Runway 11 is protected with a 34:1 non-precision approach surface.

2.4.2 Airspace

There are three major components of the airspace system which encompasses the Airport: enroute, terminal, and local airport control. Each component has a specific function and is supported in its role by a network of air traffic control facilities and NAVAIDs.

2.4.2.1 Enroute Control

Air traffic control for aircraft enroute to the Louisville area is the responsibility of the Indianapolis Air Route Traffic Control Center (ARTCC). Aircraft flying through the region or to an airport in the area typically follow designated routes known as victor airways, or jet routes. These airways are delineated on the ground by a system of radio equipment called VORs (VHF Omni-Directional Range equipment).

2.4.2.2 Terminal Approach Control Facility

Control of arrivals, departures, and overflights operating 4,500 feet and below and within a 20-mile radius of Louisville International Airport is the responsibility of the FAA Louisville Approach Control Facility. Located at the Airport, this approach facility is also responsible for providing guidance to and from two other satellite airports in the area: Bowman Field and Clark County Airport.

2.4.2.3 Air Traffic Control Tower

The FAA Louisville 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 responsible for issuing clearances to aircraft landing or departing the Airport. Bowman Field also has an ATCT that operates between 0600 and 2200 Eastern Standard Time (EST).

2.4.2.4 Class C Airspace

As shown in **Exhibit 2.4-7**, Class C airspace for Louisville International Airport includes the airspace from the surface to 4,500 feet above the Airport's elevation. The airspace consists of a vertical cylindrical surface area with a five nautical miles radius, and an outer area with a ten nautical miles radius that extends from 1,200 feet to 4,500 feet above the Airport's elevation. Two-way radio communication must be established with the Louisville ATCT prior to entry and thereafter maintained while in Class C airspace. Unless otherwise authorized or required by ATCT, no person may operate an aircraft at or below 4,500 feet above the surface within four nautical miles of a Class C surface area, or at an indicated airspeed of more than 200 knots.

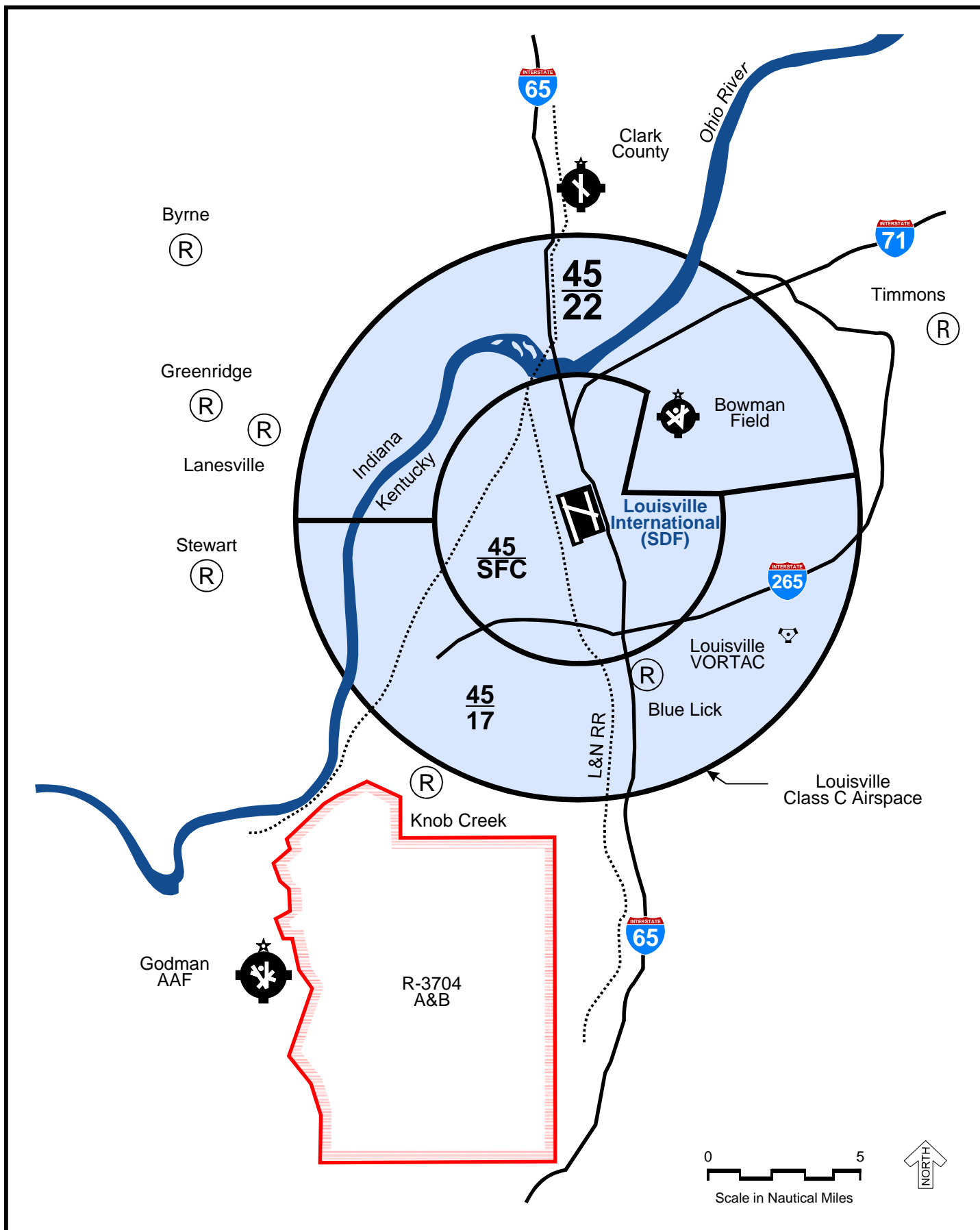
2.4.2.5 Restricted Area R-3704

Adjacent to the south edge of the 20-mile radius of the Airport's Class C airspace is the Fort Knox Military Operations Airspace Restricted Area (R-3704, A&B). This airspace is restricted for civil air traffic during certain hours due to artillery training activities.

Restricted Area R-3704 is a nearly rectangular area, approximately 100 square miles, with the northern boundary located approximately 11 nautical miles south, southwest of the Airport. The Restricted Area is vertically subdivided into areas A & B. The A area extends from the ground surface to 10,000 feet and the B area extends from 10,000 to 20,000 feet. The published hours of use (by Ft. Knox) for Area A are 1100-0500 Universal Time Coordinate (UTC), 0600-2400 EST daily and other times by Notice to Airmen (NOTAM).

Use of Area B must be cleared by NOTAM 24 hours in advance. The area is used for artillery and other military firing activity and, on occasion, aircraft activity in conjunction with surface operations.

R 3704 A & B is a joint use Restricted Area, and the Louisville ATCT vectors aircraft around or over the restricted area when departing to the southwest. When approaches to the north to Runways 35R and 35L



**Louisville International Airport
Master Plan Update**

LOUISVILLE CLASS C AIRSPACE

**EXHIBIT
2.4-7**

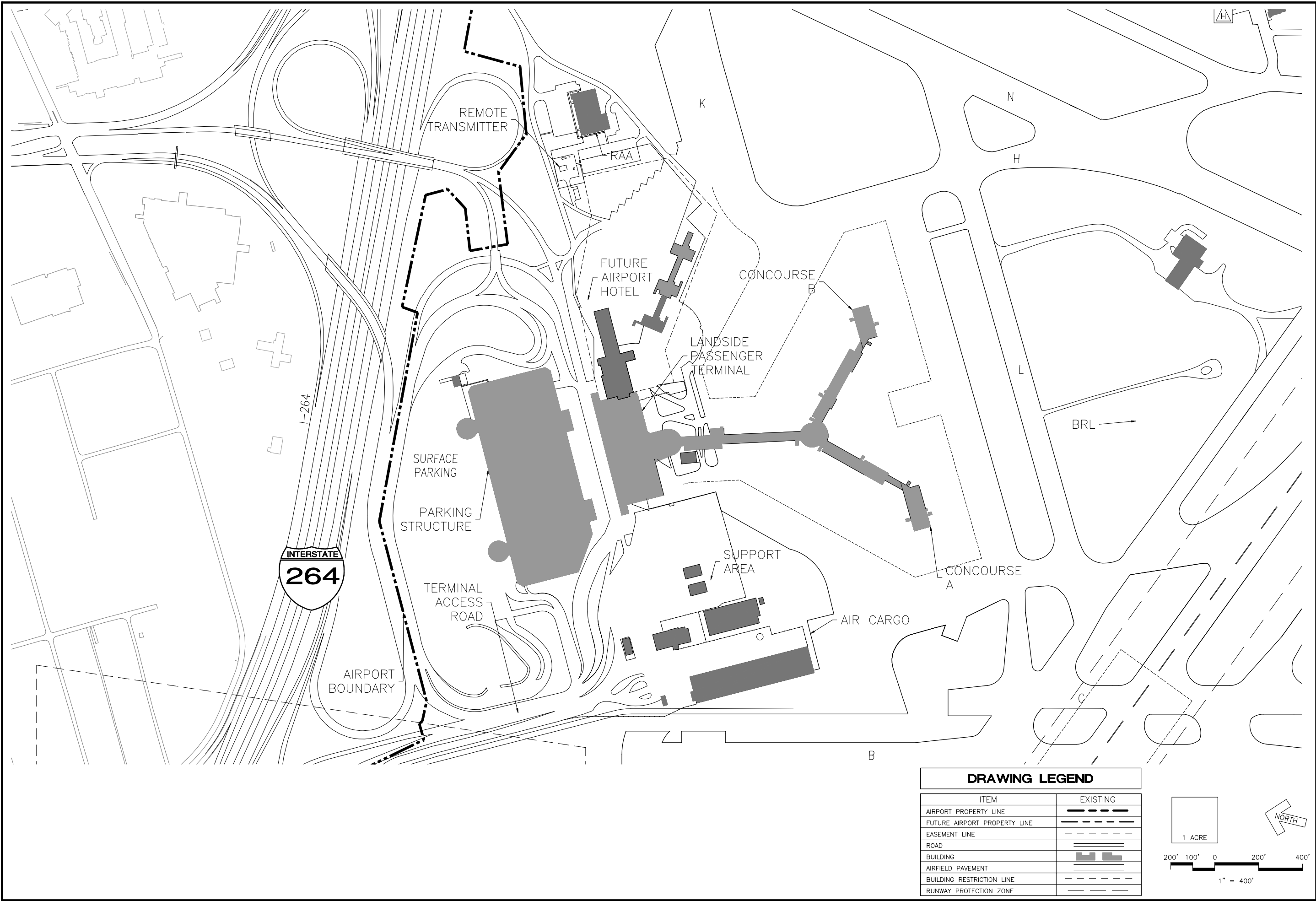
are being conducted, the tower vectors aircraft to avoid overflying the restricted area.

2.4.3 Passenger Terminal Facilities

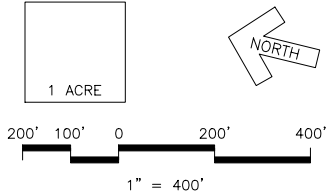
The passenger terminal area is depicted in **Exhibit 2.4-8**. The passenger terminal is a two-level structure with passenger ticketing on the upper level and baggage claim on the lower level. The landside element of the terminal contains 185,485 square feet. The airside element includes a two-level, "Y"-shaped, pier-concept concourse that supports 18 aircraft gates and contains 159,188 square feet. The landside terminal contains 172,202 square feet of leaseable space, and the airside concourses contain 137,584 square feet of leaseable space. The terminal is served by 12 signatory and five non-signatory airlines. (The list of airlines and the gate assignments are shown in **Table 2.4-2**.) The 17 airlines utilize 49,846 square feet of passenger hold room space and 31,628 square feet of baggage claim space as joint-use space.

TABLE 2.4-2			
Louisville International Airport			
PASSENGER TERMINAL AIRLINE TENANTS			
Signatory Airlines	Non-Signatory	Gate	Lease Area
AirTran	ASA NW Airlink & Mesaba United Express Skyway Airlines	-	1,790 sf
American		33	4,806 sf
Comair		1	909 sf
Continental		11	3,808 sf
Delta		5,7,9	16,670 sf
Midway		-	-
Northwest		10,12	6,723 sf
Southwest		27,29,31	6,115 sf
TWA		14,15	3,958 sf
United		20	4,053 sf
UPS		-	-
US Airways		22,24,28,34	15,242 sf

Source: PB Aviation
Regional Airport Authority Records



DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	---
FUTURE AIRPORT PROPERTY LINE	---
EASEMENT LINE	---
ROAD	---
BUILDING	■
AIRFIELD PAVEMENT	---
BUILDING RESTRICTION LINE	---
RUNWAY PROTECTION ZONE	---



EXISTING TERMINAL AREA PLAN

Other major terminal tenants are listed in **Table 2.4-3**.

TABLE 2.4-3		
<i>Louisville International Airport</i>		
MAJOR TERMINAL CONCESSIONAIRES		
Tenant	Concession	Lease Area
Host International	Food & Beverage	15,971 sf
W.H. Smith	Gifts & News	6,985 sf
U.S.O.	Military Support	2,209 sf
Alamo	Rental Car	478 sf
Avis	Rental Car	476 sf
Budget	Rental Car	434 sf
Dollar	Rental Car	310 sf
Hertz	Rental Car	613 sf
National	Rental Car	468 sf
Thrifty	Rental Car	358 sf
Carlson Wagonlit	Travel Service Center	866 sf
Fifth Third Bank	Bank & ATMs	745 sf

Source: PB Aviation
Airport Records

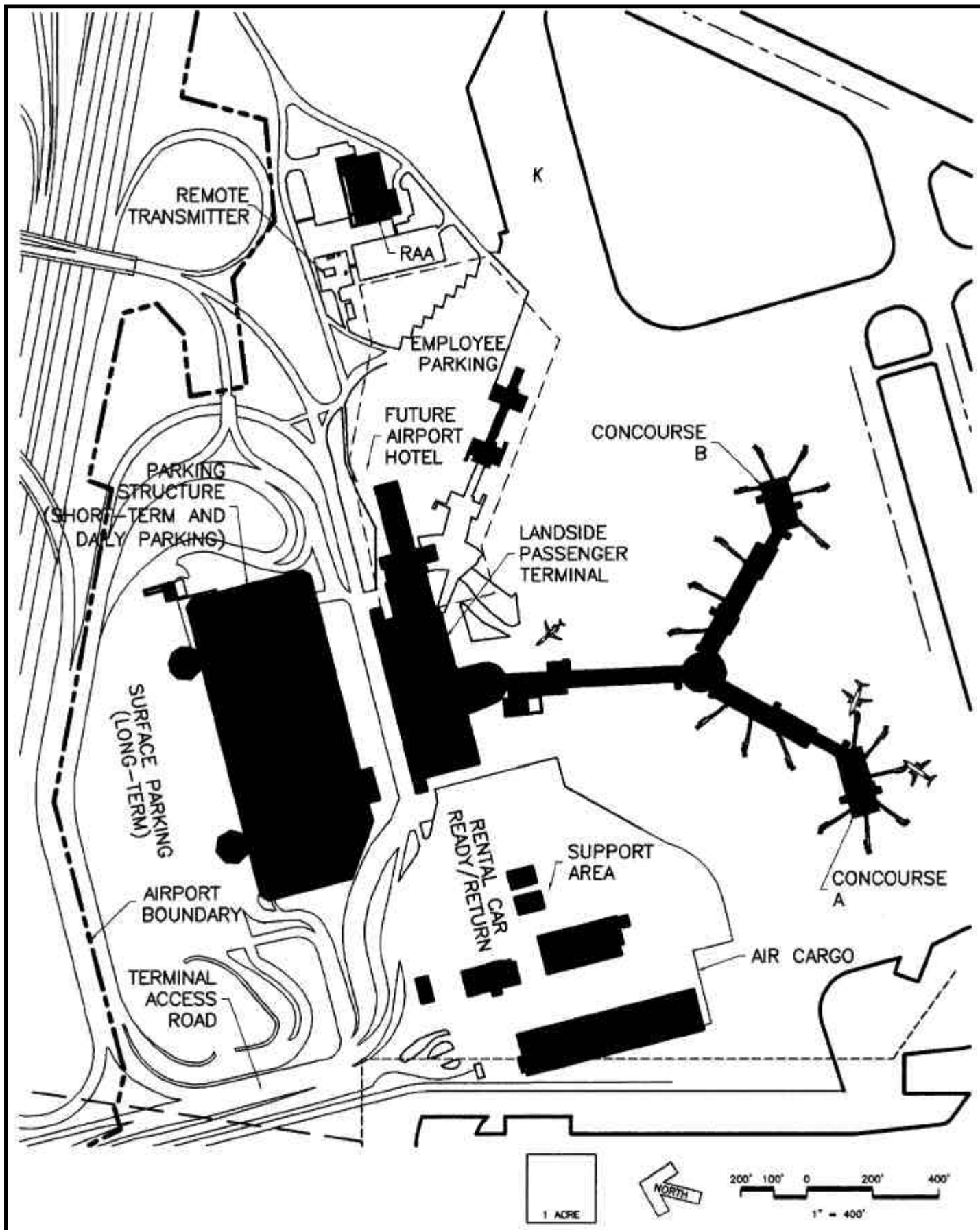
2.4.4 Parking Facilities

The Airport provides vehicle parking for passengers, visitors, and employees. **Table 2.4-4** summarizes the existing parking facilities at the Airport and **Exhibit 2.4-9** depicts their location.

TABLE 2.4-4		
<i>Louisville International Airport</i>		
EXISTING PARKING FACILITIES		
Category	Type	Number of Spaces
Public Parking		
Short-Term	Garage – Level 1	388
Daily	Garage – Levels 2-4	3,756
Remote	Surface	1,442
Rental Car Parking	Surface	467 (plus 27 queuing lanes)
Employee Parking	Surface	386

Sources: PB Aviation
Regional Airport Authority Records

All public parking is located within the terminal roadway loop. A four-level parking garage is located north of the terminal. The garage is linked to the



terminal by two corridors under the arrival roadway. The lowest level of the garage is designated as short-term and daily parking, while the other levels are designated for daily parking. Remote parking is provided in the surface lot adjacent to the garage.

Rental car ready/return parking is located in the surface lot adjacent to the west side of the terminal, with direct access from baggage claim. Approximately 467 spaces are leased to seven rental car agencies. In addition, this area contains 27 queuing lanes for the storage of vehicles and a quick turnaround facility for cleaning and fueling. Four rental car agencies operate remote service centers on approximately 15.5 acres of Airport property north of the Watterson Expressway. The locations of these properties are depicted in Exhibit 2.4-4. Employee parking is accommodated at a 386-space surface lot located east of the terminal. Approximately 875 employee parking passes are active (as of February 2000).

Three taxi companies are licensed to operate at the Airport. A taxi queuing area is located in the terminal area just north of the multi-tenant air cargo building. Individual taxis are released to the terminal curbside for passenger pickup, one at a time.

2.4.5 Air Cargo Facilities

The location of the Airport's air cargo facilities is depicted in Exhibits 2.4-2 and 2.4-3. UPS cargo facilities adjoin the southern boundary of the Airport. Construction is currently underway on a significant expansion of the UPS facilities. Known as "Hub 2000," this project will increase both the UPS sort facilities and the aircraft parking apron area.

In February 2000, FedEx began operation of their air cargo facility on the west side of the airfield along Crittenden Drive. This air cargo building is

approximately 85,200 square feet in size, with 4,000 square yards of apron for two aircraft parking positions.

The United States Postal Service's airport facilities are located on the southwest quadrant of the interchange of I-264 and Crittenden Drive. The 10-acre site includes a public service center and mail sort/transfer facility. A secure tug road with a tunnel under Crittenden Drive connects the USPS facility to the Airport terminal apron for pickup/deliveries to and from aircraft.

A multi-tenant cargo building is located on the west side of the terminal complex adjacent to the GSE service building and the flight kitchen. The 54,600 square foot building and 32,800 square yard apron are leased to two passenger airlines and three freight forwarders.

2.4.6 Airport Access

Access to the Airport, depicted in Exhibit 2.4-1, is provided primarily via the interstate highway system, with I-264 (Watterson Expressway) bordering the terminal complex on the north and I-65 bordering the Airport on the east. The interchange of I-264 and I-65 includes exit ramps for the terminal complex. Additionally, a ramp from I-264 eastbound provides access to the terminal complex. The terminal can also be reached by a ramp connection from Phillips Lane between Crittenden Drive and Preston Street. Martha Maloney Drive provides local access from Crittenden Drive to the terminal complex.

Primary access to the UPS facility is via I-65 at the Fern Valley Road interchange. Improvements to this interchange are planned in order to improve access to the UPS facilities. The Kentucky Air National Guard Base is reached by the Preston Highway/Grade Lane interchange with I-65, with secondary access from Standiford Lane. The general aviation complex is reached via Standiford Lane from Preston Highway.

2.4.7 General Aviation

General aviation facilities are located on the east side of the airfield. The fixed base operator (FBO) at the Airport occupies a 20,000 square feet terminal and a 70,000 square feet hangar, and approximately 35,500 square yards of aircraft parking apron. Additionally, five single-tenant corporate hangars, with a total of 121,000 square feet, are located in the general aviation area.

2.4.8 Military Facilities

The Kentucky Air National Guard occupies approximately 82 acres at the Airport in support of the mission of the 123rd Airlift Wing. Located on the east side of the airfield adjacent to I-65, this facility includes apron parking for 10 C-130 aircraft, a maintenance hangar, motor pool, and support buildings for functions such as engineering and administration.

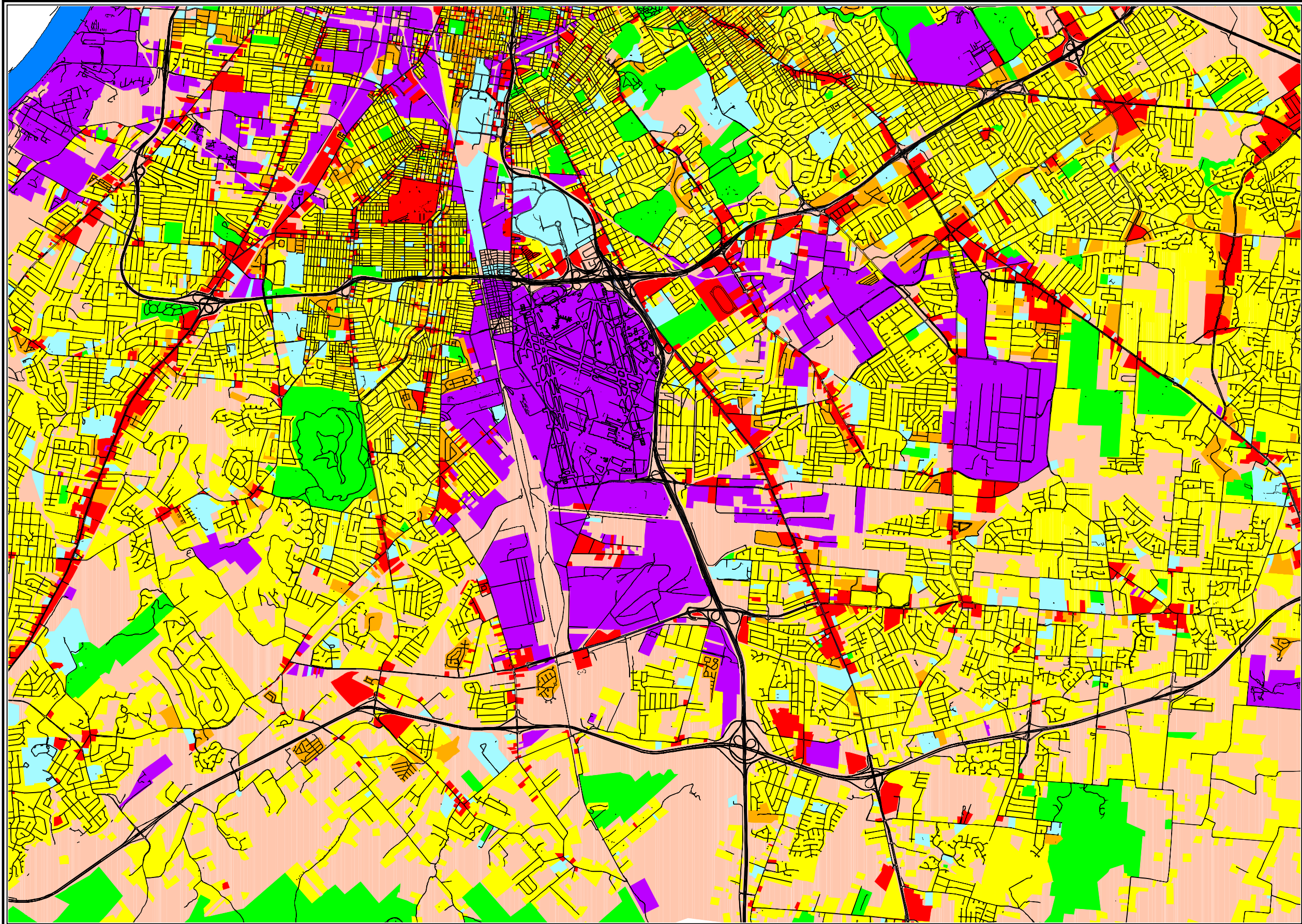
2.5 AIRPORT ENVIRONS

Existing land uses, zoning, and the relationship of the Airport with the surrounding communities define the environs in which the Airport is located. Planned land uses are also considered for compatibility with future Airport development, where appropriate.

2.5.1 Existing Land Use

Existing land uses within the vicinity of the Airport, as indicated in **Exhibit 2.5-1**, are divided into the following generalized categories:

- Single family residential – includes all types of detached residential units
- Multi-family residential – includes all types of attached residential units such as duplexes, townhouses and apartments.
- Commercial – includes retail, business and office uses



LEGEND

- Major Road
- Highway
- Ohio River
- Landuse
- Commercial
- Industrial
- Multi-Family Residential
- Parks and Open Space
- Public and Semi-Public
- Single Family Residential
- Vacant or Undeveloped

LOJIC
Louisville/Jefferson County Information Consortium

MAY 03, 2000

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Louisville Water Company

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EXISTING LAND USE

- Industrial – includes manufacturing and warehousing
- Public and semi-public – includes public institutions, and City- or County-owned properties used for governmental purposes
- Parks and open space – includes publicly and privately owned properties used for parks, cemeteries, conservation and golf courses
- Vacant or undeveloped

Residential areas north, east and west of the Airport are very developed and urbanized. Single-family residential land uses surround the Airport in all directions, with lesser amounts to the south. Multi-family uses are dispersed throughout the residential areas, with the largest concentrations associated with the downtown area and the Old Louisville Historic District north of the University of Louisville. Established neighborhoods in the immediate vicinity of the Airport include: the Minor Lane Heights and South Park View neighborhoods to the south, near the intersection of the I-65/I-265 interchange; the Beechmont neighborhood to the west; the Edgewood neighborhood to the east; and the Audubon Park, Parkway Village, Wilder Park, St Joseph, and Old Louisville neighborhoods to the north. The RAA's voluntary land acquisition program is in progress in the Edgewood and Minor Lane Heights neighborhoods.

Commercial land uses are primarily located along primary transportation corridors. The largest concentrations occur along Watterson Expressway to the north of the Airport; along Dixie highway to the west; along Preston Highway to the east; and other arterial roadways in the residential neighborhoods. Churchill Downs, also designated as a commercial land use, is located approximately 1.5 miles northwest of the Airport.

Industrial land uses are generally associated with the railroad routes and interstate highway interchanges. The largest concentrations of industrial land uses are along the western and southern boundaries of the Airport, and also to the east, south of I-264, between Poplar Level Road and Newburg Road. An abundance of industrial uses also occurs to the northwest of the Airport, southwest of downtown, to the Ohio River.

Public and semi-public land uses are dispersed throughout the Louisville area. The University of Louisville and the Kentucky Fair and Exposition Center, north of the Airport, fall into this classification.

Parks and recreation land uses, including parks, cemeteries, golf courses and forests/nature preserves, are plentiful in the Airport vicinity and throughout Jefferson County. Evergreen Cemetery is directly east of the Airport, and Iroquois Park is to the west. Jefferson Memorial Forest is located south of the Airport on the Jefferson County and Bullitt County line.

2.5.2 Zoning

The Land Development Code contains the regulations authorized by Kentucky Revised Statutes (KRS), Chapter 100, to implement the approved comprehensive plan, and coordinate and enforce zoning. The Development Code includes land development, zoning, and subdivision regulations.¹

Zoning divides a locality into districts, or zones, in order to regulate use of land for residence, recreation, trade, industry, or other purposes; to regulate densities of populations and intensity of land use; and to facilitate orderly and harmonious development. Regulations must be uniform for each class or kind of building, or other structure or use, throughout any district or zone, but may differ from those in other districts. Although the existing zoning and subdivision ordinances do not contain specific provisions, standards, or guidelines related to noise compatibility or mitigation associated with airports², the new comprehensive plan, Cornerstone 2020, briefly addresses impacts from transportation facilities. Specifically, the guidelines include the recommendation to “design transportation facilities, including rail lines and aviation facilities, to mitigate adverse noise, lighting and other nuisance impacts on residential uses”.³

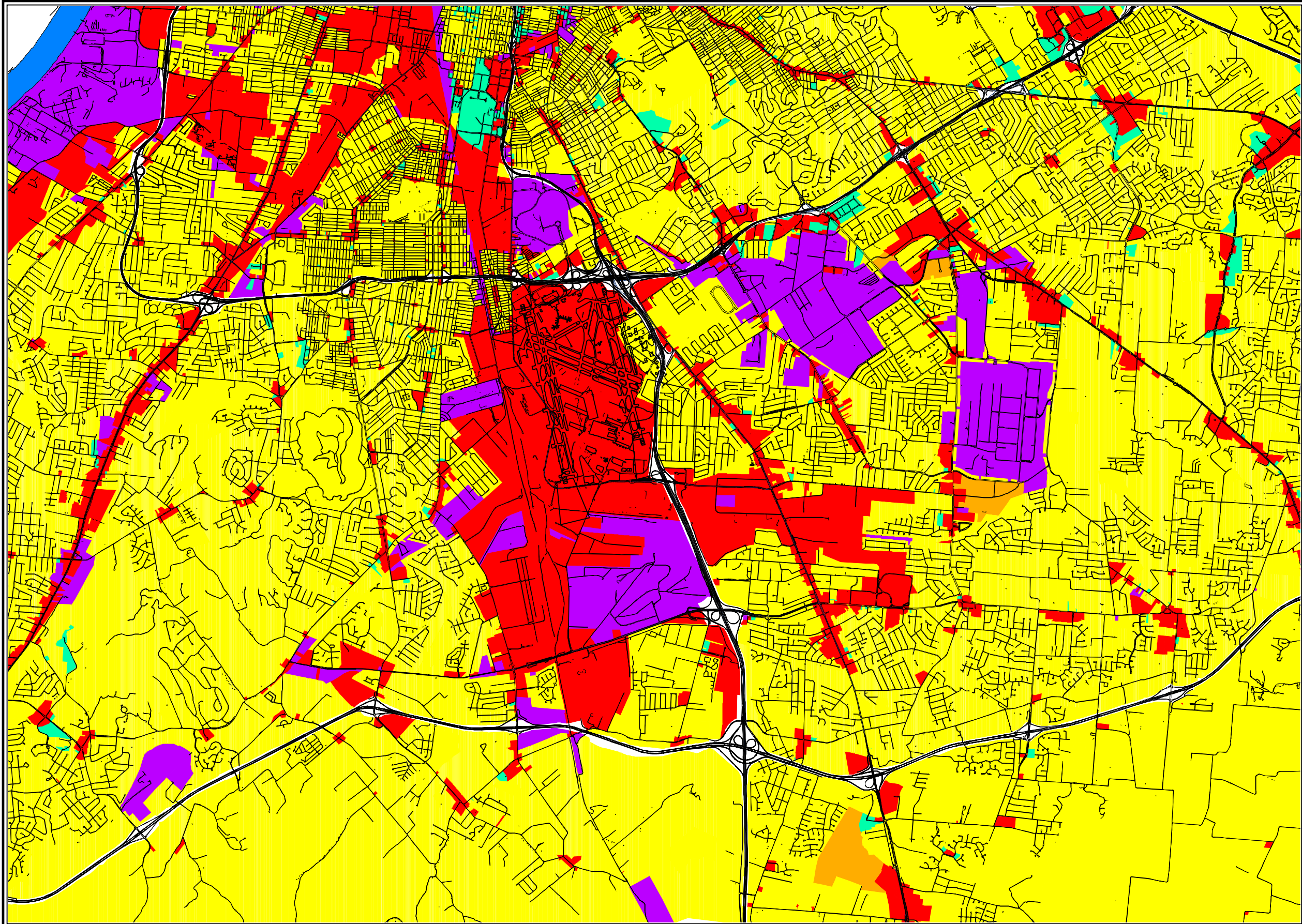
The zoning map as illustrated in **Exhibit 2.5-2** identifies zoning categories⁴ that were condensed into the following generalized designations:

- *Commercial/Industrial*
- *Industrial only*
- *Business/Office*
- *Residential*
- *Special Districts*

The Commercial/Industrial zoning includes commercial districts, neighborhood commercial districts, commercial residential districts, commercial manufacturing districts, and enterprise zones. This generalized zoning category is located along the arterial roads, along the CSX railroad lines, and at primary intersections within neighborhoods throughout the City. In addition, there are large areas zoned for commercial use immediately south of the Airport, particularly between Fern Valley Road and I-265.

The Industrial Only zoning category is specifically for industrial uses. This zoning is also located along the arterial roads and the CSX railroad, and also the area to the northwest along the Ohio River. Examples of larger areas with this zoning designation include the landfill south of the Airport, General Electric to the east of the Airport, and Watterson Park, also east of the Airport. The Kentucky Fair and Exposition Center, immediately north of the Airport, is also zoned Industrial.

The Business/Office zoning category primarily consists of several levels of Office/Commercial Districts. The majority of this zoning is located north of I-264, specifically in the University and downtown areas. Smaller amounts of Office zoning are scattered throughout the study area, with very few in the immediate Airport vicinity.





LEGEND

Major Road
Highway
Ohio River

Zoning

Commercial/Industrial
Industrial Only
Business/Office
Residential
Special



Louisville/Jefferson County Information Consortium

MAY 03, 2000

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The Residential zoning category includes all densities, from Rural Residential to Multi-family. This zoning represents the largest category in the City of Louisville and Jefferson County.

The Special Districts zoning category consists of the following:

- *Planned Research/Office District*
- *Planned Employment Center*
- *Development Review Overlay*
- *Waterfront Districts*
- *Waterfront Development Review Overlay District*
- *Corridor Review Overlay*
- *Planned Village Development District*

The Special Districts zoning is located in relatively few areas of Jefferson County, none within the immediate Airport vicinity.

2.5.3 Planned Land Use

The Louisville and Jefferson County Planning Commission is currently in the final stages of completing a new comprehensive plan, Cornerstone 2020. This plan will be the official adopted guide for actions and decisions on the use of land in Jefferson County.⁵ The new guidelines will place emphasis on the creation of eleven “Form Districts”, which will be combined with existing zoning to “ensure that current neighborhood character and patterns of development are reinforced”. The form districts will identify established or emerging forms or patterns of development, and provide planning policies for new or infill development.

Future land use developments that were identified in a recent MIS study⁶ include the following:

- New residential housing in the downtown area

- New residential development planned for the extreme southern part of Jefferson County
- Residential developments in Bullitt County, south of Louisville, continue to expand at a fast rate
- Future industrial and commercial developments are likely near the Kentucky Fair and Exposition Center, near the University of Louisville Stadium, and in areas around the Airport recently vacated by the voluntary residential buy-out program
- Major commercial development is planned south of the Airport
- The old Naval Ordnance Station, west of the Airport, is being redeveloped as the privately run Greater Louisville Technology Park, an office and technology center
- The Airport Enterprise Zone, including the Minor Lane Heights voluntary acquisition area, includes plans for commercial development.

The following noise-sensitive facilities are planned to be built within the vicinity of the Airport⁷:

- *Education Center at 15th St. and Muhammad Ali Blvd.*
- *Elementary School at 1351 Payne Street*
- *Education Center at S. Floyd Street*
- *School/Community Center, 3500 Bohne Ave.*

Future growth in the Airport vicinity also includes transportation improvements. The Transit Authority of River City (TARC) is currently reviewing options for a light rail alignment around the Airport. A recent preferred routing would take the light rail on the west side of the Airport, either on the east or west side of the CSX rail yards. An alignment on the east side of the Airport would be considered only if insurmountable problems emerge on the west side.⁸ Other transportation improvements that are planned for the Airport vicinity by the year 2020⁹ include the following:

- Improve the I-65 interchange at Fern Valley Road

- Widen Gilmore Lane between Preston Road and Poplar Level Road
- Widen Grade Lane to 4 lanes from Fern Valley Road to Outer Loop
- Widen National Turnpike from Outer Loop to Southside Dr.
- HOV lanes on I-264
- A new interchange with Highway 61 and I-65, both major access routes to the Airport
- Extend Enterprise Drive from National Turnpike to Fern Valley Road
- Widen Phillips Lane between Preston Highway and Freedom Way

2.6 SOCIOECONOMIC SETTING

Socioeconomic data relevant to the Airport were collected for the Master Plan Update. Particular emphasis was placed on population, employment, income, and housing. These factors indicate a strong economic base for continued air transportation. For the purposes of this report, Jefferson County was compared to three larger study areas (**Exhibit 2.6-1**).

- **MSA** - Metropolitan Statistical Area, 7 counties¹⁰ (Bullitt, Jefferson, and Oldham Counties in Kentucky; Clark, Floyd, Harrison, and Scott Counties in Indiana).
- **KIPDA area** - Kentuckiana Regional Planning & Development Agency, 9 counties¹¹ (Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer, and Trimble Counties in Kentucky; Clark and Floyd Counties in Indiana).
- **BEA area** - Louisville Bureau of Economic Analysis, 23 counties¹² (Breckinridge, Bullitt, Carroll, Grayson, Hardin, Henry, Jefferson, LaRue, Marion, Meade, Nelson, Oldham, Shelby, Spencer, Trimble, and Washington Counties in Kentucky; Clark, Crawford, Floyd, Harrison, Jefferson, Scott and Washington Counties in Indiana).

2.6.1 Population

Historical statistics, as illustrated in **Table 2.6-1**, show that Jefferson County experienced a 2.9 percent decrease in population between 1980 and 1990. In this same time period the MSA population fell from 953,944 to 950,420 persons, representing a 0.4 percent decline. The KIPDA area population declined 0.6 percent between 1980 and 1990. However, the BEA area

Metropolitan Statistical Area (MSA): 7 Counties (Bullitt, Jefferson, Oldham Counties in Kentucky; Clark, Floyd, Harrison, and Scott Counties in Indiana.)

Kentuckiana Regional Planning & Development Agency (KIPDA): 9 Counties (Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer, and Trimble Counties in Kentucky; Clark and Floyd Counties in Indiana.)

Louisville Bureau of Economic Analysis (BEA) area: 23 Counties (Breckinridge, Bullitt, Carroll, Grayson, Hardin, Henry, Jefferson, LaRue, Marion, Meade, Nelson, Oldham, Shelby, Spencer, Trimble, and Washington Counties in Kentucky; Clark, Crawford, Floyd, Harrison, Jefferson, Scott, and Washington Counties in Indiana.)



<p>Table 2.6-1</p> <p>Louisville International Airport</p> <p>POPULATION-HISTORICAL AND FORECASTED TRENDS</p>						
Study Area	Statistical Measurement Year					Percent Change 1980-2020
	1980 Census	1990 Census	2000 Projection	2010 Projection	2020 Projection	
Jefferson County	685,004	665,123	669,772	669,421	659,860	-4%
MSA study area	953,944	950,420	1,006,300	1,060,100	1,129,500	18%
KIPDA study area	954,438	948,672	1,004,221	1,040,897	1,063,330	11%
BEA study area	1,291,042	1,293,635	1,388,200	1,467,400	1,565,600	21%

Sources:

Jefferson County: Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinckerhoff, Inc., November 1999, Table 1-1.

MSA: 7 Counties (Bullitt, Jefferson, and Oldham Counties in Kentucky; Clark, Floyd, Harrison, and Scott Counties in Indiana), Louisville International Airport Noise Compatibility Study, Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft-September 1999, Tables 5 & 6.

KIPDA: 9 Counties (Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer, and Trimble Counties in Kentucky; Clark, Floyd Counties in Indiana), Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinckerhoff, Inc., November 1999, Table 1-1.

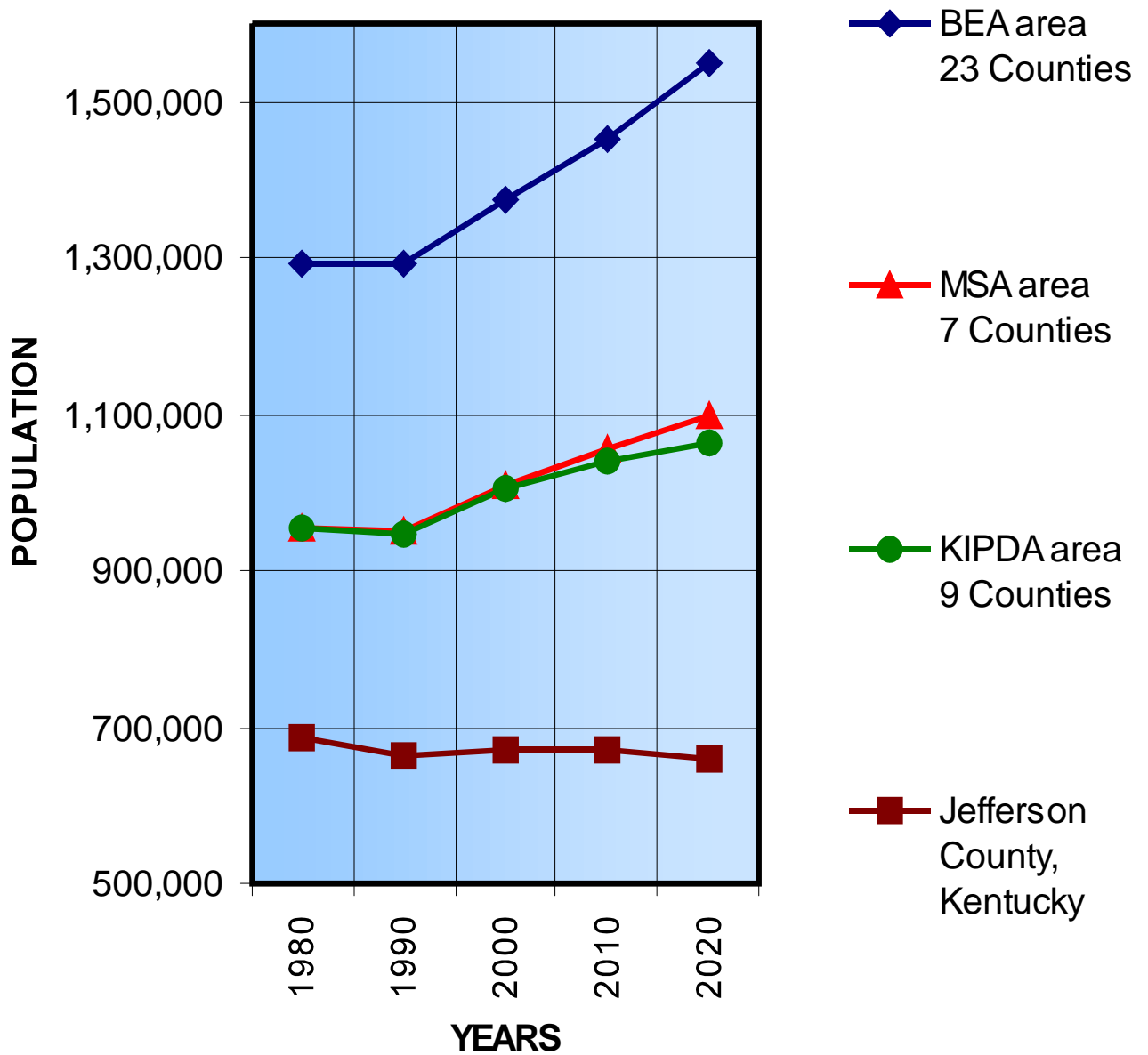
BEA: 23 Counties (Breckinridge, Bullitt, Carroll, Grayson, Hardin, Henry, Jefferson, LaRue, Marion, Meade, Nelson, Oldham, Shelby, Spencer, Trimble, and Washington Counties in Kentucky; Clark, Crawford, Floyd, Harrison, Jefferson, Scott and Washington Counties in Indiana), Louisville International Airport Noise Compatibility Study, Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft-September 1999, Tables 5 & 6.

population grew 0.2 percent during this same time period. The comparison of historical growth patterns reveals the larger 23-county BEA area with a minimal increase in population, while Jefferson County, the MSA, and KIPDA area were all in decline. This supports the “national trend in which outer suburbs have grown more quickly than the inner suburbs”¹³. Because the BEA study area is so large, it also may include populations associated with other metropolitan areas in the Louisville region. For example, as illustrated in Exhibit 2.6-1, Frankfort, the capital of Kentucky, is located in Franklin County, which directly abuts the eastern limits of the BEA area.

Population forecasts, as illustrated in Table 2.6-1, show the Jefferson County population continuing its decrease, -1.5 percent between the year 2000 and 2020. For the same time period, the MSA data project a 12 percent growth; the KIPDA area is expected to grow 6 percent; and the BEA area is projected to grow 13 percent. A graphic comparison of the population forecasts is presented in **Exhibit 2.6-2**. The projected population data from each of these study areas indicate that overall the Louisville region will likely continue to grow at a moderate rate. The outlying suburbs and surrounding counties will continue to grow at a comparatively higher rate than the interior areas. Jefferson County is projected to continue the current trend of population decline. The Kentucky State Data Center projects a 4 percent total decrease in population in Jefferson County, between 1980 and 2020, while the BEA area is expected to grow by 21 percent.

2.6.2 Employment

Historical employment trends, as indicated in **Table 2.6-2**, show that Jefferson County experienced a rise in employment from 308,481 persons in 1980 to 458,821 persons in 1990, representing a 49 percent increase. The MSA, KIPDA area, and BEA area also reported rises in employment during this same



**Louisville International Airport
Master Plan Update**

POPULATION GROWTH PATTERNS

**EXHIBIT
2.6-2**

Table 2.6-2
Louisville International Airport

EMPLOYMENT-HISTORICAL AND FORECASTED TRENDS						
Study Area	Statistical Measurement Year					Percent Change 1980-2020
	1980 Census	1990 Census	2000 Projection	2010 Projection	2020 Projection	
Jefferson County	308,481	458,821	513,363	544,743	551,507	79%
MSA study area	487,117	561,123	696,200	738,300	753,100	55%
KIPDA study area	424,232	594,284	697,463	799,728	913,003	115%
BEA study area	627,866	726,837	895,000	948,900	967,300	54%

Sources:

Jefferson County: Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinckerhoff, Inc., November 1999, Table 1-1.

MSA: 7 Counties (Bullitt, Jefferson, and Oldham Counties in Kentucky; Clark, Floyd, Harrison, and Scott Counties in Indiana), Louisville International Airport Noise Compatibility Study. Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft-September 1999, Tables 5 & 6.

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time period, at 15 percent, 40 percent, and 16 percent increases, respectively. This growth was fueled by an increased number of women in the work force, and the maturing of the “baby-boom” generation.¹⁴ The highest growth in Jefferson County is due to its traditional role as the region’s economic center. The large increase in the KIPDA area can be attributed to a surge of growth in Clark and Floyd Counties in Indiana.¹⁵

Employment forecasts, as illustrated in Table 2.6-2, predict that Jefferson County will continue to increase its employment by 7 percent between 2000 and 2020. The MSA and BEA area are both expected to grow by 8 percent during this time. However, the KIPDA area employment is predicted to experience a 31 percent increase, partially due to the expected growth in Floyd and Clark Counties. Jefferson County accounts for 67 percent of the population and 77 percent of the employment in the KIPDA study area. The higher employment numbers in Jefferson County, combined with straight-line prediction methodology, may be producing optimistic growth projections in the KIPDA area.¹⁶ Also, the Louisville area has been experiencing increased commuter activity, with growing suburban populations seeking employment in the city.¹⁷ These factors may account for the KIPDA area employment projections being substantially more than that of the MSA or BEA area.

An outline of the job sectors of the Louisville MSA Non-Farm Employment, **Table 2.6-3**, illustrates that the two largest sectors in 1980 were manufacturing, employing 104,200 persons, followed by service industries with 104,100. A list of Major Employers in the Louisville Area, **Table 2.6-4**, places UPS, Ford Motor Company, and General Electric at the top. The Greater Louisville Inc. Chamber of Commerce recognizes that “manufacturing, particularly automotive” has traditionally been a noteworthy part of the Greater Louisville economy¹⁸. However, manufacturing and non-durable goods jobs are the only sectors projected to decline by 2010.

<p>Table 2.6-3</p> <p>Louisville International Airport</p> <p>NON-FARM EMPLOYMENT IN THE LOUISVILLE MSA</p>					
Job Sector	Employment by Industry				
	1980 Census	1990 Census	2000 Projection	2010 Projection	
Mining	Non-Disclosed	Non-Disclosed	700	600	
Construction	25,500	31,300	35,900	37,900	
Manufacturing	104,200	89,600	86,100	81,200	
Non-Durable Goods	42,500	40,600	41,600	40,700	
Transportation & Public Utilities	27,200	33,900	40,700	45,400	
Wholesale Trade	26,100	28,700	30,700	31,900	
Retail Trade	79,400	102,800	114,500	123,100	
Finance, Insurance & Real Estate	41,600	40,700	43,600	46,100	
Service Professions	104,100	156,700	203,900	239,800	
Public Administration & Government	67,100	67,200	71,100	73,100	

Source: U.S. Dept. of Labor, Bureau of Statistics, Non-Farm Employment in Kentucky Area, 4520 - Louisville MSA.

(This data compiled for the MSA as defined by U.S. Census Bureau.)

Note: Data for 2020 were unavailable.

TABLE 2.6-4		
Louisville International Airport		
MAJOR EMPLOYERS IN THE LOUISVILLE AREA		
Major Employers	Company Information	
	Number of Employees	Product/Service
United Parcel Service	16,338	Shipping and Transportation Services
Ford Motor Company	9,832	Automobile Manufacturing
General Electric	7,446	Appliance Manufacturing
Norton Healthcare	5,877	Healthcare Provider
Jewish Hospital Healthcare Services	4,995	Healthcare and Emergency Services
The Kroger Company	4,700	Food Shipping & Service Provider
Humana Inc.	4,665	Healthcare and Insurance Provider
LG&E Energy	2,400	Utility Provider
Caritas Health Services	2,344	Healthcare Provider
Catholic Archdiocese of Louisville	2,295	Religion and Counseling Services
Baptist Hospital East	2,220	Healthcare and Emergency Services
Bank One, Kentucky NA	2,078	Finance and Investment Services
Sears, Roebuck & Company	1,923	Dry Goods Shipping & Product Retailer
Publishers Printing Company	1,785	Publishing and Reproduction Services
Vencor Inc.	1,710	Healthcare Provider
Anthem Inc.	1,697	Healthcare and Insurance Provider
YMCA of Greater Louisville	1,673	Community Recreation and Services Provider
Philip Morris USA	1,590	Dry Goods Manufacture & Shipping
National City Bank of Kentucky	1,580	Finance and Investment Services
BellSouth Corp.	1,573	Utility Provider
Brown-Forman Corp.	1,515	Alcoholic Beverage Manufacturing
American Commercial Lines Holdings LLC	1,475	Dry Goods Transport & Distribution
PNC Bank, NA	1,475	Finance and Investment Services
Papa John's International	1,263	Food Shipping & Service Provider

Source: Greater Louisville Inc. Chamber of Commerce, 1999

Table 2.6-3 indicates that, by 2010, service professions will experience the greatest increase, and employ more people than any other sector in the Louisville MSA. Another strength identified by the Chamber is the medical service profession. Greater Louisville Inc. reported Norton Healthcare, Jewish Hospital Healthcare Services, Humana Inc., and Baptist Hospital East already among Louisville's top employers in 1999. Current new developments in central Louisville/Jefferson County are also helping to elevate employment levels. One example, among many, would be the expansion of the Louisville Medical Center, and the auxiliary hotel, food service, and municipal infrastructure associated with it. Overall, the employment rate in the Louisville region is predicted to continue to grow at a moderate rate.

2.6.3 Income

Income statistics for Jefferson County data were also compared to the three larger composite statistical areas, the MSA, KIPDA, and BEA areas. The average projected income for the entire 9-county KIPDA area was unavailable as of this writing.

Residents of the Louisville region have historically enjoyed a healthy rise in their personal income. **Table 2.6-5** illustrates that Jefferson County reported a rise of 94 percent in the average income between 1980 and 1990. During this same time, average per capita income in the 7-county MSA also rose, from \$18,829 to \$22,953, a 22 percent increase. The 9-county KIPDA area, reflecting the trend of Jefferson County, reported a 95 percent increase. Personal income in the 23 county BEA area rose from \$17,482 in 1980 to \$21,239 in 1990, also nearly a 22 percent increase, reflecting the trends of the MSA during the same time period.

Projected income is also illustrated in Table 2.6-5. Average personal income in Jefferson County is forecasted to rise from \$28,786 in 2000 to \$74,178

<p>TABLE 2.6-5</p> <p>Louisville International Airport</p> <p>PER CAPITA INCOME - HISTORICAL AND FORECASTED TRENDS</p>						
Study Area	Statistical Measurement Year				2020 Projected	Percent Change 1980-2020
	1980 Census	1990 Census	2000 Projected	2010 Projected		
Jefferson County	\$10,102	\$19,636	\$28,786	\$47,070	\$74,178	634%
MSA study area	\$18,829	\$22,953	\$27,083	\$30,315	\$33,032	75%
KIPDA study area	\$8,271	\$16,149	DATA UNAVAILABLE	DATA UNAVAILABLE	DATA UNAVAILABLE	DATA UNAVAILABLE
BEA study area	\$17,482	\$21,239	\$24,879	\$27,862	\$30,397	74%

Sources:

Jefferson County: Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinckerhoff, Inc., November 1999, Table 1-1.

MSA: **7 Counties (Bullitt, Jefferson, and Oldham Counties in Kentucky; Clark, Floyd, Harrison, and Scott Counties in Indiana), Louisville International Airport Noise Compatibility Study**, Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft-September 1999, Tables 5 & 6.

KIPDA: **9 Counties (Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer, and Trimble Counties in Kentucky; Clark, Floyd Counties in Indiana), Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinckerhoff, Inc., November 1999, Table 1-1.**

BEA: **23 Counties (Breckinridge, Bullitt, Carroll, Grayson, Hardin, Henry, Jefferson, LaRue, Marion, Meade, Nelson, Oldham, Shelby, Spencer, Trimble, and Washington Counties in Kentucky; Clark, Crawford, Floyd, Harrison, Jefferson, Scott and Washington Counties in Indiana), Louisville International Airport Noise Compatibility Study**, Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft-September 1999, Tables 5 & 6.

in 2020, at a substantial 158 percent. An even more dramatic increase of 634 percent is expected for Jefferson County in 2020 relative to 1980 income. However, both the MSA and the BEA study areas predict a rise of only 22 percent in the per capita income between 2000 and 2020. This indicates the greatest business growth will be in central Louisville, while the surrounding 23-county area will continue growth at the historic levels.

Greater Louisville Inc. has been striving to attract and retain more “knowledge-based” business in Louisville.¹⁹ The more educated workforce utilized by “knowledge-based” businesses typically earns higher wages, travels more, and has greater income to invest in the local economy. E-commerce businesses developing in the Louisville region are helping to enlarge this employment niche. This new dynamic in the Louisville workforce has possibly been a contributing factor to the growing per capita income in the region.

2.6.4 Housing

Historical and projected household data are presented in **Table 2.6-6**. Projections for 2020 were not available for the MSA and BEA area as of this writing.

Census data indicate that Jefferson County experienced a 5 percent increase in the number of households between 1980 and 1990. During the same time period, the MSA and KIPDA areas recorded growth at 8 percent and 7 percent, respectively. The BEA area experienced the highest growth, at 9 percent. These numbers indicate that housing in the suburbs has been growing at a higher rate than central Louisville/Jefferson County.

Household projections presented in Table 2.6-6 suggest that the suburbs will continue to experience faster growth than Jefferson County, although at a

<p>TABLE 2.6-6</p> <p>Louisville International Airport</p> <p>NUMBER OF HOUSEHOLDS - HISTORICAL AND FORECASTED TRENDS</p>						
Study Area	Statistical Measurement Year				2020 Projected	Percent Change 1980-2020
	1980 Census	1990 Census	2000 Projected	2010 Projected		
Jefferson County	250,569	264,138	283,321	291,289	294,448	18%
MSA study area	339,832	366,364	399,207	418,642	DATA UNAVAILABLE	DATA UNAVAILABLE
KIPDA study area	340,592	364,779	408,715	434,431	454,773	34%
BEA study area	447,971	487,638	543,949	581,146	DATA UNAVAILABLE	DATA UNAVAILABLE

Sources:

Jefferson County: Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinkerhoff, Inc., November 1999, Table 1-1.

MSA: 7 Counties (Bullitt, Jefferson, and Oldham Counties in Kentucky; Clark, Floyd, Harrison, and Scott Counties in Indiana), Louisville International Airport Noise Compatibility Study. Airport Activity Forecasts. Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft-September 1999, Tables 5 & 6.

KIPDA: 9 Counties (Bullitt, Henry, Jefferson, Oldham, Shelby, Spencer, and Trimble Counties in Kentucky; Clark, Floyd Counties in Indiana), Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinkerhoff, Inc., November 1999, Table 1-1.

BEA: 23 Counties (Breckinridge, Bullitt, Carroll, Grayson, Hardin, Henry, Jefferson, LaRue, Marion, Meade, Nelson, Oldham, Shelby, Spencer, Trimble, and Washington Counties in Kentucky; Clark, Crawford, Floyd, Harrison, Jefferson, Scott and Washington Counties in Indiana), Louisville International Airport Noise Compatibility Study. Airport Activity Forecasts. Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft-September 1999, Tables 5 & 6.

slightly slower rate than in the past. Forecasts for 2000 and 2010 indicate Jefferson County households will increase at 3 percent, the MSA increase at 5 percent, KIPDA area with a 6 percent increase, and BEA area with 7 percent growth.

* * * * *

The information presented in this chapter serves as a baseline for the projection of aviation activity and the determination of facility requirements presented in the following two chapters. As stated earlier, the inventory is a snapshot as the Airport is continually undertaking improvements.

ENDNOTES

- ¹ Cornerstone 2020 Comprehensive Plan Elements, Louisville and Jefferson County Planning Commission (www.co.jefferson.ky.us), Draft – October 28, 1999, page 62.
- ² Noise Compatibility Study, Interim Report 2, Leigh Fisher Associates and HNTB Corporation, January 13, 2000, page 33.
- ³ Cornerstone 2020 Comprehensive Plan Elements, Louisville and Jefferson County Planning Commission (www.co.jefferson.ky.us), Draft – October 28, 1999, page 23.
- ⁴ Source: Development Code for all of Jefferson County, Kentucky, Louisville and Jefferson County Planning Commission, November 1997.
- ⁵ Cornerstone 2020 Comprehensive Plan Elements, Louisville and Jefferson County Planning Commission (www.co.jefferson.ky.us), Draft – October 28, 1999.
- ⁶ Transportation Tomorrow, Draft Major Investment Study Report, Parsons Brinckerhoff, October 1998, page 34.
- ⁷ Source: Noise Compatibility Study, Interim Report 2, Leigh Fisher Associates and HNTB Corporation, January 13, 2000, Table 5-1.
- ⁸ Meeting with TARC representatives, February 29, 2000.
- ⁹ Horizon 2020 Regional Mobility Plan, Kentuckiana Regional Planning and Development Agency Transportation Planning Division, Nov. 1996.
- ¹⁰ Louisville International Airport Noise Compatibility Study, Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft, September 1999. Note: The MSA defined herein differs from the “Louisville MSA” as defined by the United States Census Bureau. The US Census MSA includes Shelby County, Kentucky, and excludes Scott County, Indiana. For the purposes of this report, the MSA excludes Shelby County, Kentucky, and includes Scott County, Indiana.
- ¹¹ Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinckerhoff Inc., November 1999.
- ¹² Louisville International Airport Noise Compatibility Study, Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft, September 1999.
- ¹³ Ibid., page 8.
- ¹⁴ Ibid., page 8.
- ¹⁵ Kentuckiana Regional Planning & Development Agency – Rideshare Strategic Plan, Parsons Brinckerhoff Inc., November 1999, page 10.
- ¹⁶ Ibid., pages 4 & 10.
- ¹⁷ Louisville International Airport Noise Compatibility Study, Airport Activity Forecasts, Technical Report, Leigh Fisher Associates and HNTB Corporation, Draft, September 1999, page 8.
- ¹⁸ Greater Louisville Delivers: Executive Summary, Greater Louisville Inc., February 2000.
- ¹⁹ Greater Louisville Delivers: Greater Louisville Solutions, Greater Louisville Inc., February 2000, page 9.

3.0 ACTIVITY PROJECTIONS

This chapter presents and discusses the projections of passenger and aircraft activity to be used as the basis for the Master Plan Update for Louisville International Airport. These projections are essential for:

- Determining the future role of the Airport in both the type of aircraft to be accommodated and the type of aviation demand to be served in the future;
- Evaluating the capacity of existing Airport facilities and their ability to absorb projected aviation demand; and
- Estimating the extent to which airside and landside facilities should be provided at the Airport in future years.

The projections of annual and peak-hour passengers and operations presented here were developed for the *FAR Part 150 Noise Study Update Louisville International Airport* (Part 150 Study). The methodology used in projecting this activity is presented in the February 2000 *Louisville International Noise Compatibility Study Airport Activity Forecasts Technical Report*.

The Part 150 Study developed a Base, High and Low set of activity projections for the Airport. The Base forecasts of passengers and operations are used in the Master Plan Update. For purposes of facility planning and airport simulations, it is necessary to analyze activity at a more detailed level than that developed in the Part 150 Study. The additional level of detail is necessary to establish relationships between discrete levels of activity and the spatial requirements for specific types of facilities. Peak hour levels of activity are typically used for many of the facility requirement analyses.

At any airport, passenger and cargo activity levels fluctuate over the course of the year. In addition, to fully assess and plan for an airport's ability to accommodate the activity expected in the future, it is necessary to understand all aspects of passenger and aircraft activities as they unfold over the course of a day. This chapter describes the methodology and results of analyses used to construct a 24-hour schedule of

activity at the Airport. For planning purposes, activity on the average weekday of the peak month is the focus of the 24-hour schedule of activity.

Projections of activity are presented for the short-term (2005), intermediate-term (2010), and long-term (2020) planning horizons. The presentation of the projections is organized as follows:

- *Annual Passenger Projections*
- *Annual Cargo Tonnage Projections*
- *Annual Operations and Fleet Mix Projections*
- *Peak Hour Projections*
- *24-Hour Aircraft Activity Projections*
- *Summary of Base Case Forecast*

3.1 ANNUAL PASSENGER PROJECTIONS

Louisville International Airport is served by ten major air carriers and seven regional operators. Air carriers are defined as airlines that primarily fly passenger aircraft with more than 70 seats. Regional carriers are defined as airlines that primarily fly aircraft with fewer than 70 seats. Together these airlines provide non-stop service to over 26 cities. In 1998, the Department of Transportation survey ranked the Airport as sixty-third in the nation in origin/destination passenger traffic. A very small amount of charter passenger service is also provided by UPS, utilizing its aircraft during periods when the cargo operation does not require the aircraft.

The Part 150 Study projected Airport originations as a function of income in the Louisville metropolitan area, average Louisville airfares and the number of medium and large hubs with non-stop service to Louisville.¹ Originations were converted to scheduled enplanements based upon the relationship between originations and enplanements at the Airport in 1998. Scheduled enplanements were then split between major air carriers and regional carriers based upon the historical relationship between the two and some assumptions about the expected roles of the two types of carriers in the future. Some Louisville markets are served by a mix of air carrier and regional

service, while others are strictly one or the other. Total scheduled Airport historical and forecast originations and enplanements are presented in **Table 3.1-1**.

Enplanements at the Airport experienced double-digit growth in 1993 and 1994. This increase in activity was driven by the start of Southwest service in 1993, and its first full year of service in 1994. Growth has moderated since 1995.

The Airport recorded enplanement activity at 1,876,499 for 2001, a decrease of 4.95 percent from that of 2000 (1,974,269).

Louisville enplanements and originations are projected to grow at an average annual rate of 2.7 percent from 1998 through 2020. This reflects the overall growth rate seen at the Airport from 1994 through 1998, during the period after Southwest's initiation of service. It is expected that passenger deplanements will equal enplanements.

Just fewer than 8 percent of the passengers at Louisville International Airport are transfer passengers. That is, these passengers neither originate nor terminate at the Airport. Rather, they connect from one flight to another at Louisville. Transfer passengers are projected to remain at the 1998 level of 7.7 percent of total enplanements throughout the forecast period. Therefore, their growth rates are identical to those of the enplanements and originations.

Air carrier and regional carriers differ in the type of equipment flown and the size of passenger loads carried. They also differ in operational characteristics such as aircraft turn times and servicing requirements at the gate, and in baggage volume and handling. In facility planning it is important to understand the demand levels placed on the airport by each type of carrier in order to properly size and design accommodations. The following sections provide more detail on the expected growth of air carrier and regional operators at Louisville International Airport.

TABLE 3.1-1**Louisville International Airport****HISTORICAL AND PROJECTED ENPLANEMENTS****Historical**

<u>Year</u>	<u>Total Scheduled Enplanements</u>	<u>Annual Growth</u>	<u>Originations</u>	<u>Originations Percent of Enplanements</u>	<u>(1) Transfer Passengers</u>
1989	1,001,953				
1990	1,041,784	4.0%			
1991	1,001,778	-3.8%			
1992	1,034,527	3.3%			
1993	1,202,049	16.2%			
1994	1,645,788	36.9%			
1995	1,760,000	6.9%			
1996	1,774,910	0.8%			
1997	1,827,886	3.0%	1,728,370	94.6%	99,516
1998	1,828,855	0.1%	1,687,795	92.3%	141,060

Average Annual Growth

1989-1994	10.4%
1994-1998	2.7%
1989-1998	6.9%

Projected

<u>Year</u>	<u>Total Scheduled Enplanements</u>	<u>Originations</u>	<u>Originations Percent of Enplanements</u>	<u>(1) Transfer Passengers</u>
2000	1,892,000	1,746,000	92.3%	146,000
2005	2,191,000	2,022,000	92.3%	169,000
2010	2,473,000	2,282,000	92.3%	191,000
2020	3,288,000	3,034,000	92.3%	254,000

Average Annual Growth

1998-2005	2.6%	2.6%	2.6%
2005-2010	2.5%	2.4%	2.5%
2010-2020	2.9%	2.9%	2.9%
1998-2020	2.7%	2.7%	2.7%

(1) Transfer passengers = Total Scheduled Enplanements - Originations.

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000

3.1.1 Air Carrier Enplanements

Table 3.1-2 presents historical and projected air carrier enplanements at Louisville International Airport. The air carriers' share of enplanements declined in the early 1990s as airlines at the Airport followed trends of reducing costs by transferring low-density, short-haul routes to regional affiliates. In 1994, the air carrier share of traffic increased due to Southwest's presence and the departure of some regional carriers from the market. Since 1995, the air carriers' share of traffic has been slowly declining. The Part 150 Study projects this decline in air carrier share to continue throughout the forecast period, as indicated in Table 3.1-2.

Air carrier enplanements actually declined in 1998, even though total airport traffic remained level. This reflected the continuing shift of passengers to regional affiliates. This decline in air carrier enplanements was projected to continue through 2000 as the air carrier share was forecast to fall to just under 88 percent. Positive growth was projected to return by 2010, and continue to be strong through 2020 as the decline in air carrier share slows. Air carrier enplanements are projected to grow at an average annual rate of 2.1 percent from 1998 through 2020.

3.1.2 Regional Carrier Enplanements

Regional carriers have experienced erratic growth at the Airport as shown in **Table 3.1-3**. Regional enplanements peaked in 1993, fell through 1995, then began growing again, reaching an all-time high in 1998. As discussed earlier, this reflects the early 1990s trend of air carriers' shifting traffic to regional affiliates, and the impact of Southwest on Airport traffic. The share of Airport traffic accommodated on regional carriers has been steadily increasing since 1995.

TABLE 3.1-2**Louisville International Airport****HISTORICAL AND PROJECTED ENPLANEMENTS
AIR CARRIERS****Historical**

<u>Year</u>	<u>Total Scheduled Enplanements</u>	<u>Air Carrier Enplanements</u>	<u>Air Carrier Share of Total Enplanements</u>
1989	1,001,953	914,433	91.3%
1990	1,041,784	943,659	90.6%
1991	1,001,778	891,117	89.0%
1992	1,034,527	915,591	88.5%
1993	1,202,049	1,067,981	88.8%
1994	1,645,788	1,524,876	92.7%
1995	1,760,000	1,675,756	95.2%
1996	1,774,910	1,681,771	94.8%
1997	1,827,886	1,726,442	94.5%
1998	1,828,855	1,678,652	91.8%

Average Annual Growth

1989-1994	10.4%	10.8%
1994-1998	2.7%	2.4%
1989-1998	6.9%	6.3%

Projected

<u>Year</u>	<u>Total Scheduled Enplanements</u>	<u>Air Carrier Enplanements</u>	<u>Air Carrier Share of Total Enplanements</u>
2000	1,892,000	1,661,000	87.8%
2005	2,191,000	1,823,000	83.2%
2010	2,473,000	2,038,000	82.4%
2020	3,288,000	2,674,000	81.3%

Average Annual Growth

1998-2005	2.6%	1.2%
2005-2010	2.5%	2.3%
2010-2020	2.9%	2.8%
1998-2020	2.7%	2.1%

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000

TABLE 3.1-2**Louisville International Airport****HISTORICAL AND PROJECTED ENPLANEMENTS
AIR CARRIERS****Historical**

<u>Year</u>	<u>Total Scheduled Enplanements</u>	<u>Air Carrier Enplanements</u>	<u>Air Carrier Share of Total Enplanements</u>
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1991	1,001,778	891,117	89.0%
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1995	1,760,000	1,675,756	95.2%
1996	1,774,910	1,681,771	94.8%
1997	1,827,886	1,726,442	94.5%
1998	1,828,855	1,678,652	91.8%

Average Annual Growth

1989-1994	10.4%	10.8%
1994-1998	2.7%	2.4%
1989-1998	6.9%	6.3%

Projected

<u>Year</u>	<u>Total Scheduled Enplanements</u>	<u>Air Carrier Enplanements</u>	<u>Air Carrier Share of Total Enplanements</u>
2000	1,892,000	1,661,000	87.8%
2005	2,191,000	1,823,000	83.2%
2010	2,473,000	2,038,000	82.4%
2020	3,288,000	2,674,000	81.3%

Average Annual Growth

1998-2005	2.6%	1.2%
2005-2010	2.5%	2.3%
2010-2020	2.9%	2.8%
1998-2020	2.7%	2.1%

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000

The fleet mix operated by regional carriers is shifting toward more comfortable, longer-range regional jets. Seating capacity is also increasing with these newer jet aircraft. These factors, combined with the air carriers' continuing trend to shift lower-density markets to regionals, will result in a continually increasing share of traffic flown on regional carriers throughout the forecast period.

This is reflected in the projections in Table 3.1-3. Regional enplanements are projected to grow at an average annual rate of over 9 percent from 1998 through 2010. This growth will then moderate to 3.5 percent annually through 2020. Growth rates for regional enplanements in both these periods exceed those for air carrier traffic.

3.1.3 Charter Enplanements

Charter activity is currently minimal at the Airport, as indicated in **Table 3.1-4**. Most of the operations are carried out by UPS, using aircraft that fly cargo at night to fly passengers during the day. UPS is uncertain about the future growth of its charter operations. However, it was projected that this activity could grow to almost one departure per day in 2000, and then traffic would grow at the same rate as scheduled enplanements. These charter operations would go to resort areas, including international destinations such as Aruba and Cancun. This results in just over 28,000 charter enplanements per year by 2020.

3.2 ANNUAL CARGO TONNAGE PROJECTIONS

Freight and mail activity at the Airport is driven by the operations of UPS and its hub at Louisville. This is demonstrated in **Table 3.2-1**. Since 1994, UPS has grown to handle over 98 percent of the cargo tonnage at Louisville International Airport. The prominence of UPS at the Airport is expected to continue and the carrier is undergoing

TABLE 3.1-4**Louisville International Airport****HISTORICAL AND PROJECTED ENPLANEMENTS
CHARTER****Historical**

Year	Total Scheduled Enplanements	Charter Enplanements	Total Scheduled & Charter Enplanements
1989	1,001,953	0	1,001,953
1990	1,041,784	0	1,041,784
1991	1,001,778	1,892	1,003,670
1992	1,034,527	380	1,034,907
1993	1,202,049	0	1,202,049
1994	1,645,788	0	1,645,788
1995	1,760,000	68	1,760,068
1996	1,774,910	1,760	1,776,670
1997	1,827,886	4,757	1,832,643
1998	1,828,855	15,645	1,844,500

Average Annual Growth

1989-1994	10.4%	n/a	10.4%
1994-1998	2.7%	n/a	2.9%
1989-1998	6.9%	n/a	6.3%

Projected

Year	Total Scheduled Enplanements	Charter Enplanements	Total Scheduled & Charter Enplanements
2000	1,892,000	16,200	1,908,200
2005	2,191,000	18,700	2,209,700
2010	2,473,000	21,200	2,494,200
2020	3,288,000	28,100	3,316,100

Average Annual Growth

1998-2005	2.6%	2.6%	2.6%
2005-2010	2.5%	2.5%	2.5%
2010-2020	2.9%	2.9%	2.9%
1998-2020	2.7%	2.7%	2.7%

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000

TABLE 3.2-1

Louisville International Airport

**HISTORICAL AND PROJECTED CARGO
FREIGHT AND MAIL
(U.S. Tons)**

Historical

<u>Year</u>	<u>Freight</u>	<u>Mail</u>	<u>Total Cargo</u>	<u>UPS</u>	<u>All Others</u>	<u>UPS Share</u>
1989	757,330	13,357	770,687			
1990	831,917	12,631	844,548			
1991	820,408	13,672	834,080			
1992	828,882	15,101	843,983			
1993	897,312	15,985	913,297			
1994	1,603,084	16,549	1,619,633	1,584,856	34,777	97.9%
1995	1,472,530	17,065	1,489,595	1,454,279	35,316	97.6%
1996	1,492,185	16,656	1,508,841	1,476,963	31,878	97.9%
1997	1,467,586	16,088	1,483,674	1,454,977	28,697	98.1%
1998	1,524,213	13,824	1,538,037	1,510,675	27,362	98.2%

Average Annual Growth

1989-1994	16.2%	4.4%	16.0%			
1994-1998	-1.3%	-4.4%	-1.3%	-1.2%	-5.8%	
1989-1998	8.1%	0.4%	8.0%			

Projected

<u>Year</u>	<u>Freight</u>	<u>Mail</u>	<u>Total Cargo</u>
2000	1,673,786	13,963	1,687,749
2005	2,415,172	14,458	2,429,630
2010	2,927,387	14,823	2,942,210
2020	3,636,850	15,274	3,652,124

Average Annual Growth

1998-2005	6.8%	0.6%	6.7%
2005-2010	3.9%	0.5%	3.9%
2010-2020	2.2%	0.3%	2.2%
1998-2020	4.0%	0.5%	4.0%

Source: Louisville International Airport Noise Compatibility Study
Airport Activity Forecasts Technical Report February 2000

operational improvements to accommodate higher volumes of freight and mail at their Louisville cargo hub.

The hub operation at Louisville means that local cargo development is driven by the strategic corporate decisions of UPS rather than the local or national economic indicators. Therefore, the cargo projections in the Part 150 Study were developed by coordinating directly with cargo industry leaders, particularly UPS management, and by analyzing micro cargo industry trends.²

3.2.1 Freight

Growth in the air cargo industry has been affected significantly by manufacturers' decisions to alter business practices. Time-dependent delivery services are forcing cargo transportation companies to modify the way they have traditionally done business. Zone-based pricing, regional hubbing and expanded ground networks are now used by providers to enhance productivity, profitability and competitiveness. Express carriers will continue to grow, albeit not at the double-digit rates seen over the past ten years.

All of these factors were discussed and considered in developing the Part 150 Study cargo projections. The specific assumptions underlying the projections are listed below:³

- UPS will continue to develop their national hub and incorporate the Hub 2000 efficiencies at the Airport.
- There will be additional regional hub development in the domestic U.S. market within the forecast period, which will have some constraining effect on tonnage and aircraft operations at the Airport.
- Package volume (tonnage) at the Airport will grow faster than aircraft operations. UPS plans to incorporate larger aircraft into their fleet at the Airport.
- International express package activity will outpace domestic express through the forecast period.

- Trucking activity will continue to increase in the UPS network and at the Airport. These trucking operations will act as a constraining factor on the growth of aircraft operations at the Airport.
- Other Airport carriers (FedEx) will continue to increase activity primarily using surface transportation modes.

The forecasts are presented in Table 3.2-1.

Freight volume has grown at just over 8 percent per year from 1989 through 1998, although growth since 1994 has been far slower. The largest increase in activity was due to UPS and its hubbing. While the efficiency improvements from its Hub 2000 plan will further increase capacity, it is unlikely that there will be such a large increase again during the forecast period. From 1998 to 2010, tonnage is expected to grow at 5.6 percent per year as the efficiencies of Hub 2000 are realized. Subsequently, the annual growth is projected to be 2.2 percent.

3.2.2 Mail

Historically, mail volume has grown at 0.4 percent per year. The flow of mail is not under the control of specific carriers, but the United States Postal Service. Therefore, the existence of a cargo hubbing facility is not necessarily a factor that will automatically produce high volumes of mail throughput. The Postal Service determines how mail is routed. Therefore, it is projected that growth of mail volume will continue at approximately the same pace as it has in the past. Table 3.2-1 indicates that mail tonnage is forecast to grow at 0.5 percent per year throughout the forecast period.

3.3 ANNUAL OPERATIONS AND FLEET MIX PROJECTIONS

Projections of aircraft operations were developed in the Part 150 Study for all of the categories of traffic volumes forecast above. In addition to passengers and cargo, operations forecasts were also developed for general aviation, air taxi and military activity. For planning purposes, it is necessary to understand each category of activity, because each category has different facility requirements. Also, each type of operation places different demands on airspace and airfield facilities.

The specific types of equipment used for these operations were also projected. The different landed weights, wing spans, and heights of these varying aircraft must be considered in determining the need for airfield requirements as well as certain landside facility needs. Consequently, it is necessary to understand in detail how many of each type of equipment require accommodation.

This section presents the Part 150 Study projections of operations and fleet mix as follows:

- *Air Carrier*
- *Regional*
- *Charter*
- *All Cargo Activity*
- *General Aviation*
- *Air Taxi and Other Operators*
- *Military*

3.3.1 Air Carrier Operations and Fleet Mix

In order to forecast the number of air carrier operations generated by the enplanement forecast in section 3.1.1, the Part 150 Study projected an average load factor and an average number of seats-per-departing aircraft through 2020 for air carriers at the Airport. Enplanements are divided by the load factor to calculate the number of seats required to transport the forecasted passengers.

This number of seats is then divided by the expected number of seats-per-departure to calculate the number of departures implicit in the projections.

Air carrier enplaned load factors at the Airport have grown from the mid-thirty percent range in the 1980s, to the forty percent range in the early 1990s, to a 1998 level of 57.1 percent. This level was below the national average load factor for domestic air carriers. Through use of more sophisticated yield management techniques, and because the Airport's load factors are below the national average, the air carriers' enplaned load factor at the Airport is projected to grow to 60.8 percent by 2020.

Air carrier operations at Louisville International Airport are currently dominated by small and medium narrow-body aircraft such as the 78-seat DC-9-10, the 118-seat 737-200 and the 131-seat 737-300. According to the Part 150 Study, the average number of seats per aircraft at the Airport is below the 142-seat national average of all domestic airlines. Air carriers interviewed in developing the Part 150 Study indicated that the small narrow-body aircraft types would continue to be used at Louisville. It is not expected that wide-body aircraft will be used there. In accordance with aircraft size projections developed by the FAA, the average seat size at the Airport is forecast to grow from the size noted in the Part 150 Study (120.1 seats) to 136.2 seats per departure by 2020.

The implications of these load factor and average seat size projections for the level of air carrier operations at the Airport are presented in **Table 3.3-1**. Historically, the average enplaned load factor has grown at 1.3 percentage points per year. It is forecast to grow at only 0.2 points per year throughout the forecast period. This slower growth is driven by the fact that the load factor for all domestic carriers nationwide reached an all-time high, and it is unlikely that it will grow as quickly in the future as it has in the past. Conversely, average seats per departing aircraft will grow faster than has been the case in the past. This is due

TABLE 3.3-1

Louisville International Airport

HISTORICAL AND PROJECTED OPERATIONS
AIR CARRIERS**Historical**

<u>Year</u>	Average Enplaned <u>Load</u> <u>Factor</u>	Average Seats Per <u>Departure</u>	Air Carrier <u>Enplanements</u>	(1) Air Carrier <u>Departures</u>	(2) Air Carrier <u>Operations</u>
1981	34.3%	113.5			
1982	33.1%	115.1			
1983	32.0%	117.9			
1984	33.2%	116.1			
1985	32.9%	116.3			
1986	34.7%	115.2			
1987	37.4%	113.5			
1988	37.1%	110.1			
1989	39.4%	111.7	914,433	20,778	41,556
1990	40.2%	113.2	943,659	20,737	41,474
1991	39.9%	116.5	891,117	19,171	38,341
1992	44.3%	122.0	915,591	16,941	33,882
1993	49.7%	116.6	1,067,981	18,429	36,859
1994	53.5%	115.6	1,524,876	24,656	49,312
1995	55.3%	116.6	1,675,756	25,989	51,978
1996	53.2%	122.0	1,681,771	25,912	51,823
1997	55.0%	116.6	1,726,442	26,921	53,842
1998	57.1%	119.1	1,678,652	24,684	49,368
1999	n/a	120.1			

Average Annual Growth

	Points Per <u>Year</u>	Seats Per <u>Year</u>			
			10.8%	1989-1994	3.5%
1981-1998	1.3		2.4%	1994-1998	0.0%
1981-1999		0.4	7.0%	1989-1998	1.9%

Projected

<u>Year</u>	Average Enplaned <u>Load</u> <u>Factor</u>	Average Seats Per <u>Departure</u>	Air Carrier <u>Enplanements</u>	(1) Air Carrier <u>Departures</u>	(2) Air Carrier <u>Operations</u>
2000	57.1%	120.4	1,661,000	24,200	48,400
2005	57.8%	122.0	1,823,000	25,900	51,800
2010	58.8%	126.9	2,038,000	27,300	54,600
2020	60.8%	136.2	2,674,000	32,300	64,600

Average Annual Growth

	Points Per <u>Year</u>	Seats Per <u>Year</u>			
1998-2005	0.1		1.2%	0.7%	0.7%
1999-2005		0.3			
2005-2010	0.2	1.0	2.3%	1.1%	1.1%
2010-2020	0.2	0.9	2.8%	1.7%	1.7%
1998-2020	0.2		2.1%	1.2%	1.2%
1999-2020		0.8			

(1) Air Carrier Departures = (Air Carrier Enplanements/Load Factor)/Seats per Departure

(2) Air Carrier Operations = Air Carrier Departures x 2.

Source: Louisville International Airport Noise Compatibility Study

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to the shift of air carriers to larger aircraft. For example, the dominant type of equipment in 2020 will be a 137-seat aircraft, and there will be no aircraft of fewer than 100 seats operated by air carriers at the Airport.

The operations growth resulting from this combination of factors will be 1.2 percent annually from 1998 through 2020. This is much slower than the 2.1 percent annual growth in enplanements. The air carriers will be filling a higher percentage of their seats, and will be flying more seats per departure in the future.

The projected mix of air carrier aircraft is presented in **Table 3.3-2**. Air carrier aircraft with fewer than 100 seats will be totally phased out of the Airport by 2020. In 1999, over 60 percent of the aircraft operated by air carriers at the Airport had 118 or fewer seats. By 2020, only 21 percent will fall into that category.

The assumptions pertaining to the air carrier fleet mix forecast are presented in **Table 3.3-3**. Overall, the Airport will remain a narrow-body passenger aircraft operation. Airbus equipment, which does not operate here now, will operate over 20 percent of the departures by 2010, and almost 30 percent by 2020.

3.3.2 Regional Operations and Fleet Mix

Regional operations were forecast using the same methodology as air carrier operations projections. Projected regional enplanements were combined with assumptions regarding future regional load factors and equipment size to calculate regional departures and operations. **Table 3.3-4** presents the load factor and average seat size assumptions, along with the regional operations forecast.

TABLE 3.3-2**Louisville International Airport****AIR CARRIER FLEET MIX**

<u>Equipment</u>	<u>Seats</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
DC-9-10	78	2.7%	0.5%				
737-100	95	0.1%					
F-100	97	5.2%	6.1%	6.0%	6.0%	4.0%	
BAE-146	100	2.7%	2.8%	2.8%	2.0%	1.0%	
DC-9-30	100	23.6%	23.1%	23.0%	18.0%	6.0%	
A-318	100				2.0%	7.0%	8.0%
717	100				2.0%	4.0%	5.0%
737-500	104	0.6%			1.0%	1.0%	
737-600	108				3.0%	7.0%	8.0%
737-200	118	29.7%	30.6%	30.2%	21.0%	10.0%	
A-319	124				2.0%	7.5%	10.0%
737-300	131	10.4%	11.6%	12.5%	10.0%	7.0%	5.0%
737-700	137	0.5%	2.1%	3.5%	13.0%	22.0%	28.0%
MD-80	142	9.9%	11.3%	12.0%	9.0%	4.0%	2.0%
737-400	144	1.6%	0.7%		2.0%	2.0%	1.0%
727-200	148	13.0%	11.2%	9.0%	1.0%		
A-320	148				3.0%	7.5%	11.0%
737-800	162			1.0%	5.0%	9.0%	16.0%
757-200	180		0.1%			1.0%	6.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Average Seats Per Departure		119.1	120.1	120.4	122.0	126.9	136.2

Source: Louisville International Airport Noise Compatibility Study
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TABLE 3.3-3***Louisville International Airport******AIR CARRIER FLEET MIX ASSUMPTIONS***

<u>Airline</u>	
All	<p>No Stage 2 aircraft operate after December 31, 1999.</p> <p>Hush-kitting FAR Part 36 Stage 2 aircraft to meet Stage 3 requirements is assumed. The percentage of hush-kitted aircraft is assumed to be greatest in 2000 and to slowly diminish until completely withdrawn by 2020.</p> <p>No wide-body aircraft are expected to be introduced at the Airport.</p> <p>No attempt was made to forecast aircraft types not currently in the planning or design stages.</p> <p>No supersonic, hypersonic or tilt-rotor aircraft are projected.</p>
Southwest	Continue using the Boeing 737 family of aircraft as the mainstay of its fleet, gradually replacing 737-200s with larger aircraft such as the 737-700.
Delta	Replace Boeing 727 and 737 aircraft with newer Boeing aircraft such as the 737-800s and 757s.
US Airways	Undergo a major fleet transition to Airbus A-319, A-320 and A-321 over the next 20 years.
American	Acquire a large number of Boeing aircraft such as the 737-800.
Northwest	Begin phasing out hush-kitted DC-9-30s by 2010 and to replacing them with Airbus aircraft.
United	Gradually replace older generation Boeing 737 aircraft with Airbus aircraft.
Continental	Replace DC-9 aircraft with next generation Boeing 737 aircraft.
TWA	Replace older aircraft with Airbus A318 and Boeing 717 aircraft.

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000

TABLE 3.3-4

Louisville International Airport

HISTORICAL AND PROJECTED OPERATIONS
REGIONAL**Historical**

<u>Year</u>	Average Enplaned <u>Load</u> <u>Factor</u>	Average Seats Per <u>Departure</u>	Regional <u>Enplanements</u>	(1) Regional <u>Departures</u>	(2) Regional <u>Operations</u>
1981	n/a	15.9			
1982	n/a	16.5			
1983	n/a	19.2			
1984	n/a	18.6			
1985	n/a	18.9			
1986	n/a	0.7			
1987	n/a	21.0			
1988	n/a	24.0			
1989	42.2%	27.8	87,520	7,460	14,920
1990	44.6%	27.8	98,125	7,914	15,828
1991	39.8%	29.3	110,661	9,490	18,979
1992	47.1%	34.6	118,936	7,298	14,596
1993	54.8%	33.9	134,068	7,217	14,434
1994	n/a	27.8	120,912		
1995	n/a	26.5	84,244		
1996	61.7%	31.3	93,139	4,823	9,646
1997	62.2%	33.3	101,444	4,898	9,795
1998	62.9%	37.6	150,203	6,351	12,702
1999	n/a	41.0			

Average Annual Growth

	Points Per <u>Year</u>	Seats Per <u>Year</u>			
			6.7%	1989-1994	
1989-1998	2.3		5.6%	1994-1998	
1981-1999		1.4	6.2%	1989-1998	-1.8%

Projected

<u>Year</u>	Average Enplaned <u>Load</u> <u>Factor</u>	Average Seats Per <u>Departure</u>	Regional <u>Enplanements</u>	(1) Regional <u>Departures</u>	(2) Regional <u>Operations</u>
2000	63.1%	43.7	231,000	8,400	16,800
2005	63.6%	47.0	435,000	12,300	24,600
2010	64.1%	48.2	435,000	14,100	28,200
2020	65.1%	49.5	614,000	19,100	38,200

Average Annual Growth

	Points Per <u>Year</u>	Seats Per <u>Year</u>			
1998-2005	0.1		16.4%	9.9%	9.9%
1999-2005		1.0			
2005-2010	0.1	0.2	0.0%	2.8%	2.8%
2010-2020	0.1	0.1	3.5%	3.1%	3.1%
1998-2020	0.1		6.6%	5.1%	5.1%
1999-2020		0.4			

(1) Regional Departures = (Regional Enplanements/Load Factor)/Seats Per Departure

(2) Regional Operations = Regional Departures x 2.

Source: Louisville International Airport Noise Compatibility Study
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Regional load factors at Louisville International Airport grew from the 40 percent range in the early 1990s, to the mid-50 percent range in the mid-1990s, and are currently over 60 percent. The 1998 regional load factor at the Airport was 62.9 percent. According to the Part 150 Study, this load factor is higher than the national average for regional carriers, 56.5 percent. It is also higher than the air carrier load factor at the Airport. Therefore, the regional load factor is projected to grow at only 0.1 points per year through 2020, keeping it more in line with the national average.

The Part 150 Study based its regional fleet mix assumptions on airline interviews and supplemented those with published reports. The Airport will see the same rapid transition to regional jets that the rest of the country is experiencing. Regional jets were approximately 54 percent of Airport regional operations in 1999. The forecast projects them to operate 67 percent of departures by 2010, and 90 percent by 2020. This will rapidly increase the average number of seats per aircraft through 2010, with a more gradual increase to 2020. In 1998, the average regional aircraft size was 37.6 seats. This increased to 41.0 seats by 1999, and is projected to grow to 48.2 seats by 2010, and 49.5 seats by 2020. Overall, this represents an average annual increase of 0.4 seats per year from 1999 through 2020.

As Table 3.3-4 indicates, the assumptions regarding load factor and average seat size produce a regional operations forecast of 38,200 in 2020. This represents a 5.1 percent average annual growth rate in operations, compared with a 6.6 percent rate for enplanements. As with the air carriers, filling a higher percentage of seats and operating larger aircraft keep the operations from growing as quickly as the passenger forecast grows.

The regional fleet mix is presented in **Table 3.3-5**. The shift to regional jet aircraft is evident from 1998 to 1999. All jet operations increase, while all other categories decline in importance at the Airport. The 5.5 seats per departure

<p>TABLE 3.3-5</p> <p>Louisville International Airport</p> <p>REGIONAL FLEET MIX</p>							
<u>Equipment</u>	<u>Seats</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
Beechcraft	19	13.7%	12.8%	10.0%	7.0%	5.0%	3.0%
Embraer 120	30	28.8%	18.0%	12.0%			
Saab 340	34	17.3%	15.6%	11.0%	3.0%	3.0%	3.0%
EMB 135	37				10.0%	10.0%	10.0%
DHC8	37	1.6%					
RJ50	50	24.9%	33.8%	37.0%	45.0%	44.0%	44.0%
EMB 145	50	10.8%	14.4%	25.0%	30.0%	30.0%	29.0%
Avro RJ85	69	2.9%	5.5%	5.0%	5.0%	4.0%	3.0%
RJ70	70					4.0%	8.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Average Seats Per Departure		37.6	41.0	43.7	47.0	48.2	49.5

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000

growth in average aircraft size from 2000 to 2010 represents a 0.7 seat per year increase. The rate of increase from 2010 to 2020 declines to 0.1 seat per year. Comair and Continental Express, the two largest regional carriers at the Airport, are assumed in the projections to complete their transition to regional jets as announced. Other regional carriers are expected to follow a similar pattern.

3.3.3 Charter Operations and Fleet Mix

UPS operates virtually all of the charter activity at the Airport. Discussions with the carrier indicate that they plan to perform their charter operations using 148-seat 727-100 aircraft. Charter operations were projected assuming that passengers per departure would grow at the same rate as the air carrier passengers per operation. The results appear below in **Table 3.3-6**:

TABLE 3.3-6				
Louisville International Airport				
CHARTER OPERATIONS PROJECTIONS				
Year	Charter Enplanements	Enplanements per Departure	Aircraft Departures	Aircraft Operations
1998	15,645	45.7	342	684
2000	16,200	46.2	351	702
2005	18,700	47.4	395	790
2010	21,200	50.2	422	844
2020	28,100	55.7	504	1,008

Source: Louisville International Airport, Noise Compatibility Study, Airport Activity Forecasts, February 2000

3.3.4 All Cargo Operations and Fleet Mix

All cargo operations at Louisville International Airport were forecast in discussions with UPS and other freight, mail and express carriers currently operating here. The results are presented in **Table 3.3-7**. Cargo tons per operation increased significantly after the initiation of the UPS hub. This unit of measure was expected to make another large increase in 2000 when the latest round of improvements began to take effect.

TABLE 3.3-7***Louisville International Airport******HISTORICAL AND PROJECTED OPERATIONS
ALL CARGO*****Historical**

<u>Year</u>	<u>Cargo Tonnage</u>	<u>All Cargo Operations</u>	<u>Tons Per Operation</u>
1989	770,687	40,884	18.9
1990	844,548	43,382	19.5
1991	834,080	44,448	18.8
1992	843,983	47,626	17.7
1993	913,297	52,160	17.5
1994	1,619,633	n/a	n/a
1995	1,489,595	n/a	n/a
1996	1,508,841	54,978	27.4
1997	1,483,674	53,608	27.7
1998	1,538,037	55,444	27.7

Average Annual Growth

1989-1998	8.0%	3.4%	4.4%
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Projected

<u>Year</u>	<u>Cargo Tonnage</u>	<u>All Cargo Operations</u>	<u>Tons Per Operation</u>
2000	1,687,749	55,462	30.4
2005	2,429,630	65,110	37.3
2010	2,942,210	71,672	41.1
2020	3,652,124	82,232	44.4

Average Annual Growth

1998-2005	6.7%	2.3%	4.3%
2005-2010	3.9%	1.9%	1.9%
2010-2020	2.2%	1.4%	0.8%
1998-2020	4.0%	1.8%	2.2%

Source: Louisville International Airport Noise Compatibility Study
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 PB Aviation

The Airport recorded all cargo, by total landed weight, at 8,052,720,760 pounds for 2001, an increase of .99 percent over that of 2000 (7,973,435,125 pounds), as reported by the Air Carrier Activity Information System (ACAIS).

By 2010, Hub 2000 efficiencies are expected to be fully realized, resulting in more growth in tonnage per operation. Also, larger aircraft will be introduced into the fleet over this time period, allowing for more tonnage per departure. Thus, operations will grow more slowly than tonnage over the forecast period. After an average annual growth rate of 2.2 percent from 1998 through 2010, the rate will slow to 1.4 percent annually from 2010 through 2020.

The fleet mix was forecast in conversations with current cargo operators at the Airport, primarily UPS. It is presented in **Table 3.3-8**. The following assumptions were made in developing the Part 150 Study's forecast of the cargo fleet mix operating at the Airport:⁴

- Aircraft manufacturer projections and aircraft orders by cargo carriers indicate a significant increase in the wide-body aircraft fleet.
- FAR Part 36 Stage 2 aircraft, including those with hush kits, will be gradually phased out.
- 747-100 aircraft will gradually be replaced by other wide-body aircraft.
- UPS and FedEx will fly virtually all of their future growth in new, Airbus A300-600 equipment, which is on order.
- Limited numbers of new, very large aircraft (VLA), such as the proposed Airbus A3XX, will be introduced for cargo by 2020.
- No attempt was made to forecast aircraft types which are not currently in the planning or development stages. No supersonic, hypersonic or tilt-rotor aircraft are projected.

TABLE 3.3-8***Louisville International Airport******ALL CARGO FLEET MIX***

<u>Equipment</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
CNA	0.7%	0.7%	0.7%	0.5%	0.5%	0.4%
727-100	7.7%	7.4%	6.5%	1.4%	0.6%	0.2%
727-200	3.2%	1.9%	2.1%	2.3%	1.4%	0.7%
757	31.6%	31.9%	33.0%	28.4%	25.7%	22.5%
DC8	27.9%	25.0%	24.1%	14.4%	8.3%	6.3%
767-300	22.5%	26.8%	26.6%	18.7%	17.0%	14.8%
A-310				0.8%	0.7%	0.6%
A-300-600				23.9%	35.7%	44.7%
MD-11(a)				1.8%	3.1%	4.9%
747-100	5.8%	5.4%	6.0%	7.1%	6.0%	3.6%
747-200	0.7%	1.0%	1.0%	0.8%	0.7%	0.6%
A-3XX					<u>0.4%</u>	<u>0.6%</u>
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

(1) Representative Aircraft Type

Source: Louisville International Airport Noise Compatibility Study

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Over the forecast period, the Boeing 757 and 767-300 will still carry a large portion of the Airport's cargo volume. However, by 2010, the Airbus 300-600 will become the dominant aircraft in cargo operations at the Airport.

3.3.5 General Aviation Operations and Fleet Mix

General aviation activity at Louisville International Airport has been declining from 1990 through 1998, as indicated in **Table 3.3-9**. Sources at the Airport indicated that much of this decline results from decreasing piston traffic due to increasing jet activity from both passenger and UPS aircraft. It is surmised that this piston traffic is now being served by Louisville Bowman Field and Clark County Airport in Southern Indiana. Also, several companies have reduced or relocated corporate aircraft from the Airport. Thus, general aviation activity at the Airport is becoming more oriented toward turbojet and turboprop aircraft.

In spite of recent declines in general aviation activity, Louisville is expected to benefit in the future from the resurgence expected in many general aviation areas. The following factors have influenced national trends toward increasing general aviation operations:

- Cessna has resumed production of aircraft after a 10-year hiatus.
- Shipments and billings for new aircraft have exhibited extremely high growth.
- The market for business jets for use in corporate aviation has been strong for both new and older models.

In the Part 150 Study, general aviation operations were forecast by aircraft type, reflecting the different factors influencing their growth. Turbojet, turboprop and multi-engine piston aircraft are forecast to grow at rates relative to the FAA's forecasts. Single-engine aircraft operations are forecast to continue declining through 2010, just as general aviation operations have declined since 1990.

TABLE 3.3-9**Louisville International Airport****HISTORICAL AND PROJECTED
OPERATIONS AND FLEET MIX****GENERAL AVIATION****Historical**

<u>Year</u>	<u>Turbojets</u>	<u>Turbo-props</u>	<u>Multi-Engine</u>	<u>Single Engine</u>	<u>Rotorcraft</u>	<u>Total General Aviation</u>
1990						45,400
1991						39,900
1992						37,200
1993						38,500
1994						39,200
1995						32,400
1996						35,000
1997						33,100
1998	12,300	4,700	4,300	7,291	1,400	29,991

Average Annual Growth

1998-1990	(5.1)%
-----------	--------

Projected

<u>Year</u>	<u>Turbojets</u>	<u>Turbo-props</u>	<u>Multi-Engine</u>	<u>Single Engine</u>	<u>Rotorcraft</u>	<u>Total General Aviation</u>
2000	12,700	4,700	4,400	6,500	1,400	29,700
2005	15,000	5,400	4,600	4,800	1,400	31,200
2010	17,500	6,300	4,800	3,900	1,400	33,900
2020	23,400	8,300	5,100	3,200	1,400	41,400

Average Annual Growth

1998-2005	2.9%	2.0%	1.0%	(5.8)%	0.0%	0.6%
2005-2010	3.1%	3.1%	0.9%	(4.1)%	0.0%	1.7%
2010-2020	2.9%	2.8%	0.6%	(2.0)%	0.0%	2.0%
1998-2020	3.0%	2.6%	0.8%	(3.7)%	0.0%	1.5%

Source: Louisville International Airport Noise Compatibility Study

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Single-engine aircraft operations are expected to continue to decrease after 2010, but at a slower rate through 2020. Rotorcraft operations are performed by “traffic copters,” and are forecast to continue at their twice-daily current level.

Table 3.3-10 below indicates that these respective growth rates will result in a fleet mix in 2010 and 2020 that is much more oriented toward turbojet and turboprop activity.

TABLE 3.3-10						
Louisville International Airport						
GENERAL AVIATION FLEET MIX PROJECTIONS						
Year	Turbojets	Turboprops	Multi-Engine	Single Engine	Rotorcraft	Total General Aviation
1998	41.0%	15.7%	14.3%	24.3%	4.7%	100.0%
2000	42.8%	15.8%	14.8%	21.9%	4.7%	100.0%
2005	48.1%	17.3%	14.7%	15.4%	4.5%	100.0%
2010	51.6%	18.6%	14.2%	11.5%	4.1%	100.0%
2020	56.5%	20.0%	12.3%	7.7%	3.4%	100.0%

Source: Louisville International Airport, Noise Compatibility Study, Airport Activity Forecasts, February 2000

3.3.6 Air Taxi and Other Operations and Fleet Mix

“Air taxi and other operations” includes non-scheduled charter operators and air taxi operators which have not been included in categories previously presented. Air taxi operators are subject to the requirements of FAR Part 135 and offer service to the general public for a fee. Air taxi operators are considered to be air carriers, although large air carriers operate under FAR Part 121, which has even more stringent regulations than FAR Part 135. At Louisville International Airport, the category of air taxi and other includes nonscheduled cargo carriers (e.g., Air Cargo Carriers, Ameriflight, Ameristar, Kitty Hawk, Reliant, Viking Express, Wiggins Airways, and Zanstop), specialized cargo carriers (e.g., US Check), and air taxi operators (e.g., Executive Jet).

TABLE 3.3-11**Louisville International Airport****OPERATIONS AND FLEET MIX PROJECTIONS
AIR TAXI AND OTHER**

<u>Year</u>	<u>Operations</u>	
	<u>Cargo</u>	<u>Air Taxi & Others</u>
1998	55,444	19,229
2000	55,462	19,200
2005	65,110	22,600
2010	71,672	24,800
2020	82,232	28,600
<u>Average Annual Growth</u>		
1998-2020	1.8%	1.8%

<u>Equipment</u>	<u>Fleet Mix</u>			
	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
Single Engine Piston	1.7%	1.0%	1.0%	1.5%
Multi-Engine Piston	33.4%	33.5%	32.5%	33.4%
Turboprop	20.6%	20.6%	20.0%	19.2%
GA Jet	33.7%	33.3%	32.5%	32.5%
L188	1.9%	1.8%	0.9%	0.0%
DC-9-30	4.5%	4.0%	3.4%	2.7%
727-200	4.2%	3.5%	2.9%	1.6%
757	0.0%	0.9%	4.2%	6.3%
DC-8	0.1%	0.3%	0.7%	0.1%
767-300	0.0%	0.7%	0.2%	0.3%
A-300-600	<u>0.0%</u>	<u>0.6%</u>	<u>1.7%</u>	<u>2.4%</u>
Total	100.0%	100.0%	100.0%	100.0%

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000
 PB Aviation

Historical information on air taxi and other operations is not readily available, and these operations could not be forecast using statistical methods. There is a strong cargo component to these operations in equipment type and operating pattern. Therefore, these operations are projected to grow at the same rate as cargo operations at the Airport. This is presented in **Table 3.3-11**. Also presented in this table is the expected mix of equipment for air taxi and other operations.

Older types of equipment are expected to remain around longer in the fleet for this group of operators than is seen in the passenger and cargo fleet mixes. The operators of air taxi activity tend to be small companies whose financial resources will compel them to operate older aircraft longer. Therefore, their transition to newer aircraft will occur more slowly.

3.3.7 Military Operations and Fleet Mix

Military operations at the Airport have been declining since 1990. However, the Kentucky Air National Guard (KYANG) recently relocated to new facilities on the airfield. Its full complement of C-130H equipment is some of the newest aircraft in the military. The unit is called upon frequently to serve in military transport operations around the world. Given this new situation, it is expected that military operations will remain constant at 4,600 operations per year throughout the forecast period. Continued use of C-130H aircraft is expected.

3.4 PEAK HOUR PROJECTIONS

In planning airport facilities it is important to identify the times of peak activity and the levels of activity that occur during those timeframes. Facilities are designed to accommodate an average day during the peak month, rather than the absolute peak level of activity. At Louisville, there is a difference in the level of activity on weekdays versus weekend days. Weekdays tend to handle more passenger and cargo flights

than weekends. Therefore, the Part 150 Study developed its peaking forecasts for the peak hour of the average weekday of the peak month. Peaking tends to be different for arrivals and departures, as well as for the different categories of operations.

3.4.1 Passenger Peaking

The peak passenger month at the Airport is July. The Part 150 Study used 1997 as a basis for its peaking analysis because a Northwest job action in 1998 created a seasonal distortion. While there are no specific data on passenger peaking, it is felt that the passenger flow at an airport follows the flow of arriving and departing seats. Both air carrier and regional departures peak during the 7:00 AM to 7:59 AM hour. Air carrier arrivals peak from 9:00 PM to 9:59 PM, while regional arrivals peak in the late morning, from 11:00 AM to 11:59 AM. Over time, as an airline adds more flights to a schedule, the passenger peaks tend to flatten out.

The passenger peaking forecast is presented in **Table 3.4-1**. Enplanements on air carrier departures are forecast to remain at a constant level relative to annual enplanements throughout the forecast period. This is because the growth of air carrier traffic is forecast at a moderate 2.1 percent per year. This same relationship holds true for air carrier deplaning passengers. However, regional traffic is forecast to grow at 6.6 percent annually through 2020, and this is expected to shift traffic to non-peak hours, lowering the percentage of traffic in the peak hour. In both cases, arriving passengers exhibit less severe peaking than do departing passengers. Air carrier peaking passengers will increase approximately 60 percent from 2000 through 2020, while regional peaking passengers will more than double.

3.4.2 Operations Peaking

Operations for different categories of air service peak at different times of the day. Passenger flights generally operate from about 7:00 AM through 10:00

TABLE 3.4-1**Louisville International Airport****PEAK HOUR PASSENGER PROJECTIONS**

<u>Enplanements</u>	<u>Air Carrier</u>	<u>Regional</u>
Annual		
2000	1,661,000	231,000
2005	1,823,000	369,000
2010	2,038,000	435,000
2020	2,674,000	614,000
Peak Hour	(0700-0759)	(0700-0759)
2000	983	151
2005	1,079	226
2010	1,206	261
2020	1,582	351
Peak Hour %		
2000	0.0592%	0.0654%
2005	0.0592%	0.0612%
2010	0.0592%	0.0600%
2020	0.0592%	0.0572%

<u>Deplanements</u>	<u>Air Carrier</u>	<u>Regional</u>
Annual		
2000	1,661,000	231,000
2005	1,823,000	369,000
2010	2,038,000	435,000
2020	2,674,000	614,000
Peak Hour	(2100-2159)	(1100-1159)
2000	866	125
2005	951	186
2010	1,063	215
2020	1,395	289
Peak Hour %		
2000	0.0521%	0.0541%
2005	0.0522%	0.0504%
2010	0.0522%	0.0494%
2020	0.0522%	0.0471%

Source: Louisville International Airport Noise Compatibility Study

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PM. Cargo operations focus on late night and early morning activity. As freight comes into the hub, it is sorted, and then redistributed for daytime delivery. General aviation activity at Louisville is split between passenger and cargo activity, with an estimated 60 percent being driven by the cargo operation at the Airport. This same split is assumed for air taxi and other operations. Military flights are usually operated on a routine schedule for transport and training, except when major deployments take place.

Table 3.4-2 presents the peaking hours and levels of the various categories of aircraft activity at the Airport. Air carrier and regional departures both peak during the 7:00 AM – 7:59 AM hour. The air carrier departure peak will grow from 11 to 14 departures over the forecast period. This represents a steadily declining percent of annual operations. It is expected that as activity grows, departures would spread out across the hours of the day, decreasing the peaking percentage, while still increasing the number of departures in the peak hour. For regional carriers, departures in the peak hour will increase from 4 to 8, indicating a steadily declining percent of annual departures.

Air carrier arrivals peak in the evening, with less of a spike than departures. Between 9:00 PM and 9:59 PM, air carrier arrivals will grow from 9 in 2000 to 11 in 2020. Regional aircraft arrivals peak mid-day, from 11:00 AM to 11:59 AM. Arrivals of regional flights will double from 5 to 10 over the forecast period. As with departures, these arrival peaks decline steadily as a percent of annual arrivals.

Cargo activity has a pattern which is very different from that of passenger operations. The peak arrival hour is from midnight to 12:59 AM, while the peak departure hour is from 4:00 AM to 4:59 AM. These peaks are a much higher percent of annual operations than are the passenger operation peaks. As with the passenger operations, the peaks level off slightly over the forecast period.

TABLE 3.4-2					
Louisville International Airport					
PEAK HOUR OPERATIONS PROJECTIONS					
<u>Departures</u>	<u>Air Carrier</u>	<u>Regional</u>	<u>Cargo</u>	<u>General Aviation</u>	<u>Military</u>
Annual				(1)	
2000	24,200	8,400	27,731	14,850	2,300
2005	25,900	12,300	32,555	15,600	2,300
2010	27,300	14,100	35,836	16,950	2,300
2020	32,300	19,100	41,116	20,700	2,300
Peak Hour	(0700-0759)	(0700-0759)	(0400-0459)	(0800-0859)	(1300-1359)
2000	11	4	50	6.5	2
2005	11	5	56	7.0	2
2010	12	6	60	7.5	2
2020	14	8	66	9.0	2
Peak Hour %					
2000	0.0455%	0.0476%	0.1803%	0.0438%	0.0870%
2005	0.0425%	0.0407%	0.1720%	0.0449%	0.0870%
2010	0.0440%	0.0426%	0.1674%	0.0442%	0.0870%
2020	0.0433%	0.0419%	0.1605%	0.0435%	0.0870%
<u>Arrivals</u>	<u>Air Carrier</u>	<u>Regional</u>	<u>Cargo</u>	<u>General Aviation</u>	<u>Military</u>
Annual					
2000	24,200	8,400	27,731	14,850	2,300
2005	25,900	12,300	32,555	15,600	2,300
2010	27,300	14,100	35,836	16,950	2,300
2020	32,300	19,100	41,116	20,700	2,300
Peak Hour	(2100-2159)	(1100-1159)	(0000-0059)	(0800-0859)	(1500-1559)
2000	9	5	34	6.5	2
2005	9	7	38	7.0	2
2010	10	8	41	7.5	2
2020	11	10	45	9.0	2
Peak Hour %					
2000	0.0372%	0.0595%	0.1226%	0.0438%	0.0870%
2005	0.0347%	0.0569%	0.1167%	0.0449%	0.0870%
2010	0.0366%	0.0567%	0.1144%	0.0442%	0.0870%
2020	0.0341%	0.0524%	0.1094%	0.0435%	0.0870%

(1) General Aviation peak is for all operations in a single hour.

Source: Louisville International Airport Noise Compatibility Study

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Peak cargo departures increase from 50 in 2000 to 66 in 2020, while peak cargo arrivals grow from 34 to 45.

In the Part 150 Study, peaking activity for general aviation activity was projected for total operations in a single hour, rather than for arrivals and departures separately. As with air taxi and other operations, general aviation operations do not follow the structured schedules followed by passenger and scheduled cargo carriers. General aviation operations peak from 8:00 AM through 8:59 AM. This represents a combination of both cargo and passenger influences. Air taxi and other operations do not exhibit significant patterns of peaking, and were not analyzed for peaking characteristics.

Military activity involves training flights and deployment activity. This activity has a departure peak of 1:00 PM through 1:59 PM, and an arrival peak of 3:00 PM through 3:59 PM. Charter activity is forecast to have only one departure on the average weekday of the peak month. This departure would occur at approximately 9:00 AM, with a 7:00 PM arrival.

3.5 24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

For each category of activity, a daily schedule was developed. Each operation was defined as an arrival or departure, and assigned a specific time and equipment type. For the scheduled passenger and cargo operations, origin and destination points were also assigned. For general aviation, air taxi, charter, military and other operations, times and aircraft types were uniquely assigned. However, there are virtually no data on the origin and destination points of these flights. Therefore, rather than speculate on the actual cities involved, airport navigational fixes were assigned to these flights. This provides adequate information for computer simulations that evaluate the capability of the Airport's airfield to accommodate future activity.

The numbers of flights for the scheduled passenger and cargo categories assumed in this 24-hour activity projection were developed in the Part 150 Study. The

activity level described reflects the average weekday of the peak month of Airport activity. These activity levels are presented in **Table 3.5-1**. General aviation and air taxi operations for the average weekday of the peak month were deduced from the operations forecast for specific equipment types, and the total operations forecast for all activity in the Part 150 Study. Activity is depicted for 2000, 2010, and 2020. These periods correspond to the airfield simulations that are prepared for the base year, the 10-year and the 20-year planning horizons.

TABLE 3.5-1						
Louisville International Airport						
AVERAGE WEEKDAY PEAK MONTH OPERATIONS						
Year	Air Carrier		Regional		Cargo	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
2000	72	72	25	25	128	128
2005	77	77	37	37	151	151
2010	81	81	42	42	166	166
2020	96	96	57	57	190	190

Source: Louisville International Airport Noise Compatibility Study
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3.5.1 Passenger 24-Hour Aircraft Activity Projections

For passenger flights, specific arrivals and departures were added based upon historical origin and destination traffic, and logical connecting routings for service to cities without non-stop service. The Part 150 Study indicated that over the forecast period new non-stop service would be added to nine markets:

- *Las Vegas, NV*
- *Kansas City, MO*
- *Fort Lauderdale, FL*
- *Miami, FL*
- *Denver, CO*
- *Salt Lake City, UT*
- *New Orleans, LA*
- *Jacksonville, FL*
- *Fort Myers, FL*

New non-stop markets were added with morning and evening arrivals/departures, allowing for single-day round trip travel. Existing markets received additional service as traffic growth assumptions and aircraft type assumptions indicated that it would be warranted. Flights were added at times of day not already served in the market. Equipment types were assigned based upon the fleet forecast and the acquisition assumptions regarding the carriers serving or expected to serve each market.

Table 3.5-1 indicates that air carrier flights on the average weekday of the peak month will grow from 72 arrivals and departures in 2000 to 96 of each in 2020. This is a growth of 33 percent. Regional activity is forecast to more than double, from 25 departures in 2000 to 57 in 2020. Cargo operations are projected to increase from 128 arrivals and departures to 190 in 2020, an increase of 48 percent.

The arrivals and departures over a 24-hour period for air carriers and regional operations are presented in **Tables 3.5-2** and **3.5-3**, respectively. The boxed time slots represent the peak activity hours. Air carriers retain their peaking hours of 7:00 AM – 7:59 AM for departures and 9:00 PM – 9:59 PM for arrivals. Regionals continue to peak at 7:00 AM – 7:59 AM and 11:00 AM – 11:59 AM.

Charter activity is forecast for one departure and one arrival daily on the average weekday of the peak month. The timing of this operation is shown in **Table 3.5-4**. It is expected to be operated with a 727-100.

TABLE 3.5-2

Louisville International Airport

24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

AVERAGE WEEKDAY PEAK MONTH

AIR CARRIER

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059									
0100-0159									
0200-0259									
0300-0359									
0400-0459									
0500-0559									
0600-0659		7	7		8	8		7	7
0700-0759		11	11		12	12	1	14	15
0800-0859	2	2	4	2	1	3	1	2	3
0900-0959	8	3	11	9	4	13	10	4	14
1000-1059	1	5	6	2	6	8	3	7	10
1100-1159	5	4	9	5	5	10	6	6	12
1200-1259	4	5	9	4	5	9	5	6	11
1300-1359	4	4	8	4	4	8	4	5	9
1400-1459	3	4	7	4	4	8	5	4	9
1500-1559	3	3	6	3	4	7	5	4	9
1600-1659	6	3	9	7	3	10	9	6	15
1700-1759	4	6	10	5	7	12	6	9	15
1800-1859	5	4	9	6	5	11	8	6	14
1900-1959	3	3	6	4	4	8	5	5	10
2000-2059	4	4	8	4	5	9	4	7	11
2100-2159	9	4	13	10	4	14	11	4	15
2200-2259	4		4	4		4	5		5
2300-2359	7		7	8		8	8		8
Total	72	72	144	81	81	162	96	96	192
Peak Hour	9	11	13	10	12	14	11	14	15
Peak Percent	12.5%	15.3%	9.0%	12.3%	14.8%	8.6%	11.5%	14.6%	7.8%

Source: PB Aviation

TABLE 3.5-3

Louisville International Airport

24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

AVERAGE WEEKDAY PEAK MONTH

REGIONAL CARRIERS

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059									
0100-0159									
0200-0259									
0300-0359									
0400-0459									
0500-0559					1	1		1	1
0600-0659		2	2		1	1		1	1
0700-0759		4	4	1	6	7	1	8	9
0800-0859	1		1	2		2	1		1
0900-0959	1	2	3	2	4	6	2	5	7
1000-1059	1	1	2	1	1	2	2	2	4
1100-1159	5	3	8	8	2	10	10	3	13
1200-1259	1	3	4	1	5	6	3	6	9
1300-1359	2		2	4	1	5	6	3	9
1400-1459	1	1	2	2	3	5	3	5	8
1500-1559	2	3	5	3	5	8	4	6	10
1600-1659	1	1	2	3	3	6	3	4	7
1700-1759	2	1	3	2	2	4	5	2	7
1800-1859	1	2	3	3	4	7	4	7	11
1900-1959	1	1	2	1	1	2	1	2	3
2000-2059	1	1	2	3	2	5	3	2	5
2100-2159	2		2	2		2	3		3
2200-2259	2		2	2	1	3	3		3
2300-2359	1		1	2		2	3		3
Total	25	25	50	42	42	84	57	57	114
Peak Hour	5	4	8	8	6	10	10	8	13
Peak Percent	20.0%	16.0%	16.0%	19.0%	14.3%	11.9%	17.5%	14.0%	11.4%

Source: PB Aviation

TABLE 3.5-4

Louisville International Airport

24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

AVERAGE WEEKDAY PEAK MONTH

CHARTER

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059									
0100-0159									
0200-0259									
0300-0359									
0400-0459									
0500-0559									
0600-0659									
0700-0759									
0800-0859									
0900-0959		1	1		1	1		1	1
1000-1059									
1100-1159									
1200-1259									
1300-1359									
1400-1459									
1500-1559									
1600-1659									
1700-1759									
1800-1859									
1900-1959	1		1	1		1	1		1
2000-2059									
2100-2159									
2200-2259									
2300-2359									
Total	1	1	2	1	1	2	1	1	2
Peak Hour	1	1	1	1	1	1	1	1	1
Peak Percent	100.0%	100.0%	50.0%	100.0%	100.0%	50.0%	100.0%	100.0%	50.0%

Source: PB Aviation

3.5.2 Cargo 24-Hour Aircraft Activity Projections

Cargo operations are projected to increase from an average weekday, peak-month level of 256 in 2000 to 380 in 2020. As shown in **Table 3.5-5**, the same pattern of arrivals and departures is expected to continue, with a steady decline in the percentage of operations occurring in the peak hours. Increases in cargo departures occur through operations to new markets as well as through addition of flights in markets already receiving non-stop cargo service. Cargo operators were contacted regarding plans for expansion. Both domestic and international cities are among the new non-stop markets added. As with the passenger flights, service in new markets tends to be offered in the peak times, while added service to existing markets broadens the pattern of hourly service across the day. Hourly patterns of cargo service are more peaked than those of passenger service. Throughout the forecast period, passenger peaks never reach 16 percent of the day's activities, while cargo peaks never fall below 17 percent of daily arrivals and/or departures.

3.5.3 General Aviation, Air Taxi and Other 24-Hour Aircraft Activity Projections

Details on the timing, origins and destinations of general aviation and air taxi activities are not readily available. Conversations were held with operators of these activities at the Airport to better aid in understanding the characteristics of this traffic. It is assumed that 60 percent of this activity is related to cargo activities at the Airport, and the other 40 percent follows the flows of passenger activity. In order to distribute the traffic geographically accurately across the navigational fixes at the Airport, this split of activity was used. Sixty (60) percent of the general aviation and air taxi operations were distributed across fixes in the same distribution as that of the scheduled cargo departures across fixes. The remaining 40 percent of the operations were distributed across fixes as the scheduled passenger traffic is distributed.

TABLE 3.5-5

Louisville International Airport

24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

AVERAGE WEEKDAY PEAK MONTH

CARGO

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059	34		34	41	2	43	45	2	47
0100-0159	26	1	27	32	2	34	37	2	39
0200-0259	13	1	14	13	5	18	16	7	23
0300-0359		35	35		41	41		45	45
0400-0459		50	50	2	60	62	2	66	68
0500-0559	3	3	6	3	6	9	5	7	12
0600-0659					2	2		2	2
0700-0759									
0800-0859									
0900-0959	8		8	13		13	16		16
1000-1059	5		5	8		8	10		10
1100-1159	3		3	3		3	4		4
1200-1259	5		5	11		11	13		13
1300-1359				2		2	2		2
1400-1459					2	2		2	2
1500-1559		14	14		16	16		21	21
1600-1659		19	19		21	21		24	24
1700-1759		4	4		7	7		9	9
1800-1859		1	1		2	2		3	3
1900-1959									
2000-2059									
2100-2159									
2200-2259				2		2	2		2
2300-2359	31		31	36		36	38		38
Total	128	128	256	166	166	332	190	190	380
Peak Hour	34	50	50	41	60	62	45	66	68
Peak Percent	26.6%	39.1%	19.5%	24.7%	36.1%	18.7%	23.7%	34.7%	17.9%

Source: PB Aviation

The Part 150 Study indicated that there is an absolute peak in total general aviation activities at the Airport in the 8:00 AM – 8:59 AM hour. Following that, the general aviation and air taxi operations exhibit some of the timing characteristics of both passenger and cargo operations. **Table 3.5-6** presents the final distribution of general aviation activity across the hours of the day. There is an absolute peak in operations 8:00 AM – 8:59 AM. There is also high activity in the 11:00 AM – 11:59 AM hour when regional passenger activities peak. Through the early afternoon, this activity is still strong, reflecting a combination of the cargo and passenger timing. In the early morning hours, there is also activity, assumed to be related to cargo. The peak hour remains the same throughout the forecast period, with activity increasing from 13 operations in 2000 to 18 in 2020.

Air taxi and other operations appear in **Table 3.5-7**. Unlike other categories at the Airport, air taxi and other operations display very little consistency in their hourly pattern of operations.

Military operations have late morning, afternoon and evening activity. This is not forecast to change through 2020. The Part 150 Study indicated that military operations peak at four operations in a single hour. Conversations with representatives of the Kentucky Air National Guard provided information on operating patterns. The forecast of military operations across the day is presented in **Table 3.5-8**.

The distribution of all Airport operations across the day is presented in **Table 3.5-9**. The peaking of activity is driven by cargo operations, with peak arrivals occurring between 11:00 PM and 12:59 AM, and peak departures in the 4:00 AM – 4:59 AM hour throughout the forecast period. The Airport is a 24-hour per day operation, with no hour in the forecast period projected to be free of activity. Arrivals are depicted graphically in **Exhibit 3.5-1**, and departures are presented in **Exhibit 3.5-2**. From these graphs it is obvious that the peaking of

TABLE 3.5-6

Louisville International Airport

24-HOUR AIRCRAFT ACTIVITY PROJECTIONS
AVERAGE WEEKDAY PEAK MONTH
GENERAL AVIATION

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059	6	4	10	6	4	10	7	3	10
0100-0159							1		1
0200-0259		2	2		3	3		4	4
0300-0359		6	6		7	7		9	9
0400-0459									
0500-0559				1		1	1		1
0600-0659	5	2	7	6	2	8	6	5	11
0700-0759	4	3	7	4	4	8	4	5	9
0800-0859	7	6	13	8	7	15	9	9	18
0900-0959	1	3	4		3	3		3	3
1000-1059	3	1	4	3	2	5	3	2	5
1100-1159	6	4	10	7	5	12	8	6	14
1200-1259	7	2	9	7	3	10	7	4	11
1300-1359	5	4	9	5	4	9	5	4	9
1400-1459	1	2	3	2	2	4	4	3	7
1500-1559		1	1		1	1	1	1	2
1600-1659		3	3		3	3	1	3	4
1700-1759	4	5	9	7	5	12	7	5	12
1800-1859	2		2	2		2	2		2
1900-1959	2		2	2		2	3		3
2000-2059	1		1	2		2	3		3
2100-2159	1	3	4	2	4	6	3	5	8
2200-2259	1	2	3	1	2	3	1	2	3
2300-2359		3	3		4	4	2	5	7
Total	56	56	112	65	65	130	78	78	156
Peak Hour	7	6	13	8	7	15	9	9	18
Peak Percent	12.5%	10.7%	11.6%	12.3%	10.8%	11.5%	11.5%	11.5%	11.5%

Source: PB Aviation

TABLE 3.5-7

Louisville International Airport

24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

AVERAGE WEEKDAY PEAK MONTH

AIR TAXI & OTHER

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059	1	1	2				1	1	2
0100-0159		3	3	4	3	7	6	5	11
0200-0259		1	1	4	1	5	4		4
0300-0359	1	3	4	2	7	9	3	7	10
0400-0459	2		2						
0500-0559	1	4	5	2	3	5		4	4
0600-0659		2	2		4	4		7	7
0700-0759					1	1			
0800-0859		1	1		3	3	4	2	6
0900-0959	5	1	6	3	1	4	5	3	8
1000-1059	4	5	9	4	7	11	4	8	12
1100-1159	1	1	2	3	1	4	4	1	5
1200-1259	1	2	3		2	2		3	3
1300-1359									
1400-1459	4	3	7	5	4	9	3	6	9
1500-1559	6	2	8	7	2	9	5	2	7
1600-1659	5	2	7	6	2	8	6		6
1700-1759	2	1	3	2	1	3		1	1
1800-1859	2	1	3	2		2			
1900-1959	1	3	4	1	5	6	1	4	5
2000-2059	1		1	1	1	2	2	1	3
2100-2159							1		1
2200-2259									
2300-2359		1	1	3	1	4	7	1	8
Total	37	37	74	49	49	98	56	56	112
Peak Hour	6	5	9	7	7	11	7	8	12
Peak Percent	16.2%	13.5%	12.2%	14.3%	14.3%	11.2%	12.5%	14.3%	10.7%

Source: PB Aviation

TABLE 3.5-8

Louisville International Airport

24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

AVERAGE WEEKDAY PEAK MONTH

MILITARY

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059									
0100-0159									
0200-0259									
0300-0359									
0400-0459									
0500-0559									
0600-0659									
0700-0759									
0800-0859									
0900-0959	1	1	2	1	1	2	1	1	2
1000-1059	2	2	4	2	2	4	2	2	4
1100-1159									
1200-1259		2	2		2	2		2	2
1300-1359		2	2		2	2		2	2
1400-1459									
1500-1559	2		2	2		2	2		2
1600-1659	2		2	2		2	2		2
1700-1759									
1800-1859		2	2		2	2		2	2
1900-1959		2	2		2	2		2	2
2000-2059	2		2	2		2	2		2
2100-2159	2		2	2		2	2		2
2200-2259									
2300-2359									
Total	11	11	22	11	11	22	11	11	22
Peak Hour	2	2	4	2	2	4	2	2	4
Peak Percent	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%

Source: PB Aviation

TABLE 3.5-9

Louisville International Airport

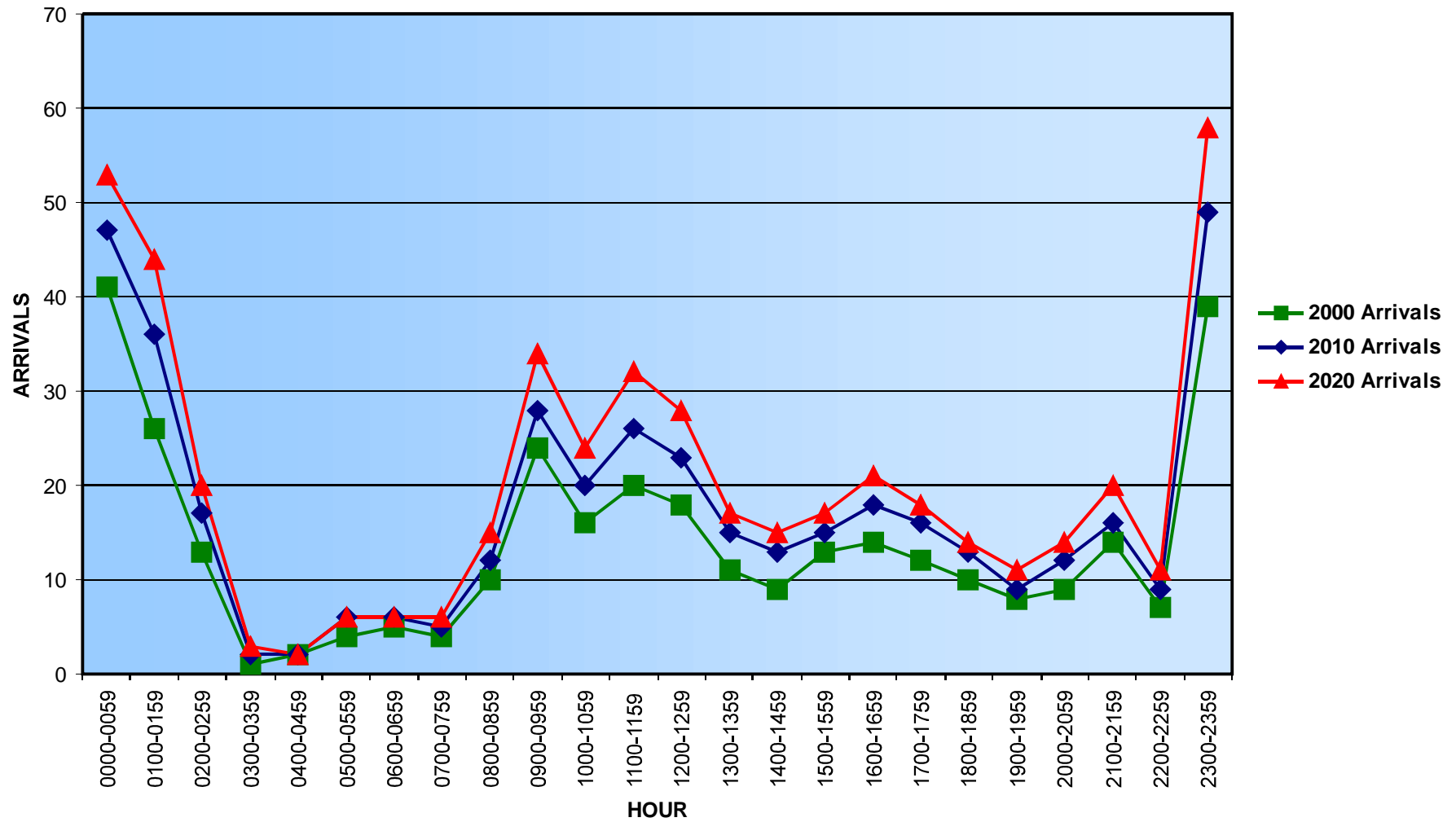
24-HOUR AIRCRAFT ACTIVITY PROJECTIONS

AVERAGE WEEKDAY PEAK MONTH

TOTAL AIRPORT

Hour	2000			2010			2020		
	Arr.	Dept.	Total	Arr.	Dept.	Total	Arr.	Dept.	Total
0000-0059	41	5	46	47	6	53	53	6	59
0100-0159	26	4	30	36	5	41	44	7	51
0200-0259	13	4	17	17	9	26	20	11	31
0300-0359	1	44	45	2	55	57	3	61	64
0400-0459	2	50	52	2	60	62	2	66	68
0500-0559	4	7	11	6	10	16	6	12	18
0600-0659	5	13	18	6	17	23	6	22	28
0700-0759	4	18	22	5	23	28	6	27	33
0800-0859	10	9	19	12	11	23	15	13	28
0900-0959	24	11	35	28	14	42	34	17	51
1000-1059	16	14	30	20	18	38	24	21	45
1100-1159	20	12	32	26	13	39	32	16	48
1200-1259	18	14	32	23	17	40	28	21	49
1300-1359	11	10	21	15	11	26	17	14	31
1400-1459	9	10	19	13	15	28	15	20	35
1500-1559	13	23	36	15	28	43	17	34	51
1600-1659	14	28	42	18	32	50	21	37	58
1700-1759	12	17	29	16	22	38	18	26	44
1800-1859	10	10	20	13	13	26	14	18	32
1900-1959	8	9	17	9	12	21	11	13	24
2000-2059	9	5	14	12	8	20	14	10	24
2100-2159	14	7	21	16	8	24	20	9	29
2200-2259	7	2	9	9	3	12	11	2	13
2300-2359	39	4	43	49	5	54	58	6	64
Total	330	330	660	415	415	830	489	489	978
Peak Hour	41	50	52	49	60	62	58	66	68
Peak Percent	12.4%	15.2%	7.9%	11.8%	14.5%	7.5%	11.9%	13.5%	7.0%

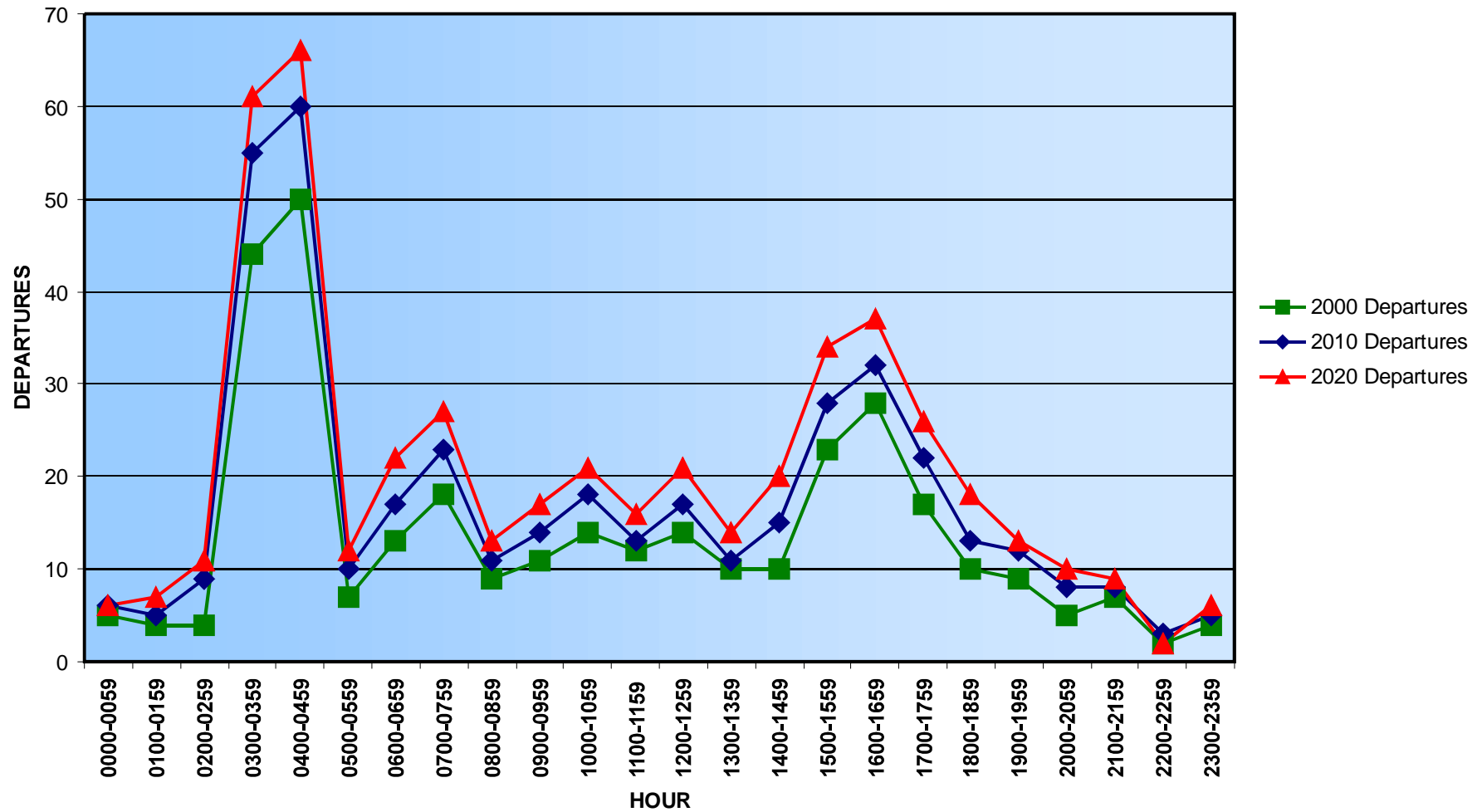
Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000
 PB Aviation



**Louisville International Airport
Master Plan Update**

HOURLY DISTRIBUTION OF AIRCRAFT ARRIVALS

**EXHIBIT
3.5-1**



**Louisville International Airport
Master Plan Update**

HOURLY DISTRIBUTION OF AIRCRAFT DEPARTURES

**EXHIBIT
3.5-2**

operations is driven by the cargo arrivals and departures in the late night and early morning hours.

3.6 SUMMARY OF THE BASE CASE FORECAST

In summary, the forecast for the Louisville International Airport presents a picture of a vibrant operation growing in all categories of activity. All facets of this growth must be considered when determining facility needs through 2020.

3.6.1 Passenger Projections

Table 3.6-1 summarizes the projected passenger growth. Regional activity will carry an increasingly larger share of passenger traffic as regional jets are introduced and air carriers rationalize their operations by handing smaller markets off to regional partners. Regional traffic will grow at 6.6 percent annually through 2020. Charter activity will remain at fewer than two departures per day throughout the forecast period. Overall growth in enplanements at the Airport is projected to be 2.7 percent annually 1998 through 2020.

3.6.2 Cargo Tonnage Projections

Cargo handling at the Airport is a significant component of activity. It is also an area projected to realize strong growth over the forecast period. The projections for cargo tonnage are reiterated in **Table 3.6-2**. Freight is projected to increase at 4.0 percent per year 1998 through 2020. Mail will grow at 0.5 percent annually. This will result in over 3.6 million tons of cargo volume by 2020, more than double the 1.5 million tons handled in 1998.

TABLE 3.6-1 Louisville International Airport PASSENGER ENPLANEMENT PROJECTION SUMMARY						
<u>Year</u>	<u>Scheduled</u>			<u>Unscheduled</u>		<u>Total</u> <u>Airport</u>
	<u>Air Carrier</u>	<u>Regional</u>	<u>Total</u>	<u>Charter</u>		
2000	1,661,000	231,000	1,892,000	16,200		1,908,200
2005	1,823,000	369,000	2,192,000	18,700		2,210,700
2010	2,038,000	435,000	2,473,000	21,200		2,494,200
2020	2,674,000	614,000	3,288,000	28,100		3,316,100
<u>Average Annual Growth</u>						
1998-2020	2.1%	6.6%	2.7%	2.7%		2.7%

Source: Louisville International Airport Noise Compatibility Study

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TABLE 3.6-2 Louisville International Airport CARGO TONNAGE PROJECTION SUMMARY (U.S. Tons)				
<u>Year</u>	<u>Freight</u>	<u>Mail</u>	<u>Total</u>	
2000	1,673,786	13,963	1,687,749	
2005	2,415,172	14,458	2,429,630	
2010	2,927,387	14,823	2,942,210	
2020	3,636,850	15,274	3,652,124	
<u>Average Annual Growth</u>				
1998-2020	4.0%	0.5%		4.0%

Source: Louisville International Airport Noise Compatibility Study

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3.6.3 Operations and Fleet Mix Projections

Aircraft operations projections are summarized in **Table 3.6-3**. Cargo operations represent the largest share of operations at the Airport, currently and through the forecast period. Regional operations are the fastest growing area at Louisville International Airport. Military operations are expected to remain at a constant level through 2020. Overall, Airport operations will grow at an average annual rate of 1.9 percent from 1998 through 2020.

Both passenger and cargo operations grow at a slower rate than traffic because of the expectations that aircraft will be larger in 2010 and 2020 than they are today. The projected fleet mix is presented in **Table 3.6-4** (operations) and **Table 3.6-5** (fleet mix percentage distribution). In both tables, the aircraft are ranked, generally, by aircraft size. In 2000, the lower portion of the equipment type list, 757s and below, represents only 29 percent of all operations at the Airport. In 2020, this group of aircraft types operates over 33 percent of Louisville International flights.

At the smaller end of the aircraft spectrum, the shift toward regional jets from propeller aircraft is evident. Operations in the categories from single-engine piston through the RJ70 shift more toward the regional jet categories throughout the forecast period. In 2000, single-engine piston, multi-engine piston and turboprop aircraft represented 18 percent of total Airport operations. This group represents only 13 percent in 2020. Conversely, the small jet categories of GA jet through the RJ70 are projected to operate 17 percent of flights in 2000, and over 26 percent in 2020.

This move toward larger aircraft by both the small operators and those who operate larger equipment allows them to fly more passengers and cargo per

TABLE 3.6-3								
Louisville International Airport								
AIRCRAFT OPERATIONS SUMMARY								
Year	Air Carrier	Regional	Cargo	Charter	General Aviation	Air Taxi & Others	Military	Total
2000	48,400	16,800	55,462	702	29,700	19,200	4,600	174,864
2005	51,800	24,600	65,110	790	31,200	22,600	4,600	200,700
2010	54,600	28,200	71,672	844	33,900	24,800	4,600	218,616
2020	64,600	38,200	82,232	1,008	41,400	28,600	4,600	260,640
Average Annual Growth								
1998-2020	1.2%	5.1%	1.8%	1.8%	1.5%	1.8%	0.0%	1.9%
Percentage Distribution								
Year	Air Carrier	Regional	Cargo	Charter	General Aviation	Air Taxi & Others	Military	Total
2000	27.7%	9.6%	31.7%	0.4%	17.0%	11.0%	2.6%	100.0%
2005	25.8%	12.3%	32.4%	0.4%	15.5%	11.3%	2.3%	100.0%
2010	25.0%	12.9%	32.8%	0.4%	15.5%	11.3%	2.1%	100.0%
2020	24.8%	14.7%	31.6%	0.4%	15.9%	11.0%	1.8%	100.0%

Source: Louisville International Airport Noise Compatibility Study
 Airport Activity Forecasts Technical Report February 2000

TABLE 3.6-4**Louisville International Airport****AIRCRAFT OPERATIONS BY EQUIPMENT TYPE****(Aircraft Ranked in General Order of Size)**

<u>Equipment</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
Rotor	1,400	1,400	1,400	1,400
Single Engine Piston	6,829	5,016	4,147	3,643
Multi-Engine Piston	11,206	12,489	13,212	14,978
Turboprop	14,193	12,510	13,520	16,080
GA Jet	19,163	22,525	25,563	32,705
EMB135	-	2,460	2,820	3,820
EMB 145	4,200	7,380	8,460	11,078
RJ50	6,216	11,070	12,408	16,808
Avro RJ85	840	1,230	1,128	1,146
RJ70	-	-	1,128	3,056
L188	360	399	212	-
C-130	4,600	4,600	4,600	4,600
DC-9-10	-	-	-	-
737-100	-	-	-	-
F-100	2,904	3,108	2,184	-
BAE146	1,355	1,036	546	-
DC-9-30	12,004	10,229	4,129	771
A-318	-	1,036	3,822	5,168
717	-	1,036	2,184	3,230
737-500	-	518	546	-
737-600	-	1,554	3,822	5,168
737-200	14,617	10,878	5,460	-
A-319	-	1,036	4,095	6,460
727-100	4,307	1,702	1,274	1,172
737-300	6,050	5,180	3,822	3,230
737-700	1,694	6,734	12,012	18,088
MD-80	5,808	4,662	2,184	1,292
737-400	-	1,036	1,092	646
727-200	6,319	2,804	1,728	1,036
A-320	-	1,554	4,095	7,106
737-800	484	2,590	4,914	10,336
757	18,302	18,664	19,973	24,213
DC-8	13,377	9,432	6,116	5,212
767-300	14,753	12,342	12,241	12,249
A-310	-	521	502	493
A-300-600	-	15,654	25,966	37,478
MD-11 (1)	-	1,172	2,222	4,029
747-100	3,328	4,623	4,300	2,960
747-200	555	521	502	493
A-3XXX	-	-	287	493
Total (2)	174,864	200,700	218,616	260,640

(1) Representative aircraft type.

(2) Total may not add due to rounding.

Source: Louisville International Airport Noise Compatibility Study

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TABLE 3.6-5

Louisville International Airport

FLEET MIX PERCENTAGES BY EQUIPMENT TYPE

(Aircraft Ranked in General Order of Size)

<u>Equipment</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
Rotor	0.8%	0.7%	0.6%	0.5%
Single Engine Piston	3.9%	2.5%	1.9%	1.4%
Multi-Engine Piston	6.4%	6.2%	6.0%	5.7%
Turboprop	8.1%	6.2%	6.2%	6.2%
GA Jet	11.0%	11.2%	11.7%	12.5%
EMB135	0.0%	1.2%	1.3%	1.5%
EMB 145	2.4%	3.7%	3.9%	4.3%
RJ50	3.6%	5.5%	5.7%	6.4%
Avro RJ85	0.5%	0.6%	0.5%	0.4%
RJ70	0.0%	0.0%	0.5%	1.2%
L188	0.2%	0.2%	0.1%	0.0%
C-130	2.6%	2.3%	2.1%	1.8%
DC-9-10	0.0%	0.0%	0.0%	0.0%
737-100	0.0%	0.0%	0.0%	0.0%
F-100	1.7%	1.5%	1.0%	0.0%
BAE146	0.8%	0.5%	0.2%	0.0%
DC-9-30	6.9%	5.1%	1.9%	0.3%
A-318	0.0%	0.5%	1.7%	2.0%
717	0.0%	0.5%	1.0%	1.2%
737-500	0.0%	0.3%	0.2%	0.0%
737-600	0.0%	0.8%	1.7%	2.0%
737-200	8.4%	5.4%	2.5%	0.0%
A-319	0.0%	0.5%	1.9%	2.5%
727-100	2.5%	0.8%	0.6%	0.4%
737-300	3.5%	2.6%	1.7%	1.2%
737-700	1.0%	3.4%	5.5%	6.9%
MD-80	3.3%	2.3%	1.0%	0.5%
737-400	0.0%	0.5%	0.5%	0.2%
727-200	3.6%	1.4%	0.8%	0.4%
A-320	0.0%	0.8%	1.9%	2.7%
737-800	0.3%	1.3%	2.2%	4.0%
757	10.5%	9.3%	9.1%	9.3%
DC-8	7.7%	4.7%	2.8%	2.0%
767-300	8.4%	6.1%	5.6%	4.7%
A-310	0.0%	0.3%	0.2%	0.2%
A-300-600	0.0%	7.8%	11.9%	14.4%
MD-11 (1)	0.0%	0.6%	1.0%	1.5%
747-100	1.9%	2.3%	2.0%	1.1%
747-200	0.3%	0.3%	0.2%	0.2%
A-3XXX	<u>0.0%</u>	<u>0.0%</u>	<u>0.1%</u>	<u>0.2%</u>
Total (2)	100.0%	100.0%	100.0%	100.0%

(1) Representative aircraft type.

(2) Totals may not add due to rounding.

Source: Louisville International Airport Noise Compatibility Study

Airport Activity Forecasts Technical Report February 2000

PB Aviation

operation as the forecast period progresses. Thus, operations do not grow as quickly as passenger and cargo volumes in the projections.

* * * * *

The next chapter assesses the ability of existing airside and landside facilities at Louisville International Airport to accommodate the aviation activity levels that are projected in this chapter. The need for improvements and expanded facilities is determined by the projections in this chapter as well as by changes known to occur in the aviation industry.

ENDNOTES

¹ *Louisville International Airport Noise Compatibility Study Airport Activity Forecasts, Technical Report*, Leigh Fisher Associates and HNTB Corporation, February 2000.

² Ibid.

³ Ibid.

⁴ Ibid.

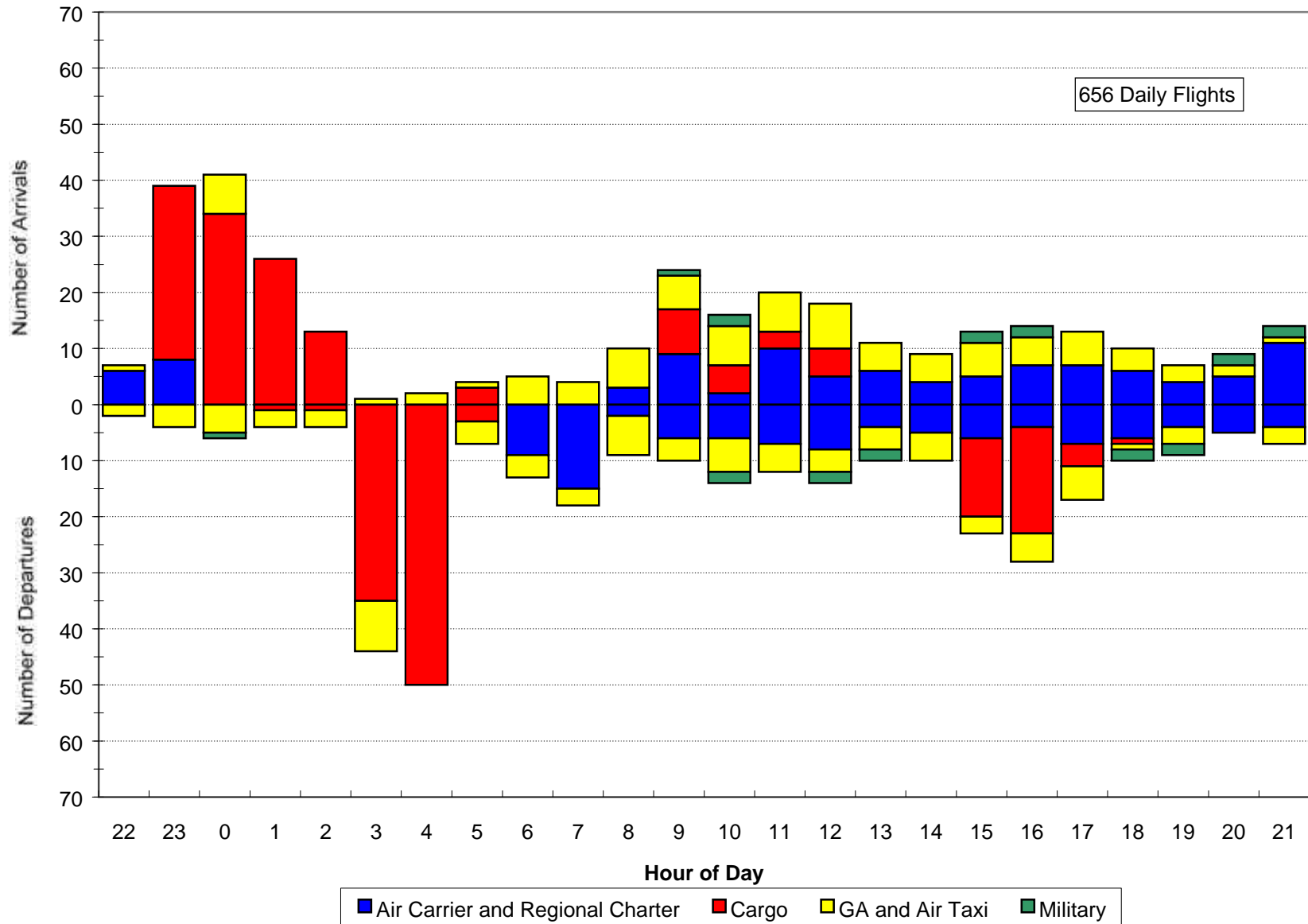
4.0 AIRFIELD CAPACITY

Computer simulations were used to evaluate the capacity of the existing airfield to accommodate projected operations for 2000, 2010, and 2020. The analysis was conducted using the FAA Airport and Airspace Simulation Model, SIMMOD. SIMMOD is a fast-time, event-step, network simulation model for aircraft traveling through airports and airspace. The model tracks the movement of individual aircraft as they travel through the airspace (arrival and departure routes) and the airfield (runways, taxiways, and gates). The model is capable of calculating delay statistics used to determine the capacity of the airfield. Simulations were conducted for both visual and instrument meteorological conditions, and for operations on Runways 17L and 17R (south-flow), and Runways 35R and 35L (north-flow).

4.1 SIMMOD INPUTS

Each operation was modeled as an individual flight, with airline, aircraft type, origin/destination, and arrival/departure time at the gate or parking position. Based on information provided by FAA ATCT personnel, flights were assigned to arrival and departure airspace fixes based on their origin or destination cities. A full day of operation was modeled, beginning at 10 p.m. when the least amount of traffic is scheduled. This approach ensured that the nighttime operations from 10:00 p.m. to 7:00 a.m. were kept together, rather than being split at midnight, so that the maximum interactions were simulated.

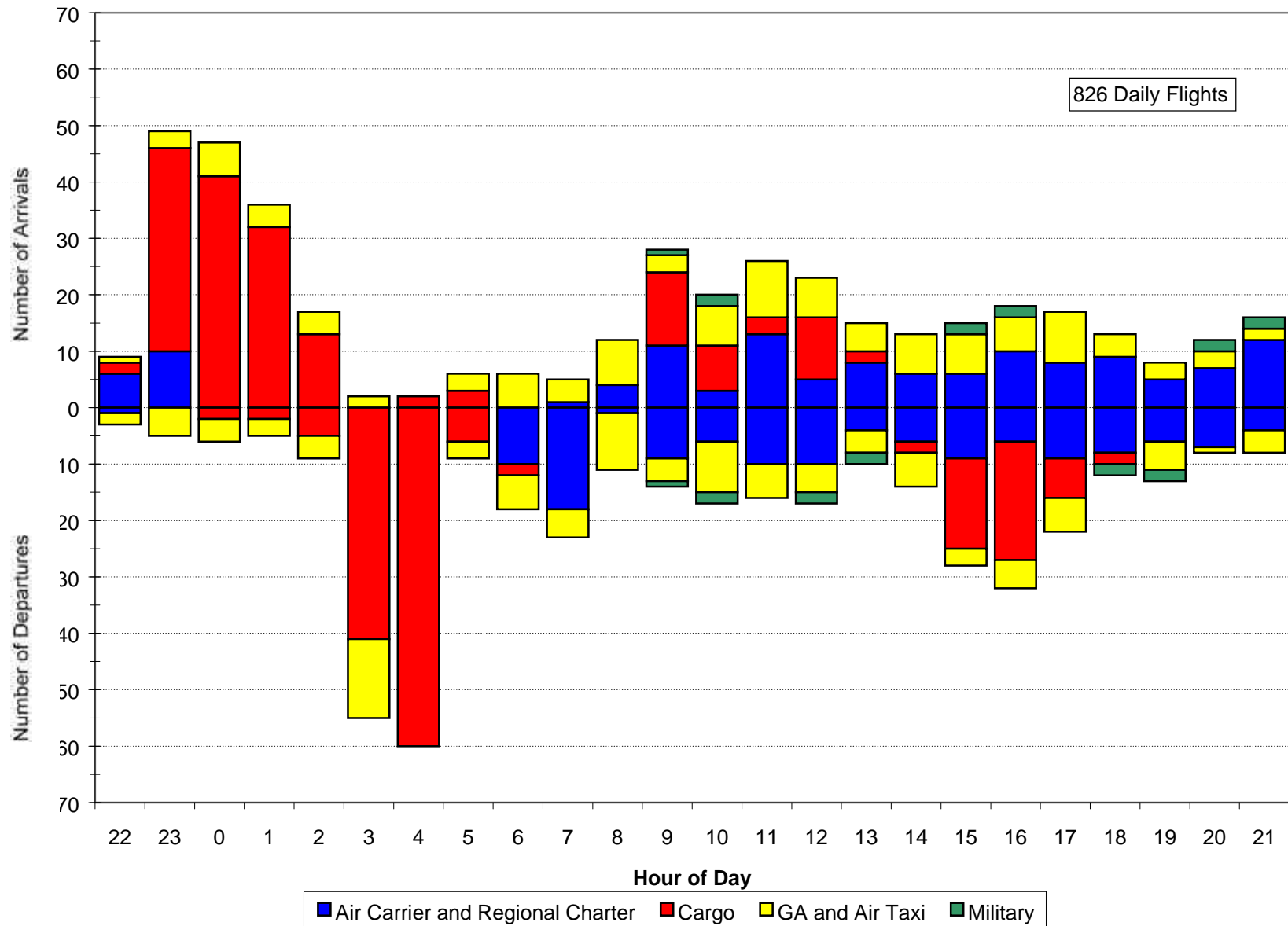
The three schedules that were simulated contained the number of flights depicted by hour in **Exhibits 4.1-1** through **4.1-3**. The total number of daily operations increases from 656 in 2000 to 974 in 2020. **Table 4.1-1** presents the maximum number of operations that are simulated during a 60-minute period, i.e., rolling hour, for each of the three schedule years.



**Louisville International Airport
Master Plan Update**

HOURLY FLIGHT DEMANDS - YEAR 2000

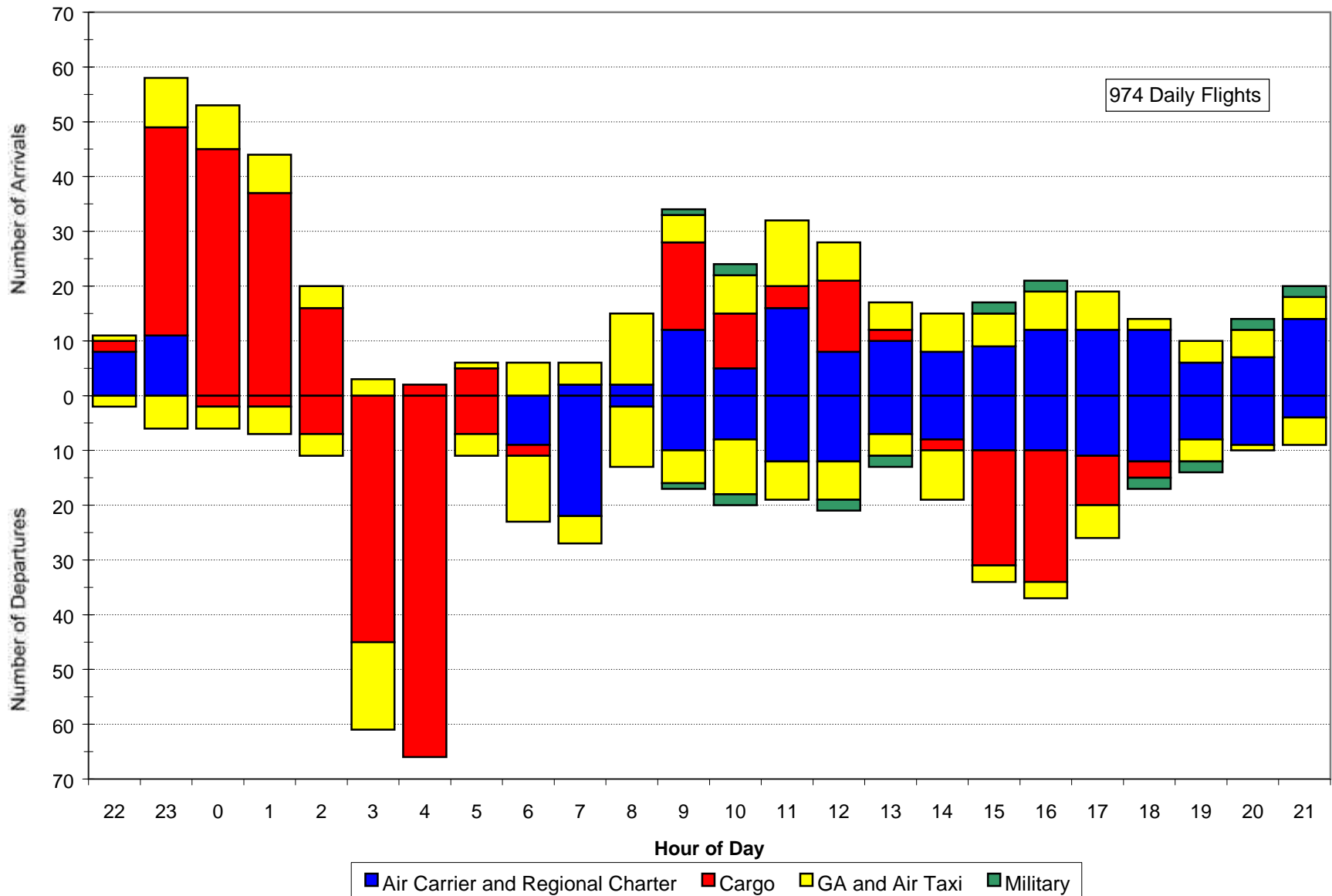
**EXHIBIT
4.1-1**



**Louisville International Airport
Master Plan Update**

HOURLY FLIGHT DEMANDS - YEAR 2010

**EXHIBIT
4.1-2**



**Louisville International Airport
Master Plan Update**

HOURLY FLIGHT DEMANDS - YEAR 2020

**EXHIBIT
4.1-3**

<p align="center">TABLE 4.1-1</p> <p align="center">Louisville International Airport</p> <p align="center">SIMULATED ACTIVITY LEVELS</p>			
Year	Daily Operations	Peak Arrival Hour (Rolling Hour)	Peak Departure Hour (Rolling Hour)
2000	656	43 (12:05 – 1:04 AM)	52 (4:01 – 5:00 AM)
2010	826	52 (12:07 – 1:06 AM)	63 (4:01 – 5:00 AM)
2020	974	59 (12:06 – 1:05 AM)	68 (4:01 – 5:00 AM)

Source: TransSolutions, LLC

Note: The four helicopter operations in each traffic demand projection were removed from the simulation because they do not use a runway.

The airspace portion of the simulation was developed using the flight track analysis from the current FAR Part 150 Noise Compatibility Study. As discussed in detail in the Part 150 Study documentation, turbojet aircraft use initial departure headings off the runway that follow the informal noise abatement flight tracks:

- Departures on Runway 17L: maintain runway heading until reaching the 270 degree radial from the VOR.
- Departures on Runway 17R: westbound aircraft maintain a 15-degree divergence (200 degrees) and eastbound aircraft maintain runway heading
- Departures on Runway 35R: maintain runway heading until reaching an altitude of 3000 feet
- Departures on Runway 35L: maintain a 15-degree divergence (330 degrees) until reaching an altitude of 3000 feet

At Louisville International Airport, departing propeller and turboprop aircraft diverge at least 15 degrees from other departing traffic. In this case, less separation is required between propeller and jet departures because the propeller aircraft are immediately separated from the jets.

Adhering to the 1997 Aviation Noise Abatement Plan (1997 NAP), during non-peak hours the current runway preference for departures is Runway 35R in north flow operations and for arrivals is Runway 17L in south flow operations. The simulation model allocated traffic to both parallel runways in order to replicate air traffic control

actions to reduce delays. However, because of runway length requirements for takeoff, Boeing 747 departures were always assigned to Runway 17R/35L, which has a length of 10,000 feet.

The runway usage in SIMMOD was adjusted so that it closely matches the usage modeled in the FAR Part 150 Noise Compatibility Study (based on Table 6-5, “Assumed Annual Average 1998 and 2005 Runway Use” from *Interim Report 2*, January 13, 2000, produced by Leigh Fisher Associates). However, because the Master Plan Update forecasts have origins and destinations assigned to the flights, there are some slight differences between the runway usage in SIMMOD and the runway usage in the Part 150 Study. It is important to note that in simulating the future cases, the Part 150 Study runway use was applied as a starting point, but during peak periods it was necessary to reduce delays for more balance in runway use. The runway end utilization percentages that occur in the simulations are listed in **Table 4.1-2**.

Because of the unique operational characteristics at the Airport (i.e., a single airline with the peak-hour operations, pure peak-hour arrival flows and departure flows at separate times, and Louisville’s position on the forefront of air traffic control technology implementation) three separate simulation cases are presented. The primary difference between the average efficiency case, the above average efficiency case, and the optimum efficiency case is the input assumption regarding variability between aircraft departures. In the optimum efficiency case, every aircraft receives clearance and departs with the minimum required separation from other aircraft. The above average efficiency and average efficiency cases assume increasing levels of variability, reflecting the “human factor” of air traffic controller workload and pilot readiness for departure.

TABLE 4.1-2			
Louisville International Airport			
RUNWAY USE SUMMARY			
2000 Arrivals Departures	Day	Runway 17L 91.3%	Runway 17R 8.7%
	Night	56.5%	43.5%
	Day	59.4%	40.6%
	Night	52.0%	48.0%
Arrivals Departures	Day	Runway 35L 39.6%	Runway 35R 60.4%
	Night	52.4%	47.6%
	Day	20.4%	79.6%
	Night	48.5%	51.5%
2010 Arrivals Departures	Day	Runway 17L 77.0%	Runway 17R 23.0%
	Night	47.6%	52.4%
	Day	55.5%	44.5%
	Night	50.7%	49.3%
Arrivals Departures	Day	Runway 35L 33.4%	Runway 35R 66.6%
	Night	45.7%	54.3%
	Day	70.8%	29.2%
	Night	65.1%	34.9%
2020 Arrivals Departures	Day	Runway 17L 70.8%	Runway 17R 29.2%
	Night	46.5%	53.5%
	Day	51.5%	48.5%
	Night	53.8%	46.2%
Arrivals Departures	Day	Runway 35L 33.9%	Runway 35R 66.1%
	Night	44.2%	55.8%
	Day	70.2%	29.8%
	Night	66.0%	34.0%

Source: TransSolutions, LLC

4.2 AVERAGE DELAY

When using a simulation model, the primary measures of airfield/airspace capacity are arrival airspace delay and departure taxi-out delay (including departure queue delay). Delay is measured as the difference in the amount of time an aircraft actually uses the runway and the time it would have used if it were able to move unimpeded throughout the airfield/airspace system. For example, if there is only one aircraft taxiing out to depart and it obtains immediate departure clearance, the aircraft would have no delay (0.0 minutes delay).

The majority of the arrival delays occur in the airspace as aircraft maintain separations and are merged into final approach. However, the majority of the departure delays occur on the airfield, because aircraft are cleared for takeoff only when proper separation has been achieved. At Louisville, departure delay is also influenced by aircraft departing for the same general destination on both runways. For example, when an east-bound aircraft departs the west runway, additional time is required before an east-bound departure can depart the east runway in order to achieve the necessary airspace separation for the two aircraft.

Delay statistics were evaluated for the entire 24-hour traffic demand and for nighttime operations (10:00 p.m. to 7:00 a.m.) in each of the three cases. **Tables 4.2-1** and **4.2-2** present average delays for south-flow and north-flow under visual meteorological conditions (VMC). Generally, average arrival airspace delays less than three minutes are considered to be acceptable, while departure taxi-out delays often reach an average of six minutes before delays are considered unacceptable. As indicated by the simulation results in Tables 4.2-1 and 4.2-2, the average delays during VMC are quite low at the Airport.

TABLE 4.2-1 Louisville International Airport AVERAGE DELAYS—SOUTH-FLOW (RUNWAYS 17R/17L) VISUAL METEOROLOGICAL CONDITIONS						
Daily Operations	24-Hour Daily Average					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average	Above Average	Optimum	Average	Above Average	Optimum
656	0.78	0.79	0.79	0.96	0.97	0.49
826	0.97	0.95	0.95	1.79	1.23	0.75
974	1.31	1.29	1.29	2.81	1.87	0.91
Nighttime Operations	Nighttime Operations Only					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average	Above Average	Optimum	Average	Above Average	Optimum
265	0.97	0.99	0.98	1.50	1.34	0.51
337	1.44	1.39	1.39	3.24	1.87	0.82
380	2.29	2.22	2.22	5.73	3.26	1.03

Source: TransSolutions, LLC

TABLE 4.2-2 Louisville International Airport AVERAGE DELAYS—NORTH-FLOW (RUNWAYS 35L/35R) VISUAL METEOROLOGICAL CONDITIONS						
Daily Operations	24-Hour Daily Average					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
656	0.45	0.43	0.45	1.33	1.05	0.51
826	0.56	0.56	0.56	1.88	1.12	0.66
974	0.94	0.82	0.82	2.40	1.64	1.04
Nighttime Operations	Nighttime Operations Only					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
265	0.48	0.52	0.48	2.52	1.70	0.67
337	0.73	0.72	0.72	3.66	1.94	0.83
380	1.33	1.20	1.20	4.75	2.89	1.39

Source: TransSolutions, LLC

Tables 4.2-3 and 4.2-4 present average delays for south-flow and north-flow under instrument meteorological conditions (IMC). The delays observed during IMC are considerably greater than those during VMC. Only a small percentage of the annual operations occur in IMC at the Airport; however, the time-critical nature of the overnight cargo industry requires that carriers maintain a schedule in bad as well as good weather. Consequently, estimates of delay during IMC are very important in the airfield capacity evaluation for Louisville International Airport.

TABLE 4.2-3 Louisville International Airport AVERAGE DELAYS—SOUTH-FLOW (RUNWAYS 17R/17L) INSTRUMENT METEOROLOGICAL CONDITIONS						
Daily Operations	24-Hour Daily Average					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
656	1.21	1.22	1.22	1.62	1.84	1.45
826	1.58	1.58	1.58	4.04	2.83	1.65
974	2.58	2.39	2.39	6.32	4.26	2.41
Nighttime Operations	Nighttime Operations Only					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
265	1.73	1.76	1.76	2.95	3.18	2.52
337	2.62	2.63	2.63	8.58	5.27	2.69
380	5.18	4.68	4.68	14.65	8.44	4.34

Source: TransSolutions, LLC

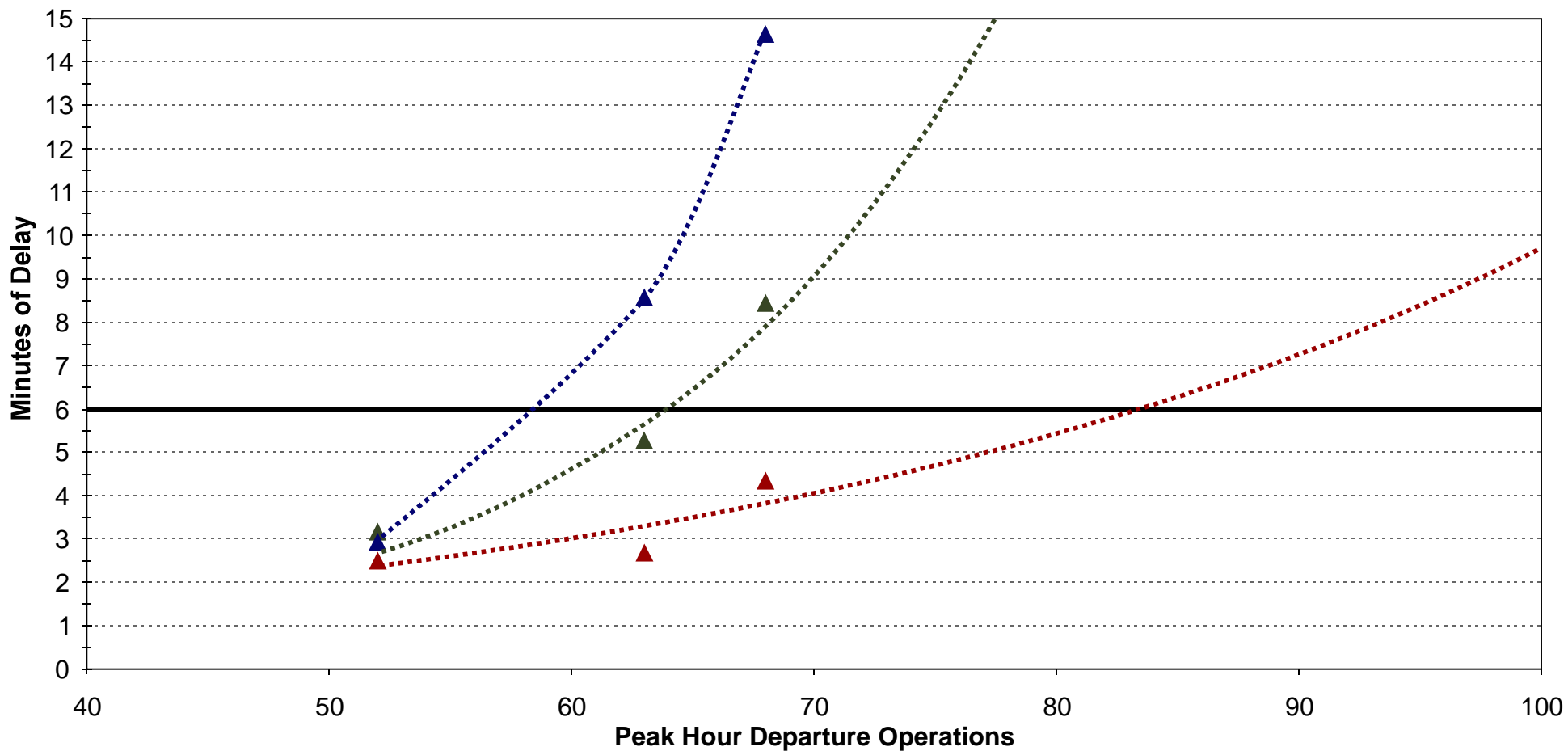
TABLE 4.2-4 Louisville International Airport AVERAGE DELAYS—NORTH-FLOW (RUNWAYS 35L/35R) INSTRUMENT METEOROLOGICAL CONDITIONS						
Daily Operations	24-Hour Daily Average					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
656	0.60	0.58	0.60	2.08	3.07	1.40
826	0.83	0.81	0.81	3.70	3.18	1.57
974	1.92	1.70	1.70	3.99	4.44	2.50
Nighttime Operations	Nighttime Operations Only					
	Average Arrival Airspace Delay (minutes)			Departure Taxi-Out Delay (minutes)		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
265	0.76	0.82	0.76	4.24	6.20	2.62
337	1.24	1.20	1.20	8.06	6.50	2.72
380	3.54	3.17	3.17	8.57	8.51	4.35

Source: TransSolutions, LLC

The delays observed during IMC are considerably greater than those during VMC, especially during the peak overnight operations. Compared to the acceptable delay standards, in the average and above average efficiency cases, both arrival and departure delays are unacceptable during the peak nighttime hours of the projected 2020 schedule. In the optimum efficiency case, nighttime delay averages are approaching unacceptable levels, indicating a need for additional capacity after 2020.

Delay curves, or the average delay plotted against the number of aircraft operations, are useful for determining when the airfield capacity will be reached. **Exhibits 4.2-1** and **4.2-2** present the average overnight delays compared with the acceptable maximum delays for peak hours. With the vast majority of overnight operations using a contraflow configuration (arrivals to Runways 35L and 35R with departures on Runways 17R and 17L), the north-flow delays are considered for arrivals and the south-flow delays for departures.

4-12



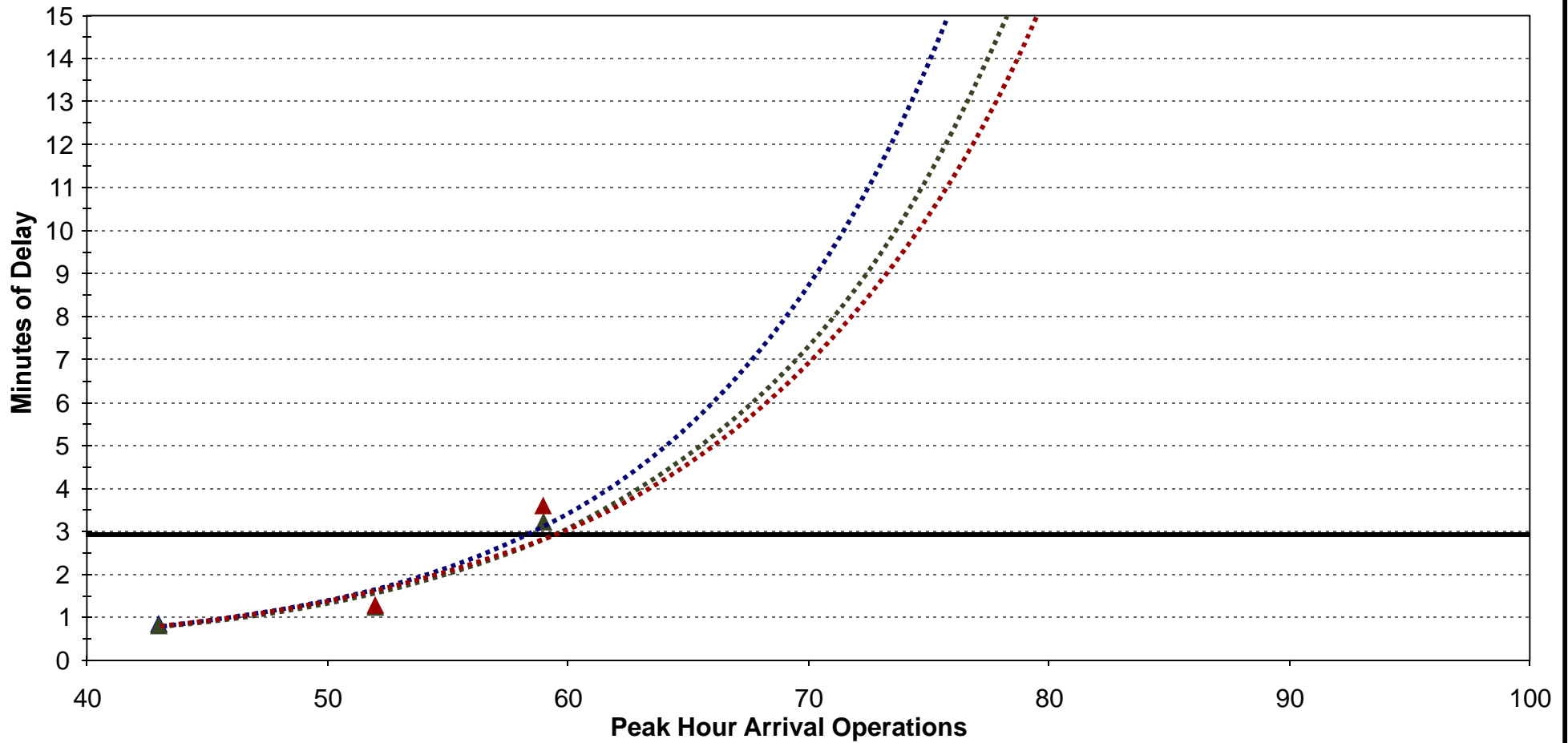
▲ Average Efficiency
 ▲ Above-Average Efficiency
 ▲ Optimum Efficiency



**Louisville International Airport
Master Plan Update**

**AVERAGE DEPARTURE TAXI-OUT DELAYS - PROJECTED FORWARD
INSTRUMENT CONDITIONS
SOUTH-FLOW NIGHTTIME OPERATIONS ONLY (10PM - 7AM)**

**EXHIBIT
4.2-1**



▲ Average Efficiency
 ▲ Above-Average Efficiency
 ▲ Optimum Efficiency



**Louisville International Airport
Master Plan Update**

**AVERAGE ARRIVAL AIRSPACE DELAY - PROJECTED FORWARD
INSTRUMENT CONDITIONS
NORTH-FLOW NIGHTTIME OPERATIONS ONLY (10PM - 7AM)**

**EXHIBIT
4.2-2**

The sensitivity of the model to the efficiency assumptions is apparent for peak-hour departures. Unacceptable delay (six minutes) is reached at higher peak-hour departure levels with increasing efficiency. There is much less variability on the arrivals side.

4.3 MAXIMUM HOURLY OPERATIONS

Another measure of capacity is the absolute maximum number of operations that can operate on the airfield in any given hour during various conditions. As peak operations occur during the overnight hours, the fleet mix of the overnight cargo demand was used in the analysis of hourly capacity. While there are a few departures during the arrival peak, and similarly a few arrivals during the departure peak, the operations are almost completely segregated during these peak periods. Thus, the Airport's capacity is most critical for pure arrivals and pure departure periods. Because of this scheduling phenomenon, hourly capacity was evaluated for arrivals only and for departures only, but not for a mixed-mode operation.

The maximum number of hourly operations was determined by using a “rolling-hour” period based on 10-minute increments, with each iteration (or each “day”) analyzed individually. Note that no consideration of ‘acceptable’ delays is considered in the hourly capacity analysis because the operational counts are not based on a particular flight schedule; rather, this is simply the number of operations that could be processed during an hour, irrespective of delay. The capacity during instrument conditions is based on the ATCT conducting independent approaches to the parallel runways simultaneously. The maximum hourly operations are presented in **Table 4.3-1**.

TABLE 4.3-1 Louisville International Airport MAXIMUM HOURLY OBSERVED OPERATIONS						
	Visual Conditions					
	100 Percent Arrivals			100 Percent Departures		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
Runways 17L/17R (South-flow)	57	71	71	62	80	80
Runways 35R/35L (North-flow)	57	82	80	61	78	86
	Instrument Conditions					
	100 Percent Arrivals			100 Percent Departures		
	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case	Average Efficiency Case	Above Average Efficiency Case	Optimum Efficiency Case
Runways 17L/17R (South-flow)	55	60	61	53	65	75
Runways 35R/35L (North-flow)	54	65	66	56	59	76

Source: TransSolutions, LLC

To achieve these numbers of operations, there must be aircraft waiting to use the runway. These capacities may be achievable for short periods, but cannot be maintained for long periods of time. However, due to the peaks at Louisville having durations of only two to three hours, it is likely that these capacities may be within reach. In fact, it may even be possible to exceed these numbers of operations in particular circumstances, based on the exact mix of aircraft in a given hour. On the other hand, the hourly capacities may not be attainable due to airline scheduling practices—including scheduled times of arrival/departure, excessive demand in a particular section of airspace, and aircraft fleet mix. Thus, these hourly operations are considered to be a theoretical capacity, rather than a feasible capacity, in actual operations.

4.4 RUNWAY CAPACITY EVALUATION SUMMARY

Due to the time-critical nature of the overnight cargo industry, peak-hour delays for all weather conditions must be closely considered. The sensitivity of the simulation cases to the departure variability assumption indicates a level of uncertainty as to the exact timing for additional capacity. In the above average efficiency case, the available departure capacity is exceeded in the overnight hours during IMC when the daily traffic reaches 65 peak-hour departures, or approximately in 2016 based on the forecasts presented in Chapter 3.0. In the average efficiency case, additional capacity is needed earlier, around 2012. The optimum efficiency case simulations indicate that capacity improvements are needed beyond the 2020 planning horizon. Additionally, changes in demand from that simulated will also influence the need for additional airfield capacity. If the traffic growth were to occur faster than currently expected, such as under the Part 150 Study “High Air Cargo Forecast,” the existing airfield layout may be deficient even earlier. Conversely, the implementation of air traffic control and flight management technologies, such as Automatic Dependent Surveillance Broadcast (ADS-B), may lower aircraft separation requirements. This, in turn, would increase airfield capacity and shift the need for airfield improvements further into the future.

Given the results of the simulations presented in this chapter, the next steps of the Master Plan Update will examine the requirements for the other Airport facilities (i.e., terminal, parking, and general aviation) and alternatives to meet those requirements. Subsequent chapters will examine improvements to the existing airfield and investigate the feasibility of relocating the Airport to a new site within the Louisville region.

5.0 FACILITY REQUIREMENTS

The capacities and capabilities of the Airport's airfield and building area facilities are evaluated in this element of the Master Plan Update. To properly plan for the Airport's future needs, the projections of aviation activity, presented in Chapter 3.0, are translated into specific types and quantities of facilities that can adequately serve projected activity levels. These analyses are intended to identify, in general terms, the deficiencies in existing facilities and outline the new facilities that will be required to meet projected growth. Alternatives for providing these facilities will then be identified in the next element of the planning process.

Facility requirements were calculated for the following airport functional areas:

- *Airfield*
- *Passenger Terminal*
- *Parking*
- *Airport Access and Curbfront*
- *Air Cargo*
- *General Aviation*
- *Support Facilities*

The individual facility requirements are based on specific elements of the aviation activity projections. For example, those functions related to passenger movements are based on passenger elements of the projections. Requirements for airfield facilities were based on aircraft classifications derived from aircraft approach speed and wingspan. The requirements for terminal space, parking, access, curbfront, and airline support facilities are based on peak or annual passenger activity levels. Requirements for air cargo facilities are based on annual tonnage projections exclusive of considerations of UPS activity. General aviation requirements are developed from the activity forecasts for general aviation aircraft operating at the Airport. Support facilities include aircraft rescue and firefighting (ARFF) requirements, derived from the type of aircraft in the passenger forecast, and airport maintenance, based on annual operations. Fueling requirements are also included in support facilities and are based

on peak month average day departures with the exception of UPS, which provides its own fueling, and general aviation piston aircraft.

The facility requirements identified represent a level of detail which is common to a master planning effort, not a level of detail that is equivalent to an architectural or engineering design study. Additionally, specific requirements for UPS-owned facilities, such as cargo sort buildings and employee parking, are not included. Requirements for UPS-owned facilities were addressed by the Hub 2000 plan. However, the airfield requirements presented in this chapter include requirements for UPS operations, as the airfield is public-use and is under the responsibility of the RAA.

5.1 AIRFIELD REQUIREMENTS

Planning and design of an airport are typically based on the airport's role and the critical aircraft that will use its facilities. Guidance for the planning and design of the airfield is obtained from FAA Advisory Circulars that aim to maximize airport safety, economy, efficiency, and longevity.

For geometric design purposes, it is necessary to establish applicable design standards for future runway and taxiway development. Information from FAA Advisory Circular 150/5300-13, "Airport Design," was used to determine the Airport Reference Code (ARC) for the Airport. The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft intended to operate there (**Table 5.1-1**). The ARC has two components that reflect an airport's critical aircraft. The first component, designated by a letter, is the approach category of the aircraft as defined by aircraft approach speed. The second component, designated by a Roman numeral, is the airplane design group as determined by aircraft wingspan. Generally, aircraft approach speed applies to runways and runway-related facilities, and aircraft wingspan relates primarily to separation criteria involving taxiways and taxilanes.

TABLE 5.1-1		
Louisville International Airport		
FAA AIRCRAFT CLASSIFICATIONS		
FAA Aircraft Approach Category Classification		
Approach Category	Approach Speed (knots)	
A	Less than 91	
B	91 – 120	
C	121 – 140	
D	141 – 165	
E	166 or greater	
FAA Airplane Design Group Classification		
Airplane Design Group	Wingspan (feet)	Typical Aircraft
I	Less than 49	Learjet 24, Rockwell Sabre 75A
II	49 but less than 79	Falcon 50, Rockwell Sabre 80
III	79 but less than 118	B-727, B-737, MD-80, DC-9
IV	118 but less than 171	B-757, B-767
V	171 but less than 214	B-747, A330, A340
VI	214 but less than 262	Antonov AN-124, A3XX

Source: FAA Advisory Circular 150/5300-13, *Airport Design*

Standards at the Airport are based on the current and projected aircraft fleet. The airfield design must meet a variety of needs of many different aircraft. As reflected in Table 5.1-1, all series of the B-747 fall within an ARC of D-V, while the B-767 and B-757 are classified as ARC C-IV aircraft. The B-727-200 and the DC-9 are both classified as C-III aircraft.

Forecasts prepared for the Airport indicate that two aircraft will qualify as critical aircraft for the airfield:¹ the Airbus A340 and the Boeing 747-100/200/400 series of aircraft. Because all three of the runways and associated taxiway systems support these aircraft, the entire airfield will need to be designed to these standards. **Table 5.1-2** shows the applicable FAA design criteria for ARC D-V aircraft. All proposed improvements to the airfield should incorporate these standards.

It is important to note that the projected fleet mix at the end of the planning period includes the A3XX aircraft, a “superjumbo” aircraft currently under development by

¹ A critical aircraft is the most demanding aircraft that conducts at least 500 annual operations at the airport.

Airbus. At the projected rate of two operations (one takeoff and one landing) per weekday, this aircraft could qualify as the critical aircraft at the end of the planning

TABLE 5.1-2		
<i>Louisville International Airport</i>		
AIRFIELD DESIGN REQUIREMENTS		
Design Criteria	Group V (ft.)	Group VI (ft.)
Runway Width	150	200
Runway Shoulder Width	35	40
Runway Centerline to:		
-Taxiway Centerline	400	600
-Aircraft Parking Area	500	500
Runway Object Free Area (Width)	800	800
-Length Beyond Runway End	1,000	1,000
Runway Obstacle Free Zone (Width)	400	400
-Length Beyond Runway End	200	200
Runway Safety Area (Width)	500	500
-Length Beyond Runway End	1,000	1,000
Taxiway Width	75	100
Taxiway Centerline to:		
-Parallel Taxiway Centerline	267	324
-Fixed or Movable Object	160	193
Taxiway Object Free Area (Width)	320	386
Taxiway Safety Area (Width)	214	262
Runway Blast Pad		
-Length	400	400
-Width	220	280

Source: FAA Advisory Circular 150/1500-13, *Airport Design*

period. Because it is only in the development stage, the ultimate dimensions such as wingspan, aircraft length, and overall footprint, have not been determined. It is unknown at this time whether the A3XX will require full Group VI design requirements (Table 5.1-2) or if the standards will be modified. Additionally, because of the limited

number of operations projected in the long-term, not all of the airfield will require modifications to meet A3XX requirements. Subsequent phases of the Master Plan Update will examine a combination of design improvements and operational procedures to accommodate the A3XX.

Airfield facility requirements were developed for each of the following functional areas at the Airport:

- *Runway Length*
- *Runway Width*
- *Airfield Safety Areas*
- *Runway Strength Taxiway System*
- *Navigational Aids (NAVAIDs)*

5.1.1 Runway Length Requirements

The future fleet mix at the Airport is projected to contain older aircraft such as the DC-8-70 and the B-747-200F in the short term, and more modern aircraft, such as the B-747-400 and the A-340 in the long-term. These aircraft are either currently or projected to be operated by UPS, the predominant and most demanding carrier on the airfield. As outlined in *Chapter 3.0, Activity Projections*, air cargo fleet mix is shifting toward longer range and heavier aircraft, which results in the need for longer runways. UPS will require the resources to fly direct international routes to cities like Narita, Japan, an Asian cargo hub.

Runway length requirements were determined by the performance characteristics of the aircraft that are projected to operate at the Airport. Ideally, these aircraft should be able to operate at maximum gross take-off weight during all weather conditions. **Table 5.1-3** depicts runway length requirements for the most demanding aircraft projected at the Airport at maximum gross takeoff weight. As shown, a runway length of 11,700 feet is needed to meet this requirement.

TABLE 5.1-3					
Louisville International Airport					
CRITICAL AIRCRAFT RUNWAY LENGTH REQUIREMENTS AND PAYLOAD PENALTIES					
Aircraft Model	Max. TOW (pounds)	Standard Day ³ (feet)	Hot Day ⁴ (feet)	Payload Penalty ⁵ (pounds)	
				Standard Day (feet)	Hot Day (feet)
B-747-200F ¹	836,000	10,900	11,700	126,200	146,200
B-747-400F ²	873,000	10,750	11,500	177,300	202,300

Sources: PB Aviation

Aircraft Operating Manuals

Notes: ¹ JT9D-7Q Engines

² CF6-80C2B1F Engines

³ Adjusted for field elevation

⁴ Hot day is defined as standard day + 15 degrees Celsius

⁵ Existing 10,000 foot runway, full fuel

To illustrate the operational limitations of the current airfield, **Table 5.1-4** shows ranges available at the existing 10,000-foot runway length and with an 11,700-foot runway length, at 75 and 100 percent of payload, by weight. As shown in **Exhibit 5.1-1**, if the runway were extended to 11,700 feet, the B-747-400 would be capable of flying non-stop to Narita, Japan; this flight would require a fueling stop if the runway were to remain at 10,000 feet. **Exhibit 5.1-2** depicts similar aircraft range data for the B-747-200. With increased runway length the B-747-200 would be capable of reaching markets such as Milan, Rome and countries of the former Soviet Union. Therefore, it is recommended that at least one runway at the Airport be extended to 11,700 feet.



Shaded Area is Out of the Range

B-747-400
Aircraft Range with 11,700 FT Runway



Shaded Area is Out of the Range

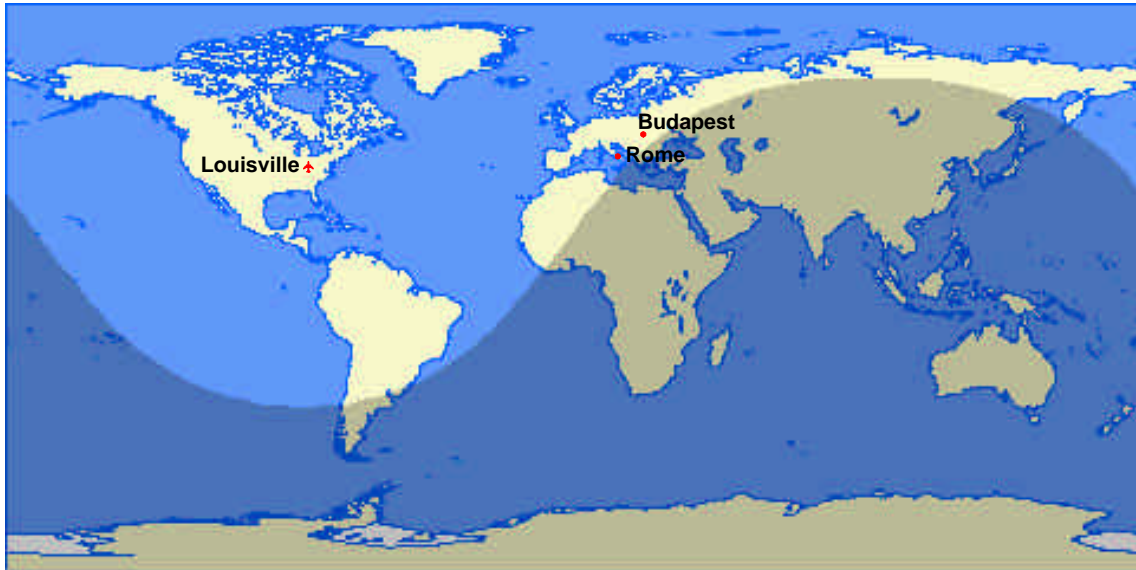
B-747-400
Aircraft Range with 10,000 FT Runway



Louisville International Airport
Master Plan Update

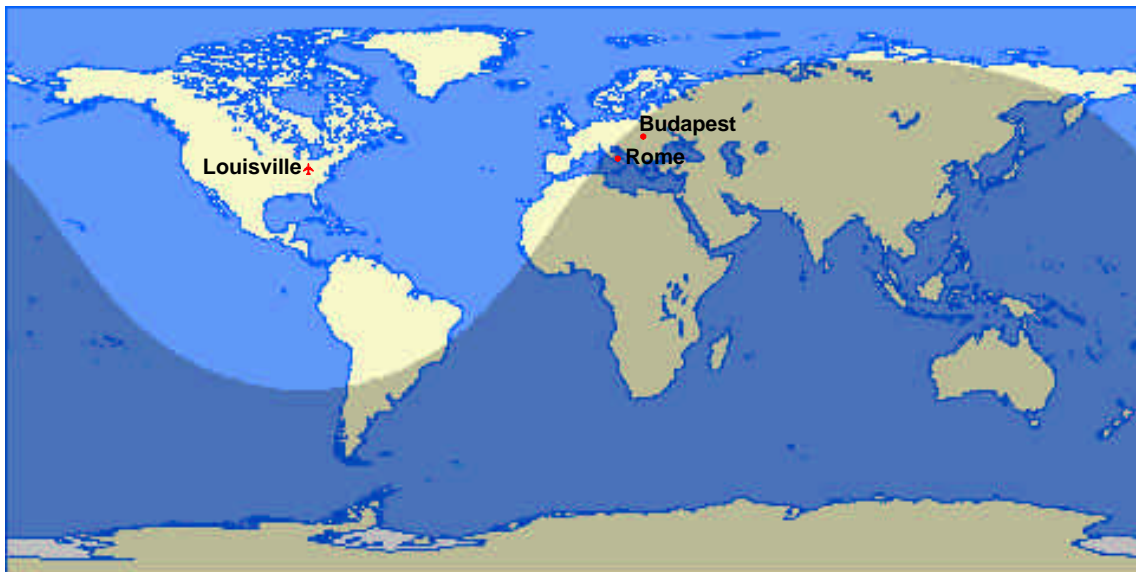
B-747-400 RANGE
10,000 FT RUNWAY
vs. 11,500 FT RUNWAY

EXHIBIT
5.1-1



Shaded Area is Out of the Range

B-747-200
Aircraft Range with 11,700 FT Runway



Shaded Area is Out of the Range

B-747-200
Aircraft Range with 10,000 FT Runway



Louisville International Airport
Master Plan Update

B-747-200 RANGE
10,000 FT RUNWAY
vs. 11,500 FT RUNWAY

EXHIBIT

5.1-2

TABLE 5.1-4				
Louisville International Airport				
CRITICAL AIRCRAFT RANGE BY RUNWAY LENGTH (NAUTICAL MILES)				
Aircraft	75% Payload		100% Payload	
	11,700 Feet Runway	10,000 Feet Runway	11,700 Feet Runway	10,000 Feet Runway
B-747-200F ¹	4,500	4,100	3,300	2,900
B-747-400F ²	6,100	5,250	5,200	4,250

Sources: PB Aviation

Aircraft Operating Manuals

Notes: ¹ JT9D-7Q Engines

² CF6-80C2B1F Engines

5.1.2 Runway Width

The Airport's three runways, Runways 17L/35R, 17R/35L and 11/29, are all currently 150 feet wide. This runway width meets Group V design requirements of all aircraft currently in production and should be adequate throughout the 20-year planning period.

As noted earlier, the A3XX aircraft is included in the projected fleet mix at the end of the planning period. If operations qualify the A3XX as the critical aircraft (500 per year), a runway width of 200 feet would be required. Subsequent phases of the master plan will include such a design improvement.

5.1.3 Airfield Safety Areas

This section presents the FAA's standards as they apply to safety at Louisville International Airport. The following airfield safety standards apply and are reviewed in this section:

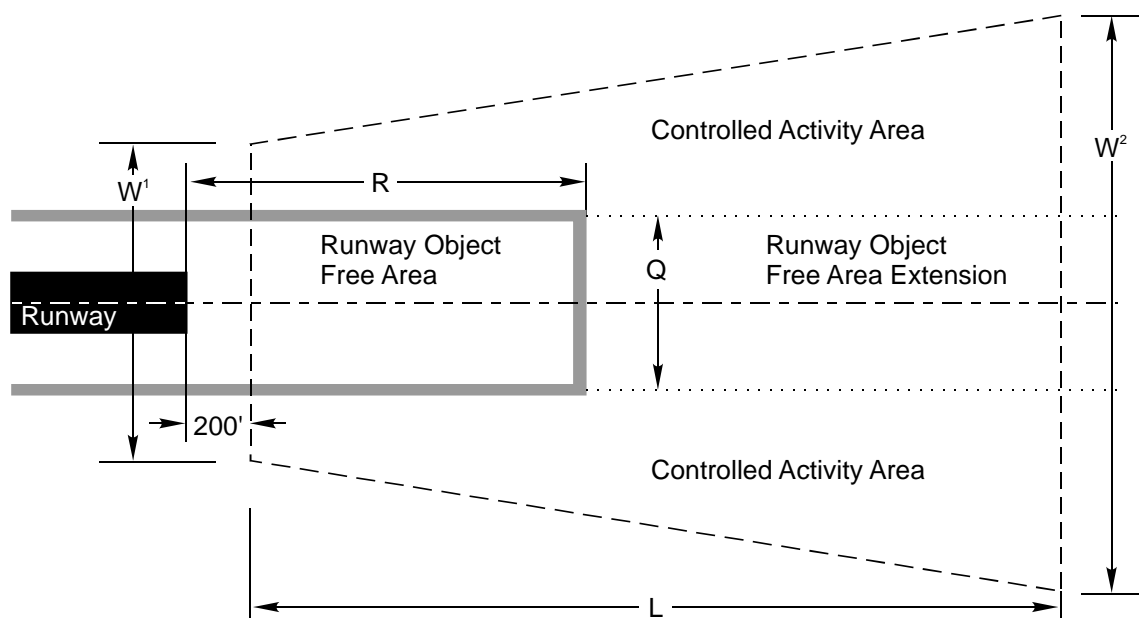
- Runway Protection Zone (RPZ)
 - Runway Object Free Area (OFA)
 - Controlled Activity Area
- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
 - Runway OFZ
 - Inner Approach OFZ
 - Inner-Transitional OFZ

5.1.3.1 Runway Protection Zone (RPZ)

The RPZ, depicted in **Exhibit 5.1-3**, is an area on the ground that is trapezoidal in shape and is centered on the extended runway centerline. The purpose of the area is to enhance the protection of people and property on the ground. This is achieved through airport owner control of property located in RPZs. The RPZ begins 200 feet beyond the end of the runway pavement useable for takeoff and landing. It is important to note that the threshold location does not affect the beginning point of the RPZ. The dimensions of the RPZ are contingent on the size of aircraft operating on the runway as well as the type of approach capability. Generally, as aircraft size increases and approach minimums decrease, dimensions of the RPZ increase.

The RPZ contains two sub-areas: the runway OFA and the controlled activity area. These two sub-areas are discussed as follows:

- *Runway OFA* – The runway OFA is a two-dimensional ground area surrounding the runway. FAA standards prohibit parking aircraft and objects, except NAVAIDs and frangible objects with locations fixed by function (e.g., runway visual range (RVR) posts) within the OFA. The OFA lengths for all three runways extend 1,000 feet beyond the respective runway end and are 800 feet wide. The runway system was reviewed and the following impacts to runway OFAs were noted:
 - Runway 17L/35R
 - Perimeter road
 - Runway 17R/35L
 - Perimeter road
 - Runway 11/29
 - Grade Lane



Runway	W ¹	W ²	L	R	Q
35L	1,000 FT	1,750 FT	2,500 FT	1,000 FT	800 FT
17R	1,000 FT	1,750 FT	2,500 FT	1,000 FT	800 FT
35R	1,000 FT	1,750 FT	2,500 FT	1,000 FT	800 FT
17L	1,000 FT	1,750 FT	2,500 FT	1,000 FT	800 FT
11	1,000 FT	1,510 FT	1,700 FT	1,000 FT	800 FT
29	1,000 FT	1,750 FT	2,500 FT	1,000 FT	800 FT

W¹ = Runway Protection Zone - Inner Width
W² = Runway Protection Zone - Outer Width
L = Runway Protection Zone - Length
R = Object Free Area - Length
Q = Object Free Area - Width

Source: Advisory Circular 150/5300-13, "Airport Design," Change 6.



**Louisville International Airport
Master Plan Update**

RUNWAY PROTECTION ZONE AND OBSTACLE FREE AREA STANDARDS

**EXHIBIT
5.1-3**

- Interstate 65
- Perimeter Road
- Crittenden Drive

It should be noted that a “Modification to FAA Airport Design Standards” is in place to allow an OFA of 600 feet in length for Runway 11/29. Alternatives to the remaining infringements on the OFAs should be investigated to meet the FAA Runway OFA standards. In cases where design standards cannot be achieved, a modification to standards will be sought.

- *Controlled Activity Area* – The controlled activity area is the portion of the RPZ that lies outside the runway OFA. It is recommended that the Airport have positive control of this area. It should be free of land uses that create glare, smoke and activities that attract large amounts of people. While it is desirable to clear all objects from this area, some uses are permitted if they are below the approach surface and do not interfere with NAVAIDs. Golf courses (but not clubhouses) and certain agricultural operations, in particular, are permitted within the controlled activity area.

The controlled activity areas for all runway ends extend off Airport property. Generalized uses in these controlled activity areas include:

- Runway 11
 - Crittenden Drive
 - Industrial and commercial buildings
- Runway 17L
 - Interstate 65/264 interchange
- Runway 17R
 - Industrial and commercial buildings
 - Interstate 264/Crittenden Drive interchange
- Runway 29
 - Grade Lane
 - Interstate 65
 - Residential (within the Airport’s noise acquisition area)
- Runway 35L
 - Warehousing
 - Railroad

- Runway 35R
 - UPS Parking
 - Grade Lane
 - Interstate 65

5.1.3.2 Runway Safety Area (RSA)

The RSA, also illustrated in Exhibit 5.1-3, is a critical two-dimensional safety area surrounding the runway. Based on FAA design criteria, the RSAs for all three runways at Louisville are 500 feet in width and extend 1,000 feet beyond each runway end. The RSA must be:

- Cleared, graded, and free of potentially hazardous surface variations
- Properly drained
- Capable of supporting ARFF equipment or an aircraft without causing damage to the aircraft
- Free of objects, except for objects mounted on low-impact-resistant supports with location fixed by function

The RSA is the most stringently regulated surface associated with a runway. Currently, there are no violations to the RSAs for Runways 17L/35R and 17R/35L at the Airport. Runway 11/29 has the following violations:

- Runway 11 (approach end)
 - Perimeter Road
 - Crittenden Drive
- Runway 29 (approach end)
 - Grade Lane
 - Interstate 65
 - Perimeter Road

It should be noted that a “Modification to FAA Airport Design Standards” is in place to allow an RSA of 600 feet in length beyond the ends for Runway 11/29.

5.1.3.3 Obstacle Free Zone (OFZ)

The OFZ is a three-dimensional volume of airspace (as opposed to the RPZ, OFA, and RSA, which are two-dimensional and at ground level) that supports the transition of ground to airborne operations (or vice versa) and is illustrated in **Exhibit 5.1-4**. The standards prohibit taxiing and parked aircraft and other objects, except frangible NAVAIDs or fixed-function objects, from penetrating the OFZ.

The runway OFZ extends 200 feet beyond each end of the runway and measures 400 feet in width.

Inner-Approach OFZ – The inner-approach OFZ is a defined volume of airspace centered on the approach area that applies only to runways with approach lighting (Runways 17L, 17R, 29, 35L, 35R). The inner-approach OFZ begins 200 feet from the runway threshold and extends 200 feet beyond the last unit in the approach lighting system. It is the same width as the runway OFZ and rises at a slope of 50:1 away from the runway.

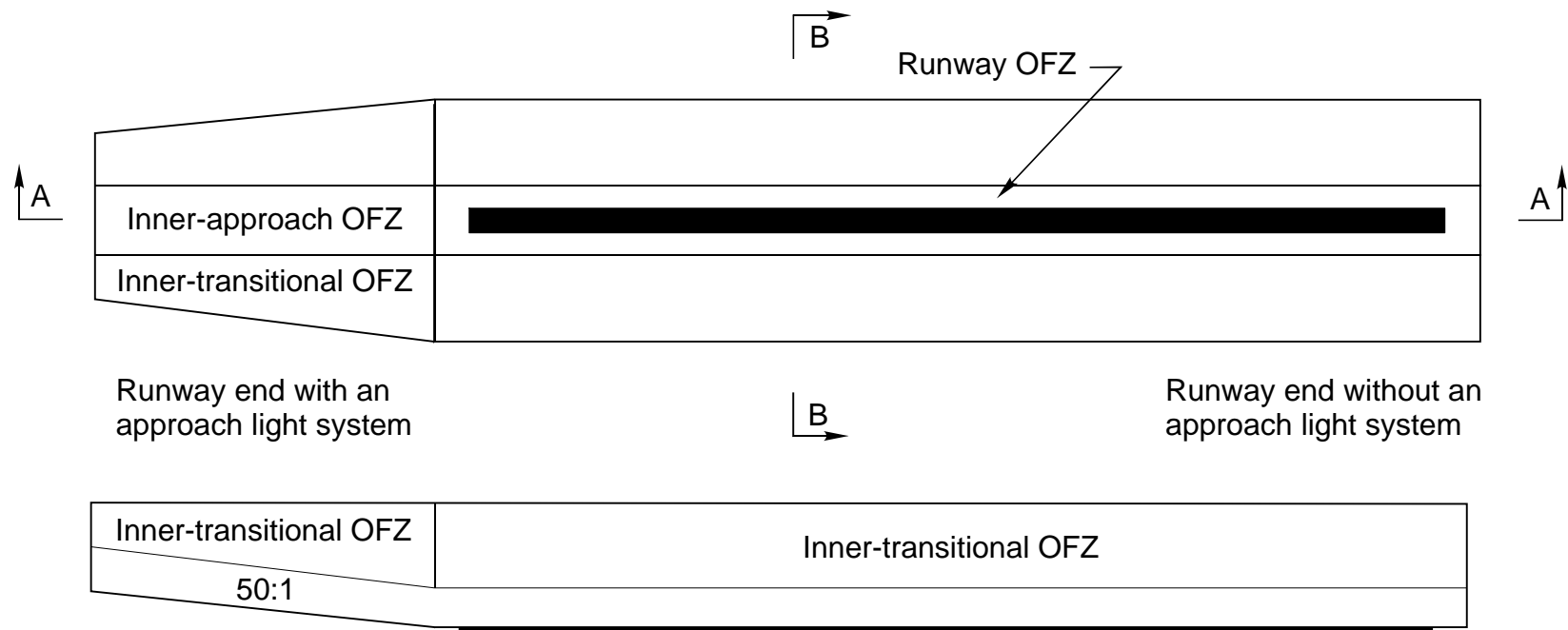
The Inner-Transitional OFZ – The inner-transitional OFZ is a defined volume of airspace along the sides of the runway OFZ and inner-approach OFZ. It applies to runways with lower than the $\frac{3}{4}$ -statute mile approach visibility minimums (Runways 17L, 17R, 29, 35L, 35R).

Currently, no objects violate the runway OFZ, the inner-approach OFZ or the inner-transitional OFZ for the runways at the Airport.

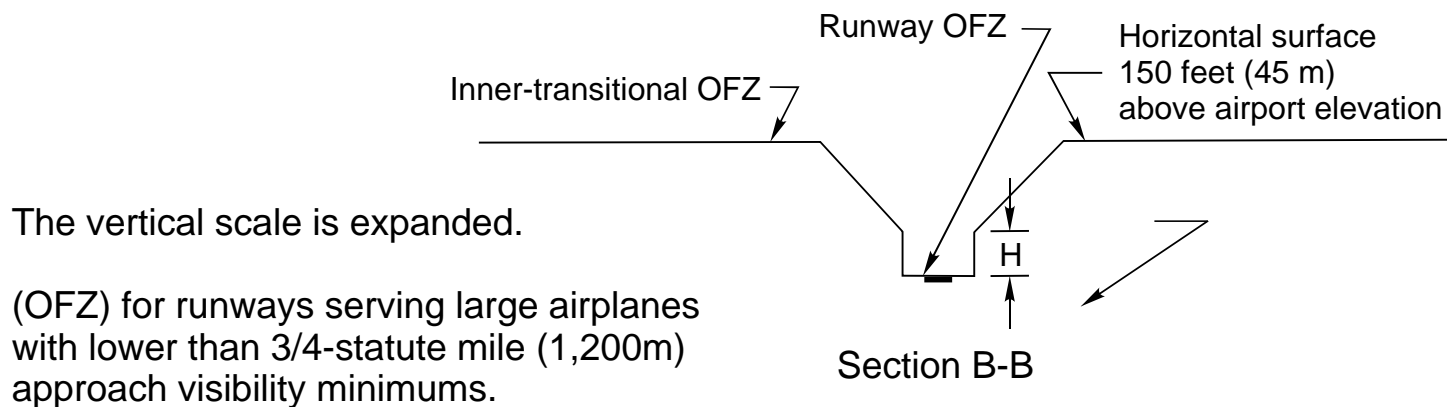
5.1.4 Taxiway Requirements

Taxiway requirements are based on the projected fleet that will be using the Airport over the 20-year planning period. All taxiways are designed to meet Group V aircraft design standards. Because this is the most demanding aircraft group (currently in production), the current taxi design is adequate for the airfield.

It was ascertained through interviews with the air traffic control tower and airfield users that several additional taxiways are required to make the airfield operate more efficiently. These taxiways, as depicted in **Exhibit 5.1-5**, are:



Section A-A



Section B-B



**Louisville International Airport
Master Plan Update**

OBSTACLE FREE ZONE

**EXHIBIT
5.1-4**

- A taxiway to link Taxiway L with Taxiway D at taxiway connector D4 or D5, which would eliminate a circuitous taxi route.
- The completion of the parallel Taxiway E to allow general aviation (GA) and military aircraft to taxi to Runway 35R without crossing that runway.
- A taxiway connector from Taxiway E-3 to Taxiway D, which would eliminate the need to taxi onto Runway 17L/35R in order to reach Taxiway D.

Additional taxiway improvements to improve operational flow may be included in the alternatives development phase of the Master Plan Update, depending on the alternative under investigation.

5.1.5 Navigational Aids

Louisville International Airport is currently supported by instrument approaches to allow for continuous operations in IFR weather. Runways 35L and 35R are currently supported by Category (CAT) I, II, and III instrument landing systems (ILS). A CAT III ILS approach offers the lowest minimums of any approach currently available. Runway 17L and 17R are each supported by a CAT I ILS approach. Runway 11/29 is supported by a localizer (LOC) approach for Runway 29 and a visual approach for Runway 11. High Intensity Runway Lights (HIRLs) currently support all three runways, and the runway ends are outfitted with appropriate approach lighting systems. The Airport's existing NAVAIDs should be adequate throughout the 20-year planning period, although the Airport's Part 150 Study (in progress) may recommend additional NAVAIDs based on a preferred noise abatement alternative. **Exhibit 5.1-6** depicts all of the NAVAIDs available for instrument approaches available at the Airport.

Global positioning system (GPS) navigation uses signals transmitted by a series of satellites orbiting the earth. Unfortunately, the GPS service does not

	Runway 11	Runway 17L	Runway 17R	Runway 29	Runway 35L	Runway 35R
<i>Approaches</i>						
ILS						
CAT I		■	■		■	■
CAT II					■	■
CAT III					■	■
LOC		■	■	■	■	■
GPS		■	■	■	■	■
NDB				■		
VOR				■		
TACAN				■		
<i>Lighting</i>						
ALSF II					■	■
MALSR	■	■	■			
HIRL	■	■	■	■	■	■

Source: FAA 5010 Form



have sufficient accuracy and signal integrity to be used for precision instrument approaches to airports. The FAA is developing the Local Area Augmentation System (LAAS), a ground-based station to enable precision instrument approaches with GPS. A major benefit of LAAS is that one station can provide instrument approach capabilities to numerous airports. According to the FAA, full deployment of LAAS will begin in 2003 and will be completed by 2006.

5.2 PASSENGER TERMINAL REQUIREMENTS

This section provides the facility requirements for the passenger terminal at the Airport.

Peak hour passenger numbers are used when quantifying passengers for the purposes of assessing a particular processing function or specific terminal area. Peak hour passenger figures are derived from the forecast schedules and represent the peak hour of the average day of the peak month.

Utilizing these activity projections, terminal facility requirements were determined based on a set of formulas developed by the International Air Transport Association (IATA). These IATA formulas were modified to reflect conditions specific to Louisville International Airport and were used in conjunction with additional formulae developed by the Master Plan Consultant Team. In general, these formulae consider the number of passengers (and others) involved in a specific activity. The assumptions underlying the terminal facility requirements are presented in Appendix A. Level of Service (LOS) standards are applied for the people involved in the function to achieve an estimate of the total area required in order to achieve the desired LOS.

The passenger terminal capacity is directly related to the LOS provided. The LOS can be considered to be a range of values, or assessments, of the ability of supply to meet demand. These values combine both qualitative and quantitative assessments of relative comfort and convenience experienced by the traveling public.

It is difficult to establish a precise, quantified relationship between available space, time and level of service. Many factors such as passenger behavior patterns, psychological requirements and passenger comfort can affect the space required in relation to the occupancy time. Therefore, LOS is not solely a function of space; time must be considered a factor of LOS. Additional criteria for evaluating level of service include comfort, convenience and distance. However, the primary focus to date has been upon time and space. To allow comparison among the various systems and sub-systems of the airport, and to reflect the dynamic nature of demand upon a facility, a range of level of service capacities from “A” through “F” similar to that used in highway traffic engineering has been developed by IATA, as presented in **Table 5.2-1**.

TABLE 5.2-1						
Louisville International Airport						
LEVEL OF SERVICE STANDARDS (SQUARE FEET/OCCUPANT)						
Functional Area	Level of Service (LOS)					
	A	B	C	D	E	F
Check-in Queue Area	20	17	15	13	10	System Breakdown
Waiting and Circulating	29	25	20	16	10	
Holdrooms	15	13	11	9	7	
Baggage Claim (exclusive of devices)	20	20	17	15	13	
Government Inspection Facilities	15	13	10	9	7	

Source: International Air Transport Association (IATA)

Level of Service:

A = Excellent Level of Service; condition of free flow; excellent level of comfort

B = High Level of Service; condition of stable flow; very few delays; high level of comfort

C = Good Level of Service; condition of unstable flow; acceptable delays; good level of comfort

D = Adequate Level of Service; condition of unstable flow; acceptable delays for short period of time; adequate level of comfort

E = Inadequate Level of Service; condition of unstable flow; unacceptable delays; inadequate level of comfort

F = Unacceptable Level of Service; condition of cross-flows; system breakdown and unacceptable level of comfort

Subsystems operating at or above LOS C do not have a maximum occupancy time standard associated with them. This is because the passenger terminal could theoretically operate continuously at this LOS. However, when the LOS drops below C, a time duration factor should be added. For example, for the holdroom LOS D, the standard of nine square feet per occupant should only be applied for an occupancy duration time of less than fifteen minutes. For a greater duration time than this, the

congestion standard should be increased accordingly. A similar approach should be followed for other sub-systems that operate below LOS C.

The preceding description explains LOS in theoretical terms that are sometimes difficult to translate into real situations. From a passenger perspective, LOS A would mean no queuing at any facilities, no obstacles in the concourse, and boarding of the aircraft upon arrival in the departure lounge. At a busy airport, this LOS cannot be attained during a peak period. Although interaction with other pedestrian traffic would occur, generally the experience would be pleasant and with minimal stress. Passengers would not miss a flight due to long waiting conditions, or experience disorientation due to crowds. A number of areas at Louisville operate at LOS A, but not necessarily during peak periods.

LOS E is verging on total system gridlock. In this scenario, passengers queue for long periods, potentially missing their flights. Navigating concourses is difficult, with passengers having to stop for cross-flow conditions and dodge around slower moving groups. At LOS E, passenger anxiety is very high, making the travel experience a very negative one.

Level of Service C is recommended as the minimum design objective as it denotes good service at a reasonable cost. Level of Service C has been used for the calculations at Louisville.

5.2.1 Terminal Gates

Chapter 3.0, *Activity Projections*, gives the number and type of aircraft operations that are expected through 2020. From these data the number of aircraft gates that will be required for each planning year can be determined. **Table 5.2-2** shows the results of this analysis for the planning horizon years 2000, 2005, 2010 and 2020. The average number of seats for each aircraft together with the average number of operations that each aircraft type would

perform in a peak hour must equal the number of peak hour enplaning passengers. The total number of aircraft arriving and departing during the peak hour, plus a reserve to accommodate aircraft that occupy a gate during the peak

TABLE 5.2-2						
Louisville International Airport						
DOMESTIC AIRCRAFT GATE REQUIREMENTS – YEAR 2000						
Aircraft	Average Seats per Aircraft	Seats per Load Factor	Percent of Arrivals Per Day	Peak Hour Aircraft	Peak Hour Seats at Load Factor	Required Aircraft Gates
DC-9-10	80	49	-	-	-	-
737-100	100	61	-	-	-	-
F-100	107	65	6.00	0.66	43	1
BAE-146	82	50	2.80	0.31	15	0
DC-9-30	105	64	23.00	2.53	161	3
A-318	108	66	-	-	-	-
717	110	67	-	-	-	-
737-500	108	66	-	-	-	-
737-600	108	66	-	-	-	-
737-200	115	70	30.20	3.32	232	4
A-319	124	75	-	-	-	-
737-300	128	78	12.50	1.38	107	2
737-700	128	78	3.50	0.39	30	0
MD-80	142	86	12.00	1.32	114	2
737-400	146	89	-	-	-	-
727-200	145	88	9.00	0.99	87	1
A-320	150	91	-	-	-	-
737-800	162	98	1.00	0.11	11	0
757-200	178	108	-	-	-	-
Air Carrier Subtotal		74	100.00	11	800	14
Beechcraft	19	12	10.00	0.40	5	1
Embraer 120	30	19	12.00	0.48	9	1
Saab 340	33	21	11.00	0.44	9	1
EMB135	45	28	-	-	-	-
DHC8	50	32	-	-	-	-
RJ50	50	32	37.00	1.48	47	2
EMB 145	50	32	25.00	1.00	32	1
Avro RJ85	85	54	5.00	0.20	11	0
RJ70	70	44	-	-	-	-
Regional Carrier Subtotal		30	100.00	4	112	6
Total		105	100.00	15	912	20

TABLE 5.2-2 (continued)						
Louisville International Airport						
DOMESTIC AIRCRAFT GATE REQUIREMENTS – YEAR 2005						
Aircraft	Average Seats per Aircraft	Seats per Load Factor	Percent of Arrivals Per Day	Peak Hour Aircraft	Peak Hour Seats at Load Factor	Required Aircraft Gates
DC-9-10	80	49	-	-	-	-
737-100	100	62	-	-	-	-
F-100	107	66	6.00	1	43	1
BAE-146	82	50	2.00	0	11	-
DC-9-30	105	65	18.00	2	128	2
A-318	108	66	2.00	0	15	-
717	110	68	2.00	0	15	-
737-500	108	66	1.00	0	7	-
737-600	108	66	3.00	0	22	-
737-200	115	71	21.00	2	163	3
A-319	124	76	2.00	0	17	-
737-300	128	79	10.00	1	87	1
737-700	128	79	13.00	1	113	2
MD-80	142	87	9.00	1	86	1
737-400	146	90	2.00	0	20	-
727-200	145	89	1.00	0	10	-
A-320	150	92	3.00	0	30	-
737-800	162	100	5.00	1	55	-
757-200	178	109	-	-	-	-
Air Carrier Subtotal		75	100.00	11	822	14
Beechcraft	19	12	7.00	0	4	0
Embraer 120	30	19	-	-	-	-
Saab 340	33	21	3.00	0	3	0
EMB135	45	29	10.00	1	14	1
DHC8	50	32	-	-	-	-
RJ50	50	32	45.00	2	72	3
EMB 145	50	32	30.00	2	48	2
Avro RJ85	85	54	5.00	0	14	0
RJ70	70	45	-	-	-	-
Regional Carrier Subtotal		31	100.00	5	154	6
Total				16	976	20

TABLE 5.2-2 (continued)						
Louisville International Airport						
DOMESTIC AIRCRAFT GATE REQUIREMENTS – YEAR 2010						
Aircraft	Average Seats per Aircraft	Seats per Load Factor	Percent of Arrivals Per Day	Peak Hour Aircraft	Peak Hour Seats at Load Factor	Required Aircraft Gates
DC-9-10	80	50	-	-	-	-
737-100	100	63	-	-	-	-
F-100	107	67	4.00	0	32	1
BAE-146	82	51	1.00	0	6	0
DC-9-30	105	66	6.00	1	47	1
A-318	108	68	7.00	1	57	1
717	110	69	4.00	0	33	1
737-500	108	68	1.00	0	8	0
737-600	108	68	7.00	1	57	1
737-200	115	72	10.00	1	86	2
A-319	124	78	7.50	1	70	1
737-300	128	80	7.00	1	67	1
737-700	128	80	22.00	3	212	3
MD-80	142	89	4.00	0	43	1
737-400	146	91	2.00	0	22	0
727-200	145	91	-	-	-	-
A-320	150	94	7.50	1	85	1
737-800	162	101	9.00	1	110	1
757-200	178	111	1.00	0	13	0
Air Carrier Subtotal		77	100.00	12	947	15
Beechcraft	19	12	5.00	0	4	0
Embraer 120	30	19	-	-	-	-
Saab 340	33	21	3.00	0	4	0
EMB135	45	29	10.00	1	17	1
DHC8	50	32	-	-	-	-
RJ50	50	32	44.00	3	85	3
EMB 145	50	32	30.00	2	58	2
Avro RJ85	85	54	4.00	0	13	0
RJ70	70	45	4.00	0	11	0
Regional Carrier Subtotal		31	100.00	6	191	8
Total				18	1,138	23

TABLE 5.2-2 (continued)						
Louisville International Airport						
DOMESTIC AIRCRAFT GATE REQUIREMENTS – YEAR 2020						
Aircraft	Average Seats per Aircraft	Seats per Load Factor	Percent of Arrivals Per Day	Peak Hour Aircraft	Peak Hour Seats at Load Factor	Required Aircraft Gates
DC-9-10	80	52	-	-	-	-
737-100	100	65	-	-	-	-
F-100	107	69	-	-	-	-
BAE-146	82	53	-	-	-	-
DC-9-30	105	68	-	-	-	-
A-318	108	70	8.00	1	78	1
717	110	71	5.00	1	50	1
737-500	108	70	-	-	-	-
737-600	108	70	8.00	1	78	1
737-200	115	74	-	-	-	-
A-319	124	80	10.00	1	112	2
737-300	128	83	5.00	1	58	1
737-700	128	83	28.00	4	325	5
MD-80	142	92	2.00	0	26	0
737-400	146	94	1.00	0	13	0
727-200	145	94	-	-	-	-
A-320	150	97	11.00	2	149	2
737-800	162	105	16.00	2	235	3
757-200	178	115	6.00	1	97	1
Air Carrier Subtotal		79	100.00	14	1,221	18
Beechcraft	19	12	3.00	0	3	0
Embraer 120	30	20	-	-	-	-
Saab 340	33	21	3.00	0	5	0
EMB135	45	29	10.00	1	23	1
DHC8	50	33	-	-	-	-
RJ50	50	33	44.00	4	115	4
EMB 145	50	33	29.00	2	76	3
Avro RJ85	85	55	3.00	0	13	0
RJ70	70	46	8.00	1	29	1
Regional Carrier Subtotal			100.00	8	264	10
Total				22	1,485	28

Source: PB Aviation

hour, but do not move, generate the total number of gates required. The total was broken down further to determine gates required by aircraft type, by air carrier and regional aircraft, and the total number of gates required by year.

One gate, Gate Number 1, functions solely as a regional carrier gate where passengers are only ground loaded from this gate. There are seven other gates, which can be cross-utilized as either air carrier or regional carrier gates. These gates have loading bridges available and have staircases and elevators in close proximity. The remaining 10 gates are served only by loading bridges and are limited to use by air carrier aircraft. As outlined in the departure lounge requirements, the majority of the departure lounges are sized to accommodate only a maximum 80-100 seat aircraft when used individually. Therefore, in assessing the future gate requirements, regional carrier aircraft were first assigned to the gate limited to ground loading, and then to those gates that can be cross-utilized. The remaining gates were then assumed to be available for air carrier aircraft until a deficiency occurred.

Table 5.2-3 summarizes the required number of gates and projected deficiency at the Airport. Two additional gates were required by the end of 2000. This deficiency was corrected through the Airport's reuse of two gates on the former Delta concourse. By 2020, ten additional gates will be required.

5.2.2 CURBSIDE CHECK-IN

Curbside check-in, or skycap positions, are those facilities located at the exterior of the terminal which allow a passenger to check his/her baggage at curbside without going to the interior check-in counters. Louisville currently has twelve skycap positions. As illustrated in **Table 5.2-4**, which presents all of the domestic terminal space requirements, the existing facilities are projected to exceed the requirements throughout the planning period. The numbers of passengers utilizing curbside check-in would suggest that only six to seven skycap positions are needed in the early planning years and nine in the last planning year. In actuality, the individual airlines often give their passengers a higher level of service by offering more skycaps.

TABLE 5.2-3						
Louisville International Airport						
DOMESTIC AIRCRAFT GATE REQUIREMENT SUMMARY						
Existing Gates		Required Gates ²	2000	2005	2010	2020
Regional Carrier Only	1	Regional Carrier	6	6	8	10
Regional or Air Carrier ¹	7	Air Carrier	<u>14</u>	<u>14</u>	<u>15</u>	<u>18</u>
Air Carrier Only	<u>10</u>	Total	20	20	23	28
Total	18					
		Gate Deficiency				
		Regional Carrier	0	0	0	1
		Air Carrier ³	<u>2</u>	<u>2</u>	<u>5</u>	<u>9</u>
		Total	2	2	5	10

Source: PB Aviation

- Notes:
- ¹ Loading bridge and staircase/elevator access enables gates to be used by air carriers or regional carriers.
 - ² Requirements based on first assigning regional carrier aircraft to the Regional Only gate, then to the Regional or Air Carrier gates. Refer to Section 4.2.11, Domestic Departure Lounges for specific size requirements.
 - ³ Renovation of gates at the end of the former Delta concourse has compensated for short-term gate deficiencies.

TABLE 5.2-4
Louisville International Airport
DOMESTIC TERMINAL FACILITY REQUIREMENTS

	Existing	2000	2005	2010	2020
Curbside Check-in					
Number of Skycap Positions	12	6	7	7	9
Area for Curbside Check-in (square feet)	1,827	1,050	1,193	1,325	1,692
Terminal Area Check-in					
Number of Domestic Check-in Counters (exclusive use)	33	28	32	36	46
Length of all Domestic Check-in Counters (lineal feet)	368	101	115	127	163
Area of Check-in Queue (serpentine queue)(40% of peak hour passengers (PHP) in 20 min.)	9,200	10,660	12,113	13,448	17,180
Counter and Take Away Belt Depth (lineal feet)	10	10	10	10	10
Area of Check-in Counters and Work Area (square feet)	3,680	1,010	1,147	1,274	1,627
Area for Terminal Area Check-in (square feet)	12,880	11,670	13,260	14,722	18,808
Oversize Baggage Check					
Number of Positions	0	1	2	2	2
Area for Oversized Baggage Check (square feet)	0	282	320	355	454
Airline Ticket Sales Counters					
Number of Ticket Sales Positions	0	3	3	4	5
Length of all Domestic Ticket Sales Counters (lineal feet)	0	10	11	13	16
Depth of the Ticket Sales Area (lineal feet)	0	10	10	10	10
Area of the Ticket Sales Counters (square feet)	0	101	115	127	163
Centralized Security Area					
Number of Security Stations	3	3	4	4	6
Primary Screening Area (square feet)	1,948	1,134	1,288	1,430	1,827
Secondary Screening Area (square feet)	0*	963	1,094	1,215	1,552
* =Included in Primary Screening area					
Number of Search Rooms		1	1	1	1
Area of All Search Rooms (square feet)	0	50	60	60	80
Area of the Security Queue (non-serpentine) (40% of PHP in 20 min.)	1,599	2,232	2,537	2,816	3,579
Area of Centralized Security (square feet)	3,547	4,379	4,979	5,521	7,056

TABLE 5.2-4 (continued)
Louisville International Airport
DOMESTIC TERMINAL FACILITY REQUIREMENTS

	Existing	2000	2005	2010	2020
Domestic Baggage Claim Area					
Total Exposure Length of Baggage Claims (flat bed/common use)	725	940	1,069	1,187	1,516
Number of Domestic Baggage Claim Devices	5	6	7	8	10
Area of Domestic Claim Devices (square feet)	3,625	4,702	5,345	5,934	7,578
Area of Domestic Baggage Claim Exclusive of Claim Devices (square feet)	15,485	14,106	16,036	17,801	22,734
Area of Domestic Baggage Claim Facility (square feet)	19,110	18,808	21,382	23,735	30,313
Waiting and Seating					
Terminal Departure Area (square feet)	0	4,728	5,372	5,964	7,619
Terminal Arrival Area (square feet)	0	4,019	4,568	5,071	6,477
Concourse Area (square feet)	0	4,457	5,066	5,624	7,184
Area for Waiting and Seating (square feet)	948	13,204	15,007	16,659	21,279
Public Restrooms					
Terminal Departure Area (square feet)	1,626	1,555	1,767	1,962	2,506
Terminal Arrival Area (square feet)	1,220	1,322	1,503	1,668	2,130
Concourse Area (square feet)	3,659	2,932	3,333	3,700	4,726
Area of Public Restrooms (square feet)	6,505	5,810	6,603	7,330	9,363
Baggage Make-up and Delivery Areas					
Outbound Baggage Make-up Area (square feet)	26,470	24,600	24,600	27,300	33,000
Inbound Baggage Drop Off Stations (square feet)	4,800	6,485	7,373	8,185	10,453
Baggage Service Offices (exclusive use) (square feet)	1,252	1,425	1,620	1,798	2,297
Area of Domestic Baggage Make-up and Delivery Areas (square feet)	32,522	32,510	33,593	37,283	45,749
Ground Transportation Counters					
General Information Counter (square feet)	220	235	235	235	235
General Information Counter Queue (square feet)	217	81	92	103	131
Number of Rental Car Counters (exclusive use)	25	5	6	6	8
Total Rental Car Counter Length (lineal feet)	149	24	28	31	39
Overall Depth of the Rental Car Counters (lineal feet)	15	15	15	15	15
Rental Car Counter Area (square feet)	2,238	365	415	461	588
Rental Car Counter Queue (square feet)	1,493	160	181	201	257
Other Ground Transportation Counters (square feet)	0	450	500	550	600
Area of Ground Transportation Counters (square feet)	4,318	865	951	1,030	1,251

TABLE 5.2-4 (continued)
Louisville International Airport
DOMESTIC TERMINAL FACILITY REQUIREMENTS

	Existing	2000	2005	2010	2020
Departure Lounges					
Number of 1-25 Seat Aircraft Departure Lounges	0	1	-	-	-
Area of 1-25 Seat Aircraft Departure Lounges (square feet)	0	281	-	-	-
Number of 26-49 Seat Aircraft Departure Lounges	0	2	1	1	1
Area of 26-49 Seat Aircraft Departure Lounges (square feet)	0	1,102	551	551	551
Number of 50-79 Seat Aircraft Departure Lounges	1	3	5	7	9
Area of 50-79 Seat Aircraft Departure Lounges (square feet)	924	2,664	4,441	6,217	7,993
Number of 80-100 Seat Aircraft Departure Lounges	17	-	-	-	-
Area of 80-100 Seat Aircraft Departure Lounges (square feet)	31,724	-	-	-	-
Number of 101-200 Seat Aircraft Departure Lounges	0	14	14	15	18
Area of 101-200 Seat Aircraft Departure Lounges (square feet)	0	36,807	36,807	39,436	47,323
Number of 201-300 Seat Aircraft Departure Lounges	0	-	-	-	-
Area of 201-300 Seat Aircraft Departure Lounges (square feet)	0	-	-	-	-
Number of 301-560 Seat Aircraft Departure Lounges	0	-	-	-	-
Area of 301-560 Seat Aircraft Departure Lounges (square feet)	0	-	-	-	-
Area of Departure Lounges (square feet)	32,648	40,854	41,799	46,204	55,867
Public Corridors in the Concourse(s)					
Public Corridor Area (square feet)	*	54,075	54,930	61,950	75,150
Area of the Public Corridors in the Concourse(s) (square feet)	0	54,075	54,930	61,950	75,150
* Area included in Total Public and Non-public circulation below					
Airlines Operations and Maintenance					
Passenger Services and Other Concourse Areas (square feet)	0	2,425	2,495	2,785	3,375
Administrative/Ticketing Offices (square feet)	8,155	3,333	3,787	4,204	5,370
Enclosed Operations Spaces (square feet)	31,851	36,050	36,620	41,300	50,100
Unenclosed Operations Spaces (square feet)	580	21,630	21,972	24,780	30,060
Area of Airline Operations and Maintenance (square feet)	40,586	63,438	64,874	73,069	88,905
Total Useable Area (Square Feet)	153,064	245,996	257,811	287,987	354,357

TABLE 5.2-4 (continued)
Louisville International Airport
DOMESTIC TERMINAL FACILITY REQUIREMENTS

	Existing	2000	2005	2010	2020
Concessions					
Food and Beverage Concessions (square feet)	10,863	9,225	9,668	10,800	13,288
Retail Shops (square feet)	9,183	18,450	19,336	21,599	26,577
Concession Support (square feet)	7,464	7,749	8,121	9,072	11,162
Airline Clubs (square feet)	0	6,800	7,600	8,800	10,800
Area of Concessions (square feet)	27,510	42,223	44,725	50,270	61,827
% of Total Domestic Terminal Area	8	10	10	10	10
% of Total Domestic Terminal Area w/o Clubs	8	9	9	9	9
Public and Non-Public Circulation (square feet)	112,032	28,822	30,254	33,826	41,618
Subtotal Domestic Terminal to be Maintained (square feet)	292,606	317,042	332,790	372,083	457,803
Maintenance/Janitorial/Shops and Stores (square feet)	2,743	9,511	9,984	11,162	13,734
Subtotal Environmentally Controlled Domestic Terminal Space (square feet)	295,349	326,553	342,774	383,245	471,537
Mechanical (square feet)					
Mechanical, Electrical, Shafts, Shops (square feet)	-	48,983	51,416	57,487	70,731
PC Air Equipment Room (square feet)	-	9,180	10,260	11,880	14,580
Ground Power Equipment Room (square feet)	-	7,990	8,930	10,340	12,690
Communications Equipment (square feet)	-	3,266	3,428	3,832	4,715
Area of Mechanical Equipment (square feet)	34,236	69,418	74,034	83,539	102,716
Net Domestic Terminal Area (square feet)	329,585	395,971	416,807	466,785	574,253
Structure and Walls					
Structure, Exterior and Interior Walls (square feet)	6,592	19,799	20,840	23,339	28,713
Area of Structure and Walls (square feet)	6,592	19,799	20,840	23,339	28,713
TOTAL DOMESTIC TERMINAL (square feet)	336,176	415,770	437,648	490,124	602,965
Area per Gate (square feet)	17,178	20,788	21,882	21,310	21,534

Source: PB Aviation

At the beginning of the planning period, the Airport had 1,827 square feet of space devoted to curbside check-in. With the desired level of service and the projected number of passengers utilizing curbside check-in, only 1,692 square feet of space will be required for these functions in 2020. However, as security measures tighten during the planning period, and the airlines fully enforce carry-on regulations, the facilities may have to be enlarged or re-allocated to incorporate security-screening and size check devices.

5.2.3 Terminal Area Check-in and Ticket Sales

The terminal area for check-in and ticket sales is that area in the interior of the building where passengers go to check-in for their flight, check-in baggage, receive boarding passes, change reservations or tickets, or purchase tickets. This area also includes the queuing area in front of the check-in counters and the agent work area and take-away belt behind the check-in counters. The area counted as check-in at the existing facility includes those unleased areas which do not currently function as check-in desks, but which are intended to be opened as demand requires.

At the Airport a large percentage of the domestic, originating passengers by-pass the check-in counter and continue directly to the gate. According to the Customer Satisfaction Survey January – December 1999, almost twenty-eight percent of the domestic, originating passengers by-pass the terminal check-in. This area is by-passed for a variety of reasons, most notably, curbside check-in and electronic ticketing coupled with limited carry-on (and no checked) baggage, a condition that describes passengers that are predominantly business travelers.

As can be seen from Table 5.2-4, the existing area provided for check-in and ticket sales at Louisville was forecast to be adequate through 2000 for domestic traffic alone. By 2005, an additional 380 square feet will be required.

By 2020, another 5,928 square feet will be required to accommodate domestic traffic.

The areas shown in Table 5.2-4 are calculated as though the ticketing and check-in procedures in place at the beginning of the planning period were continued through 2020. However, as the airlines increasingly move toward ticketless travel, the need for the passengers to check-in at the check-in hall decreases. Passengers with only carry-on or no baggage can proceed directly to the gate. This will decrease the amount of space required in the check-in hall, but can push some of these requirements out to the departure lounges.

5.2.4 Oversized Baggage Check

The oversize baggage check is that area where an agent will input a large item such as a bicycle into the baggage system. Currently, there are no oversized baggage checks at the Airport. If a large item is presented at check-in, a porter must be summoned from curbside check-in to take the item by cart down to the apron level, baggage make-up system. This area must be convenient to all agents, but as a large portion of the passengers do not use this area, the number of these facilities can be kept to a minimum.

For operational efficiency, it is recommended that at least one oversized baggage check be present. Given the configuration of Louisville's check-in counters where they are divided into two groups by the corridor that leads to security, two oversize baggage checks might be provided for convenience. Table 5.2-4 presents oversize baggage handling requirements.

5.2.5 Centralized Security Area

The centralized security area is that area through which all passengers, their visitors, employees and their carry-on baggage must pass before traveling to the airside concourses. The security area consists of magnetometers that

passengers and visitors pass to be screened. It also contains the screening equipment for all hand-carried items travel, the queuing area in front of the machines, and areas where a search can be conducted.

A screening position is defined as one hand-baggage-screening device and either one magnetometer or a magnetometer shared with another hand-baggage-screening device. The area also includes the queue before these devices and the secondary screening area after these devices. As can be seen from Table 5.2-4, the three security positions provided were adequate to meet demand at the beginning of the planning period. By 2020, a total of six screening positions will be required.

The area provided for centralized security, including both the queue area and the actual screening area, was marginally adequate for the beginning of the planning period. By 2020, 3509 square feet will be needed in addition.

5.2.6 Baggage Claim Area

The baggage claim area is located on the lowest level of the landside passenger terminal.

There are currently five baggage claim devices. These are flat bed devices of varying lengths, averaging about 145 lineal feet of exposed length. In total, these five baggage claim devices have an exposure length of approximately 725 lineal feet. This is 23 percent less length than is projected to be required in 2000 for the domestic traffic.

These calculations apply for the flatbed type of baggage claim device through 2020. If sloping bed devices are added in the future, they will take up more space, but they also have about one third more storage capacity than a flat bed of equal frontage. In addition, sloping bed claim devices are considered to

be more secure because once a bag is placed on the device, it does not travel back to the secure airside. It continues to revolve until it is picked off the device.

The area of the baggage claim was adequate for accommodating domestic traffic levels for the beginning of the planning period. By 2005, the baggage claim facilities will become crowded during the peak hour. By 2020, an additional 11,203 square feet will be required.

5.2.7 Waiting and Seating

Waiting and seating areas are exclusive of those found in the departure lounges and concessions. As our population ages, these amenities will become more necessary. Waiting and seating areas serve as a place for visitors to wait for their passengers while the passenger is checking in and as a meeting place for colleagues in the baggage check-in hall. They also provide an oasis for families traveling with young children.

As can be seen from Table 5.2-4, there are currently 948 square feet devoted to waiting and seating in the entire existing terminal, which are significantly less than the 13,204 square feet requirement for 2000. By 2020, a total of 21,279 square feet will be needed to provide adequate waiting and seating areas in the terminal. The Airport's terminal renovation plans include additional waiting and seating areas, which will compensate for some of the existing deficiency.

5.2.8 Public Restrooms

Restrooms are required throughout the terminal and concourses, but particularly where passengers are required to wait for any period of time or in the vicinity of food and beverage. Restroom requirements calculated here are for public restrooms only. Restrooms required for employees are calculated within the areas of administration and operations.

Table 5.2-4 presents all public restroom requirements. The total area of restrooms on the departure level of the terminal is currently 1,626 square feet, which is projected to be sufficient until just before 2005 at the projected traffic levels. By 2020, however, an additional 880 square feet will be required.

This marginal acceptability is also true on the baggage claim level, where there are 1,220 square feet of restroom area. For the beginning of the planning period, it was anticipated that 1,322 square feet would be required. By 2020, there will be a need for 2,130 square feet.

In the concourses, there is a total of 3,659 square feet of restroom facilities. It is projected that this will be sufficient through 2010, when 3,700 square feet will be required for domestic traffic. By 2020, approximately 4,726 square feet will be required for accommodating projected domestic passenger levels.

5.2.9 Baggage Make-up and Delivery Areas

The baggage make-up area is the area to which a passenger's baggage travels along the conveyor belt into the wall behind the check-in agent or skycap. The conveyor at Louisville delivers the baggage to a carousel or conveyor, depending on the airline, where the baggage tag is read and the baggage is sorted to a cart for all of the baggage on a particular flight. The baggage cart is then pulled by a tug and delivered and loaded onto the proper aircraft.

The area calculated in Table 5.2-4 is that area devoted to baggage make-up and delivery in the landside terminal building. There are approximately 32,522 square feet of baggage make-up and delivery in the terminal facility. The calculations for 2000 indicated that only approximately 32,510 square feet were required.

Baggage make-up and delivery systems are very dependent upon the airlines that own and operate them. The make-up system where baggage is sorted directly off a conveyor or carousel by hand into a waiting cart destined for a particular flight, and the delivery system where the bags are off-loaded onto a conveyor leading directly to a baggage claim device, are probably the most common systems in the U.S. today. For that reason, the calculations for space for baggage make-up and delivery systems for the future planning years at Louisville have continued with the assumption that this make-up and delivery system will continue to be utilized. It should be noted that if a decision is made to go to a tilt-tray system, the total area required would have to be increased 100 to 150 percent. The Airport's peak-hour projections through the planning period are at the lower threshold that would justify going to a tilt-tray system, but it is by no means a requirement.

As stated above, the area for baggage make-up and delivery was adequate to accommodate projected traffic for the beginning of the planning period. However, depending on the operational practices of the airlines, individually and collectively, almost certainly by 2010 the area will become congested. By 2020, it is projected that an additional 13,227 square feet, for a total of 45,749 square feet, will be required.

5.2.10 Ground Transportation Counters

The ground transportation counters encompass the rental car desks and the desks that arrange local public transportation such as taxis, regional shuttles and busses. Technically, rental car counters are concessions. However, the requirements for ground transportation counters have been broken out separately and combined with the usually much less utilized public transportation counters. At Louisville, as is the case in most airports, these counters and their back offices can be found in the baggage claim hall.

Table 5.2-4 also presents the calculations for ground transportation counters. As depicted, only 1,251 square feet of ground transportation facilities will be required in 2020 to accommodate domestic traffic. There are currently 4,318 square feet of space making up this area. The likely reason for the large discrepancy is that each of the rental car agencies wants to display the biggest, brightest, most enticing lure for the undecided passenger/prospective customer. The calculations are based only on what is required based on the number of passengers likely to utilize a rental car during the peak hour. It is not anticipated that additional square footage will be needed for this function.

5.2.11 Domestic Departure Lounges

The departure lounges are those areas directly adjacent to the gate or door through which the passengers travel to enter the aircraft. These areas generally consist of a number of seats with walk aisles between the rows. Also included is a check-in desk where those passengers who did not check-in at the landside terminal can go to get their boarding cards and pass their security checks. More queue space is required as the number of passengers using these desks increases. A small podium at the gate is also included for the attendant to utilize while collecting tickets. Also necessary, but not always incorporated, is a designated path for passengers getting off the aircraft to use rather than having to shoulder their way through the passengers waiting to get onto the aircraft. Louisville currently incorporates all of these elements in the departure lounges.

Table 5.2-4 indicates various groups of aircraft defined by the number of seats the aircraft contains. After each aircraft group the average recommended size of departure lounge associated with it is indicated. This size is based on providing seating space for eighty percent of the passenger capacity in the largest aircraft to be parked at the gate, with standing room for the remaining passengers, meeter/greeters and well wishers. This includes space for a small

check-in desk with queue, a departure path, and a podium at the gate. These requirements are specific to the airport and take into account not only the passengers, but also the percentage of visitors traveling to airside as well as the average number of visitors accompanying each passenger.

Each of the gates requires a place for the passengers to assemble before boarding the aircraft. Typically, for small commuter aircraft, the passengers assemble in a common departure lounge, where all of the passengers for all of the gates assemble in one area or room. For larger aircraft, each gate will have a departure lounge reserved specifically for that gate. It is common for two or more departure lounges to be combined so that the passengers can spread out into all of the surrounding departure lounges. This works well as long as the gates served by these adjacent lounges are not being used at or near the same time.

Louisville currently has 924 square feet of departure lounge space at Gate Number 1. This is sized to accommodate aircraft which have up to approximately 80 seats. This gate does not have a passenger loading bridge, but it does have a set of stairs and an elevator for the ground loading of passengers. It is utilized to accommodate some of the regional carrier traffic. The remainder of the regional air carrier traffic is handled through gates located in Concourses A and B. Of the gates located in Concourses A and B, seven have a set of stairs and an elevator in close proximity and could be utilized for the ground loading of aircraft. Therefore, the existing gates could conceivably accommodate the regional carrier traffic through the year 2010. Approaching 2020, however, an additional regional carrier gate must be provided.

The 17 departure lounges located on Concourses A and B are individually sized to be able to accommodate aircraft of 80 to 100 seats. The need for aircraft gates in the 80 to 100 seat range was not projected beyond 2000;

however, a need for nine 50-79 aircraft seat departure lounges is projected for 2020 and can easily be accommodated in the existing departure lounges.

Of these 17 departure lounges, all but one are located next to another similarly sized lounge. When combined into eight double departure lounges, these departure lounges can accommodate aircraft up to from 201 to 300 seats in some cases, if only one aircraft is utilizing either of the two gates associated with these two lounges. For the beginning of the planning period, there was a need for 14 departure lounges sized to accommodate an aircraft of 80 to 100 seats. The Airport has accommodated this. By 2020, however, there will be a requirement for 18 departure lounges sized to accommodate an aircraft of 101 to 200 seats.

Because the Airport does not have any domestic departure lounges sized to accommodate aircraft that seat more than approximately 100 passengers, the availability of these double lounges allows larger aircraft to be served. In 1999, many of the 101-200 seat aircraft were accommodated in the eight double departure lounges described above. It must be recognized, however, that by using two lounges to serve one aircraft, the total number of gates available in the facility is reduced.

Where multiple departure lounges are not available, the passengers are crowded into the departure lounge and allowed to spill out into the circulation corridor. This, in turn, impacts the capacity of the circulation corridor.

Table 5.2-4 indicates that in 2000, when only two additional gates were required, an additional 8,206 square feet was required. By 2020, an additional ten domestic gates will be required over the current number of gates and an additional 23,219 square feet over that currently in use in order to provide Level of Service C. In particular, it was projected that at least eight additional gates of a size to accommodate 101-200 seat aircraft were required in 2000 and a total of

10 additional gates of this size will be required by 2020 in order to achieve a Level of Service C.

5.2.12 Concessions

Concessions are those non-aviation functions that sell goods or services to the passengers. These include everything from restaurants and snack bars to newsstands/gift shops and rental car counters. There are many methodologies for formulating the percentage of concession space to non-concession space and the number and type of concession spaces that an airport should have to generate the optimum revenue. For Louisville International Airport, an approach that increases the percentage of concession to non-concession space over the existing space was selected.

The ratio of concession space to the gross square footage of the terminal at Louisville appears to be within the typical range. However, as there are a number of areas in the terminal that require expansion, this ratio can be misleading. Calculations indicate that at the beginning of the planning period, an additional 14,713 square feet of concessions could be supported by the domestic traffic alone if the rest of the terminal were expanded as well. The Airport's remodeling endeavor effort will substantially increase the square footage devoted to concessions. By 2020, a total of 61,827 square feet of concessions could be supported by the domestic traffic, an increase of almost 125 percent.

5.2.13 International Passenger Facilities

Although no international passengers are projected in Chapter 3.0, the need for international terminal facilities may be required in conjunction with the UPS passenger charter operations. Therefore, international terminal requirements were based on the existing charter traffic levels growing at a rate consistent with the domestic passenger projections. Terminal requirements are presented separately in order to differentiate between the facilities required by

traffic generated by these two segments of the traveling public. However, international and domestic passengers will not necessarily require separate facilities.

Table 5.2-5 lists the size of the terminal components required to accommodate the international passengers and generally follows the format of the domestic terminal requirements outlined in the previous sections.

By 2020, a total of 65,436 square feet is projected to be required to support the international traffic alone if the international passengers are required to re-check their baggage. If the international traffic is accommodated in the domestic terminal, and if the international and domestic peaks do not coincide, a portion of this square footage can be cross utilized between the domestic and international traffic.

International gates for the purposes of this discussion are those gates that can accommodate flights from non-NAFTA countries – those flights that require Federal Inspection Services (FIS). Currently, the Airport does not have formal international facilities. It was determined that initially a Boeing 727-100 series aircraft at an eighty percent load factor would be utilized as a peak hour passenger load on the FIS facilities, as this is the aircraft that the UPS charter operation currently uses. The calculation of the number of international departure lounges and required space is presented in Table 5.2-5. For the international passengers, ninety percent seating is provided under the assumption that if there is a delay with the international traffic, it will be of a longer duration than that of domestic traffic.

International departure lounges do not differ from domestic departure lounges, as the only formal procedural difference between the two is the check to

TABLE 5.2-5 Louisville International Airport PASSENGER TERMINAL FACILITY REQUIREMENTS - INTERNATIONAL					
	Existing	2000	2005	2010	2020
Area for Terminal Area Check-in (square feet)	0	350	415	476	709
Area for Oversized Baggage Check (square feet)	0	56	66	76	113
Area of the Ticket Sales Counters (square feet)	0	36	36	36	40
Area of Centralized Security (square feet)	0	349	414	474	707
Area of International (Non-NAFTA) Baggage Re-check (square feet)	0	174	199	221	309
Area of Inbound Security (square feet)	0	770	853	930	1,226
International Meeter/Greeter Area (square feet)	0	126	150	172	256
Area of International Baggage Claim Facility (square feet)	0	2,202	2,336	2,678	3,990
Area for Waiting and Seating (square feet)	0	449	533	611	911
Area of Public Restrooms (square feet)	0	393	467	535	797
Area of International Baggage Make-up and Delivery Areas (square feet)	0	2,179	2,212	2,243	3,739
Area of Ground Transportation Counters (square feet)	0	9	10	12	18
Departure Lounges					
Number of 80-100 Seat Aircraft Departure Lounges	0	1	1	1	2
Area of 80-100 Seat Aircraft Departure Lounges (square feet)	0	1,589	1,589	1,589	3,178

TABLE 5.2-5 (continued)
Louisville International Airport
PASSENGER TERMINAL FACILITY REQUIREMENTS - INTERNATIONAL

	Existing	2000	2005	2010	2020
Federal Inspection Services					
Number of Peak Hour Passengers to be Processed by FIS	0	75	89	102	152
Immigration and Naturalization Service					
Number of Positions Required	0	2	2	2	3
Number of Two Position Booths Required	0	1	1	1	2
Area of Immigration Desks and Circulation (square feet)	0	8	9	10	15
Area of Immigration Queue (serpentine) (square feet)	0	675	801	918	1,368
Circulation Prior to INS Processing (square feet)	0	113	134	153	228
Area of INS Processing (square feet)	0	795	943	1,081	1,611
Baggage Claim					
Overall Length of the Baggage Claim Devices (sloping bed) (lineal feet)	0	59	70	80	120
Number of Baggage Claim Devices	0	1	1	1	1
Area of Baggage Claim Devices (square feet)	0	328	389	446	665
Area of Baggage Claim Exclusive of Baggage Claim Devices (s.f.)	0	886	1,051	1,204	1,795
Number of Oversize Devices	0	1	1	1	1
Area of Oversize Device(s) (square feet)	0	600	600	600	600
Area of Baggage Claim (square feet)	0	1,814	2,040	2,250	3,060
Customs and Agriculture Inspection					
Primary Inspection Corridor (square feet)					
Green Corridor (square feet)	0	164	195	223	332
Number of Customs Secondary Positions Required	0	1	1	1	1
Pairs of Secondary Counters	0	1	1	1	1
Queue Area for Secondary Customs Inspection (square feet)	0	1,440	1,440	1,440	1,440
Area of Secondary Customs Inspection (square feet)	0	210	210	210	210
Screening Counters for Agriculture (square feet)	0	1	1	1	1
Agriculture Inspection Area (square feet)	0	170	170	170	170
Buffer after Customs and Agriculture Inspection Area (square feet)	0	520	520	520	520
Area of Customs and Agricultural Inspection (square feet)	0	2,505	2,536	2,564	2,673
Immigration Offices (square feet)	0	645	765	877	1,307
US Public Health Offices (square feet)	0	910	910	910	910
Customs Offices (square feet)	0	634	752	862	1,284
Animal and Plant Offices (square feet)	0	244	289	332	494
US Fish and Wildlife Office (square feet)	0	420	420	420	420
Total Area of Federal Inspection Services (square feet)	0	7,966	8,656	9,296	11,760

TABLE 5.2-5 (continued)
Louisville International Airport
PASSENGER TERMINAL FACILITY REQUIREMENTS - INTERNATIONAL

	Existing	2000	2005	2010	2020
Area of the Public Corridors in the Concourse(s) (square feet)	0	2,085	2,085	2,085	4,170
Sterile Corridor(s) (square feet)	0	1,390	1,390	1,390	2,780
Area of In-transit Lounge (square feet)	0	-	-	-	-
Area of Airline Operations and Maintenance (square feet)	0	3,030	3,141	3,245	5,984
Total Useable Area (square feet)	0	20,742	22,110	23,595	36,487
Concessions					
Area of Concessions (square feet)	0	3,387	3,584	3,798	6,054
Percentage of International Area	0	9	9	9	9
Public and Non-Public Circulation (square feet)	0	2,631	2,791	2,964	4,628
Maintenance/Janitorial/Shops and Stores (square feet)	0	868	921	978	1,527
Subtotal Environmentally Controlled International Terminal Space (square feet)	0	29,807	31,617	33,578	52,435
Area of Mechanical Equipment (square feet)	0	5,481	5,753	6,047	9,885
Area of Structure and Walls	0	1,764	1,868	1,981	3,116
TOTAL INTERNATIONAL (Non-NAFTA) TERMINAL	0	37,053	39,238	41,606	65,436
Area per Gate	0	37,053	39,238	41,606	32,718

Source: PB Aviation

ensure that the passenger has a valid passport and/or visa for the destination point. The difference between the two types of lounges occurs when the passengers arrive in the U.S.; upon departing the aircraft, the passengers must be kept completely separated from all other people until they have passed through FIS.

Table 5.2-5 lists those spaces required to accommodate the outbound international passenger. Only one departure lounge is required through 2010. By 2020 it is projected that two departure lounges could be required during the international peak hour.

One departure lounge capable of servicing an aircraft of 101 to 200 seats is required through 2010. By 2020, a second lounge of the same size could be required. The Airport does not have a departure lounge of this size; however, if the international peak does not coincide with the domestic peak, two adjacent departure lounges of sufficient size may accommodate this requirement.

With the constraints put on the facilities by domestic traffic, provisions will need to be made by 2020 for departure lounges that can service 101-200 seat aircraft. Provisions should be included for at least two of those gates to accommodate international traffic.

5.2.14 Federal Inspection Services and Related Facilities

The Federal Inspection Facilities (FIS) are the services provided by the federal government, that consist of including the Transportation Security Administration (TSA), the Immigration and Naturalization Service (INS), the U.S. Customs Service (USCS), the Animal and Plant Health Inspection Service (APHIS), the U.S. Fish and Wildlife Service (FWS) and the Public Health Service. These agencies are charged with inspecting all persons and goods entering the U.S. to determine that no undesirable elements such as criminals, disease, pests or contraband are allowed to enter the country. To that end, all international

arriving passengers and their baggage are required to go through the FIS facilities.

FIS facility requirements are presented in Table 5.2-5. Calculations were performed utilizing the standards for FIS facilities as laid out in *Airport Federal Inspection Facilities Guidelines*, 1994 Edition. This document was prepared by the USCS, the INS, APHIS, the U. S. Public Health Service and the FWS. With the exception of the baggage claim areas, all of the areas listed under FIS are those listed as required by the above document. The baggage claim function is necessary for the U.S. Customs process, but could conceivably be as simple as the placement of the aircraft's baggage on the apron for retrieval by the passengers. For planning purposes, space for a baggage claim device is incorporated into the calculation of the requirement for the FIS facility.

Baggage re-check is required if the passengers enter into the secure area of the airport terminal and then make their way to either a connecting gate, the parking area, or ground transportation at the curb. In any of these cases, the baggage must be re-checked in the FIS area and the baggage re-claimed at the domestic baggage claim area. Known as "double handling of bags," this is inconvenient to the international passenger. The area required for baggage re-check has been calculated in case the alternative selected requires this.

In the event that the FIS facilities are located in a separate building, calculations for maintenance, janitors' closets and mechanical spaces, and structure and walls, are presented in order to obtain a more complete gross estimate of the square footage required. If the FIS facilities were placed in the existing terminal, the calculations for some of these functions would also apply to other functions already housed in the passenger terminal.

5.2.15 General and Common Use Areas

Table 5.2-6 presents general and common use facilities requirements, which are based on the functional area space requirements for domestic and international passengers. These areas include administration, a first aid facility, circulation, mechanical space, and structural space. Also presented are total terminal square footages for the planning period. The total terminal area required at the beginning of the planning period was approximately 496,000 square feet, or 151,204 square feet more than the then-existing total terminal space. The total space requirement increases to 746,484 square feet by 2020.

5.2.16 Summary of Terminal Facility Requirements

The following points summarize key terminal space requirements:

- **Airline Gates** – Airline gates will have to be increased to accommodate the expected increase in aircraft during the peak hour. Before 2005, an additional 2 air carrier gates will be required and by 2020, an additional 9 air carrier and at least one regional gate will be required over the existing gates. This assumes that eight of the regional aircraft can continue to utilize specific air carrier gates in the concourses.

Domestic Departure Lounges – The existing domestic departure lounges are undersized. There is currently one gate sized to accommodate a 26-49 seat aircraft. This is Gate Number One, currently used to accommodate regional air traffic. There are 17 gates sized to accommodate 80-100 seat aircraft. At the beginning of the planning period, 14 departure lounges were needed to accommodate 101-200 seat aircraft at a Level of Service C. With careful management, these aircraft can be accommodated by utilizing two adjoining departure lounges. However, this reduces the overall number of departure lounges available, and several of these gates will be serving the regional carriers. This will become critical during the peak hour. By 2020, there will be a requirement for 18 departure lounges that can accommodate 101-200 seat aircraft. This will equate into a need for a total of 55,867 square feet of domestic departure lounge by 2020, or an increase of 23,219 square feet.

TABLE 5.2-6 Louisville International Airport PASSENGER TERMINAL FACILITY REQUIREMENTS – GENERAL AND COMMON USE					
	Existing	2000	2005	2010	2020
Administration (square feet)					
Airport Administration (Future projections are for Total Administration)	2,183	10,904	12,627	14,253	18,949
Airport Security Offices	451	99	115	130	172
U.S. Government Offices (non FIS)	0	1,090	1,263	1,425	1,895
City/County Police Department	466	3,180	3,683	4,157	5,527
Area of Administration	3,100	15,274	17,687	19,965	26,543
First Aid Facility (square feet)					
Beds	0	360	360	360	360
Exam Rooms	0	300	300	300	300
Trauma Room	0	100	100	100	100
Dental Chair	0	80	80	80	80
Waiting Area and Toilet	0	305	305	305	305
Staff Office	0	150	150	150	150
Area of the First Aid Facility	0	1,295	1,295	1,295	1,295
Religious Facilities (square feet)	0	382	442	499	663
Areas Under Airport Management (not included in building total) (square feet)	13,781	13,357	15,468	17,459	23,213
Central Control Room (square feet)	678	420	486	549	730
Light Rail Station (square feet)					
Waiting	0	0	1,238	1,378	2,675
Seats in the Waiting Area	0	0	31	34	67
Ticket Positions	0	0	6	6	12
Ticket Queue Area	0	0	253	282	547
Restrooms	0	0	156	173	335
Station Services	0	0	200	200	200
Area of the Light Rail Station	0	0	1,853	2,039	3,770

TABLE 5.2-6 (continued)
Louisville International Airport
PASSENGER TERMINAL FACILITY REQUIREMENTS –COMMON USE AREAS

	Existing	2000	2005	2010	2020
Post Office (square feet)	0	240	240	360	480
Information Counters (square feet)	220	380	380	380	380
Subtotal General and Common Use	3,998	31,348	37,851	42,546	57,074
Public and Non-Public Circulation (square feet)	400	3,135	3,785	4,255	5,707
Area to be Maintained (square feet)	4,398	34,483	41,636	46,801	62,782
Maintenance/Janitorial/Shops and Stores (square feet)	2,743	1,172	1,249	1,404	1,883
Area to be Environmentally Controlled (square feet)	7,141	35,655	42,885	48,205	64,665
Mechanical (square feet)					
Mechanical, Electrical, Shafts and Shops	1,000	5,348	6,433	7,231	9,700
Area of Mechanical	1,000	5,348	6,433	7,231	9,700
Net Area of General and Common Use (square feet)	8,141	41,004	49,318	55,435	74,365
Structure and Walls (square feet)					
Structure, Interior and Exterior Walls	356	2,050	2,466	2,772	3,718
Area of Structure and Walls	356	2,050	2,466	2,772	3,718
TOTAL GENERAL AND COMMON USE (square feet)	8,497	43,054	51,784	58,207	78,083
TOTAL DOMESTIC, INTERNATIONAL (square feet) AND GENERAL AND COMMON USE	344,673	495,877	528,670	589,937	746,484
Number of Gates	18	21	21	24	30
Average Area Per Gate (square feet)	19,148	23,613	25,175	24,581	24,883

Source: PB Aviation

- International Departure Lounges – Currently, there are no departure lounges dedicated to the international traffic, and there is no need for any, as long as the international traffic peak does not occur at the same time as the domestic peak. However, if this traffic is placed in another facility, or if the peaks coincide, the traffic would indicate that one departure lounge capable of accommodating a 101-200 seat aircraft is required. By 2020, two such departure lounges for a total of 3,178 square feet will be required.
- Federal Inspection Facilities (FIS) – As with the international departure lounges, currently there are no FIS facilities at the Airport. The assumption was made that the international traffic would begin with the B 727-100 aircraft currently used by UPS, and that it would increase at the same rate as the domestic traffic. It is, therefore, anticipated that the FIS and its related facilities, which required 7,966 square feet in 2000, will require 11,760 square feet in 2020.
- Concessions – Concessions at any airport are a unique reflection of that airport's philosophy and the RAA is in the midst of an improvement program for expanding concession space in the terminal. There are currently 27,510 square feet devoted to concessions, which equates to approximately eight percent of the gross square footage of the terminal. In 2000, approximately 42,223 square feet of concessions were required. By 2020, a total of 61,827 square feet of concessions could be supported if the rest of the terminal is expanded as well.
- Baggage Claim – The area of the baggage claim at the beginning of the planning period was just over the projection of the requirements for the year 2000 for domestic traffic. By 2005, the baggage claim facilities will become crowded during the peak hour. By 2020, an additional 11,203 square feet will be required even if the international charter traffic is not included. If it is included, a total of 34,303 square feet will be required.
- Baggage Make-up and Delivery – Currently, there are approximately 32,522 square feet of baggage make-up and delivery in the landside terminal building. The calculations for 2000 indicated that only approximately 32,510 square feet were required for domestic traffic. Assuming that the international charter traffic occurs at a time other than the domestic peak, the current facilities can accommodate both types of traffic. However, depending on the operational practices of the airlines, by the year 2010 the current area will be congested. This is especially true if the international charter traffic is also being accommodated within the domestic peak. By 2020, it is projected that

an additional 16,966 square feet for a total of 49,488 square feet will be required for both domestic and international service.

- **Waiting and Seating Areas** – There are currently 948 square feet devoted to waiting and seating in the entire existing terminal outside of the departure lounges and concessions. In 2000, 13,204 square feet were required for the domestic portion of the passenger traffic. By 2020, an additional 21,242 square feet will be needed for both the domestic and international charter portions of the traffic. The Airport's terminal renovation plans include added waiting and seating areas throughout the terminal.

5.3 AIRPORT PARKING REQUIREMENTS

Parking in the terminal area is an important element in the requirements analyses. Airport parking requirements for passengers, visitors, and employees are presented in the following sections.

5.3.1 Public Parking

Public parking facilities at the Airport consist of a 1,442-space surface lot (long-term) and a 4,320-space garage adjacent to the terminal. In December of 1999, the parking garage was transitioned from a single-rate pricing structure into a two-rate pricing structure with short-term parking (under four hours) and daily parking (over four hours).

Short-term parking is designed for high turnover and short-duration stays associated with passenger pick-up or drop-off. The average duration for short-term parking, or amount of time a space is occupied by a vehicle, is approximately 3.1 hours, which is consistent with average short-term parking durations observed at other US airports.

Short-term parking requirements are presented in **Table 5.3-1**. The requirements are based on a maximum accumulation of vehicles on a rolling basis which reflects the parking one hour before and one hour after the peak hour. As indicated, short-term parking requirements increase from 461 spaces in 2000 to 785 spaces in 2020. With 540 spaces in the short-term parking

TABLE 5.3-1				
Louisville International Airport				
SHORT-TERM PARKING REQUIREMENTS				
	2000	2005	2010	2020
Peak-Hour Originating Passenger Enplanements	1,047	1,205	1,354	1,784
Number of Spaces Required	461	530	596	785
Short-Term Parking Surplus/(Deficit)	79	10	(56)	(245)

Source: PB Aviation

inventory, an additional 245 spaces will be required by the end of the planning period.

The methodology used to determine daily and long-term parking requirements differs from short-term parking in that annual originating enplanements are used, rather than peak hour passengers, to reflect the longer duration and overnight parking. Originating passenger enplanements were used to project the annual number of vehicles entering, which, combined with average duration and a desired utilization rate, determine the number of spaces required.

Table 5.3-2 presents daily parking requirements. The number of vehicles entering is projected to increase commensurate with originating passenger enplanements. Average duration is projected to increase by 0.5 hours per year during the planning period, from 58 hours to 68 hours, reflecting a gradual increase in travel duration. E-mail and teleconferencing are expected to reduce the number of one-day business trips, and leisure trips are increasingly being coordinated with business travel, resulting in longer average durations. This trend is reflected in a recent OAG survey of business travel that found the average business trip to be 3.3 nights away in 1998, up from the average of 3.1 nights away in 1996.

TABLE 5.3-2				
<i>Louisville International Airport</i>				
<i>DAILY AND LONG-TERM PARKING REQUIREMENTS</i>				
Daily Parking Requirements	2000	2005	2010	2020
Originating Passenger Enplanements	1,761,269	2,039,553	2,302,147	3,060,760
Number of Vehicles Entering	440,317	509,888	575,537	765,190
Average Duration (hours)	58.0	60.5	63.0	68.0
Utilization	90%	90%	90%	90%
Number of Spaces Required	3,239	3,913	4,599	6,600
Daily Parking Surplus/(Deficit)	541	(133)	(819)	(2,820)
Long-Term Parking Requirements				
Originating Passenger Enplanements	1,761,269	2,039,553	2,302,147	3,060,760
Number of Vehicles Entering	158,514	183,560	207,193	275,468
Average Duration (hours)	66.0	68.0	70.0	72.0
Utilization	90%	90%	90%	90%
Number of Spaces Required	1,327	1,583	1,840	2,516
Long-Term Parking Surplus/(Deficit)	115	(141)	(398)	(1,074)

Source: PB Aviation

The utilization rate was fixed at 90 percent in order to avoid excessive circulation of vehicles in search of parking. In other words, for planning purposes, a maximum occupancy of 90 percent of the available spaces at any point during the average day represents the desirable parking facility capacity.

Daily parking requirements would increase from 3,239 spaces in 2000 (a surplus of 541 spaces) to 6,600 spaces in 2020 (a deficiency of 2,820 spaces).

Table 5.3-2 also presents long-term parking requirements using the same methodology as daily parking. Because one of the markets the Airport serves is

that of low-fare travel, the long-term parking lot is preferable to the price-sensitive leisure traveler.

As expected, average duration for this lot is higher than the daily lot (66 hours versus 58 hours). This figure is anticipated to increase to 72 hours over the planning period, representing usage by the leisure traveler that typically has longer duration trips than business travelers. The utilization rate of 90 percent, as discussed with daily parking, was used through the planning period.

In 2000, 1,327 spaces were required in long-term parking, indicating that this lot was nearing capacity. By 2020, an additional 1,074 spaces would be required for a total long-term lot size of 2,516 spaces.

Requirements for each parking segment are projected individually because of the unique characteristics of each. However, it is important to note the interrelationship within the passenger parking area. For example, with the long-term parking area nearing capacity, drivers are forced to use the daily parking section of the garage, which decreases the available capacity in that area.

5.3.2 Rental Car Ready/Return Parking

The rental car ready/return parking area is conveniently located adjacent to the west side of the terminal and includes 467 parking spaces and 27 queuing lanes as well as a car wash and fuel facility. Discussions with the managers of the rental car agencies indicated that the existing lot provides adequate space and a high level of customer service.

Rental car space requirements are heavily dependent on the individual agencies. For example, fewer spaces near the terminal require more drivers to shuttle cars to and from remote wash and fuel facilities; operating a remote

ready/return lot in conjunction with maintenance facilities requires shuttle buses and drivers. In short, alternatives development should include the number of spaces required to maintain the level of customer service desired by the Airport. To maintain the existing level of service, future ready/return spaces were developed based on projected enplanements. As shown in **Table 5.3-3**, 800 ready/return spaces would be required by 2020.

5.3.3 Terminal Area Employee Parking

Terminal area employee parking is provided in a 386-space lot east of the passenger terminal. There are currently 875 active parking passes for the employee lot. However, because the Airport operates around the clock with full- and part-time employees, spaces do not need to be provided for each parking pass. Discussions with Airport staff and the Airport's parking operator indicate that existing peak occupancy is approximately 250 to 275 spaces. This is consistent with the requirements analysis presented in **Table 5.3-4**. Based on employee spaces required per enplaned passenger and number of spaces per active parking passes, the parking requirement at the beginning of the planning period was 274 spaces, while 477 employee parking spaces would be required by the end of the planning period. The surplus and deficiency line of this table is provided for reference only, as relocation and modification of the employee lot has been included as part of the hotel project adjacent to the terminal.

TABLE 5.3-3				
Louisville International Airport				
RENTAL CAR READY/RETURN PARKING REQUIREMENTS				
	2000	2005	2010	2020
Originating Passenger Enplanements	1,687,795	1,923,319	2,193,279	2,891,279
Required Ready/Return Parking Spaces	467	532	607	800
Ready/Return Parking Surplus/(Deficit) ¹	0	(146)	(221)	(414)

Source: PB Aviation

Note: ¹ Based on the existing ready/return lot level of service.

TABLE 5.3-4				
Louisville International Airport				
EMPLOYEE PARKING REQUIREMENTS				
	2000	2005	2010	2020
Passenger Enplanements	1,892,000	2,191,000	2,473,000	3,288,000
Required Employee Parking Spaces	274	318	359	477
Employee Parking Surplus/(Deficit) ¹	112	68	27	(91)

Source: PB Aviation

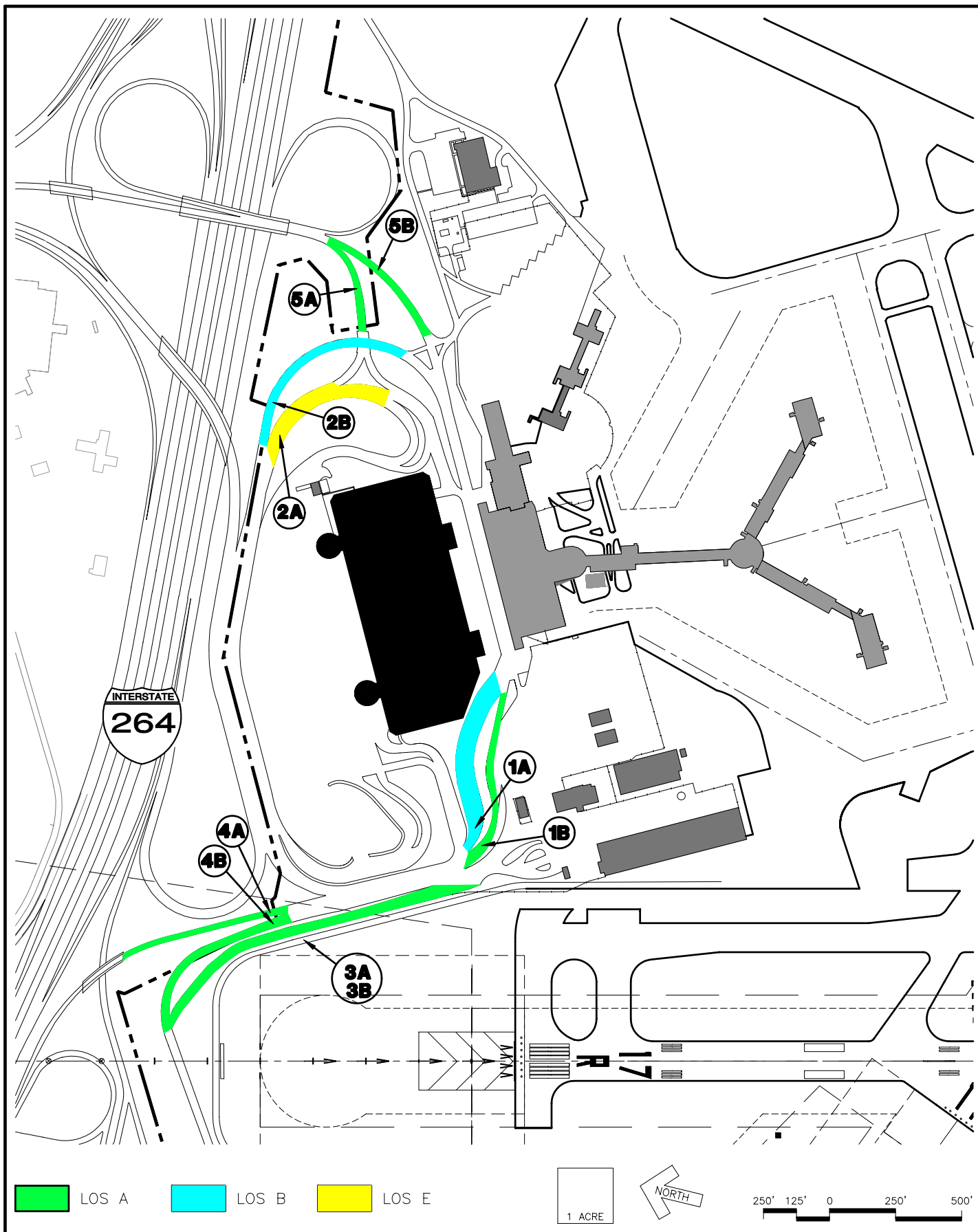
Note: ¹ Based on the employee parking lot prior to being modified or relocated with construction of the hotel project.

5.4 AIRPORT ACCESS AND CURBFRONT REQUIREMENTS

Access requirements for the Airport are presented for the circulation roadways, the terminal curbside and transit access.

5.4.1 Airport Roadway Access

In order to examine the capacities of the Airport's roadway network, traffic counts were conducted at five locations – two permanent locations for seven days and three rotating one-day counts. **Exhibit 5.4-1** depicts these locations. The two permanent stations were located for the duration of the counts along the Airport loop road, one location respectively to pick up inbound and outbound traffic. Location 1 picked up incoming traffic going to either the arrival (1A) or departures location (1B). Location 2 picked up outbound traffic from the departure location (2B) or the arrivals location/parking garage (2A). The rotating stations were sited at a mixture of in-bound and out-bound locations to capture traffic. Location 3 on Cargo Road picked up entering/exiting (3A & 3B) airport related traffic (rental cars, maintenance vehicles, concessions, etc.) as well as taxis and other traffic. Location 4 picked up inbound traffic from I-264 east (Watterson Expressway) (4A) and Crittenden Drive (4B). Location 5 picked up outbound traffic heading to I-264 west (Watterson Expressway) or to the Kentucky Fair and Exposition Center, from the RAA offices and the departure location (5B) or the parking garages and arrival locations (5A).



Louisville International Airport Master Plan Update

TRAFFIC COUNT LOCATIONS AND 2020 LEVEL OF SERVICE

EXHIBIT 5.4-1

The data collected provided the baseline traffic and a portrayal of “typical” traffic circulation patterns on the Airport, covering all types of traffic for inbound, outbound and through movements. The base year (2000) was adjusted with traffic growth rates based on growth rates of passenger activity forecasts. These data were used to determine Level-Of-Service (LOS), a descriptive term used to characterize traffic flow and operations in terms of three variables: speed, density and service flow. LOS is calculated numerous ways, using a number of traffic operating characteristics such as speed, volume, and density as prescribed by the Highway Capacity Manual (HCM). LOS is expressed as a value ranging from A (free-flow operations – the best condition) to F (total breakdown in vehicle flows – the worst condition). Intermediate ranges include B, reasonable flow at near free-flow speeds; C, lower free-flow speeds and more constraints in terms of vehicle maneuverability; D, noticeable declines in speed, even more constraints on maneuverable and more noticeable delays; and E, operations at near capacity, slow speeds, many constraints on maneuverability.

As presented in **Table 5.4-1**, LOS calculations were directly based on volume to capacity ratios (V/C), a calculation that divided peak-hour traffic counts by ideal capacity of the individual lane on the particular roadway segments. Assumed capacity was based on the type of roadway under consideration and

TABLE 5.4-1	
<i>Louisville International Airport</i>	
<i>LOS AND V/C RELATIONSHIP</i>	
Level-Of-Service (LOS)	Volume to Capacity Ratio (V/C)
A	0 - .28
B	.29 - .47
C	.48 - .66
D	.67 - .79
E	.80 - 1.00
F	> 1.01

Source: Highway Capacity Manual

multiplied by the appropriate number of lanes. For instance, a roadway that theoretically could handle 1,000 vehicles per hour on a one-lane segment and has an observed peak-hour vehicle flow of 500 would yield a V/C ratio of 0.50. LOS calculations for each segment are presented in **Table 5.4-2**. Based on the peak-hour traffic counts, the base year 2000 LOS functions at LOS A for all but one location (9 of 10). Location 2A, the departure roadway to I-264 east/I-65 from the departures location and parking garage, operates at LOS C and has a V/C ratio of .48. It experienced a very high volume of traffic, 967 vehicles per hour from 9:00 to 10:00 PM on Sunday evening April 9, 2000, yielding the lower LOS.

The modeled year of 2005 is very similar to the base year. Again, all but location 2A has a LOS of A. Location 2A again has a LOS of C with a slightly worse V/C ratio of .58.

For 2010, the forecast traffic volumes and LOS are not that much different from those for 2000 or 2005. Again, many locations (eight of 10) function at LOS A. Location 2A still functions at LOS C, having a bit higher V/C ratio of .62. Location 2B functions at LOS B with a V/C ratio of .29.

For 2020, the LOS at the various locations changes a bit more notably. LOS A is maintained at only six of the 10 locations. Location 2A worsens to LOS E with a V/C ratio of .83. The companion roadway at location 2B still functions at LOS B with a V/C ratio of .39. Other locations at LOS B include location 1A with a V/C ratio of .37, and location 3B with a V/C ratio of .30.

Given the estimates of future growth in traffic, this analysis concludes that the existing on-Airport roadway system, as currently configured, is adequate to handle existing and projected traffic growth to 2020. Only one segment, Location 2A, which handles outbound traffic from the departure level and the parking garage, has an operating LOS of E in 2020. It is important to recognize that this

traffic analysis is limited to ramps in the terminal area. Increased traffic destined for eastbound I-264, particularly after special events at the Kentucky Fair and Exposition Center and Freedom Hall, often causes congestion for vehicles traveling from I-65 and I-264 to the Airport terminal. Although this is not reflected in the capacity analysis presented above, alternatives will be examined to improve or separate these traffic flows to improve access to the Airport.

5.4.2 Airport Transit Access

Transit access to the Airport is currently limited to scheduled bus service. However, the Transit Authority of River City (TARC) has completed Phase II documentation for the Transportation Tomorrow (T²) project for a preferred alignment for a fixed-guideway light rail transit (LRT) line light rail system, which includes a link to the Airport. In the subsequent phase of the project, Preliminary Engineering/Environmental Impact Statement (PE/EIS) preparation, more detailed planning, analysis and environmental documentation has taken place.

Under the preliminary alignment, the LRT makes a stop at the Kentucky Fair and Exposition Center's West Hall, comes south over the Watterson Expressway on an elevated section, and enters the Airport terminal area east-to-west near the access ramps from the Watterson eastbound. However, this is subject to change pending the outcome of the western alignment options under consideration by TARC and its consultants.

The most feasible location for a station on the airport property, regardless of where the alignment enters/departs the Airport, is the current open space between the south exterior of the parking garage and the upper level departure roadway. This area was reserved for a transit station during the design and construction of the parking garage. A station at this location would provide convenient access for both departing and arriving passengers, as well as access to the new Marriott hotel. The location is compatible with both an east-to-west (proposed) and alternatively, a west-to-east guideway alignment configuration.

TABLE 5.4-2**Louisville International Airport****AIRPORT ROADWAY VOLUME AND LEVEL OF SERVICE**

Year	2000				2005			
Roadway Segment	Peak Hr. Traffic	Capacity	V/C	LOS	Peak Hr. Traffic	Capacity	V/C	LOS
Access Road to Airport Departures (Loc. 1A)	435	2,000	0.22	A	495	2,000	0.25	A
Access Road to Airport Arrivals (Loc. 1B)	378	3,000	0.13	A	430	3,000	0.14	A
Departure Road to I-264 East/I-65 from Departures/Parking (Loc. 2A)	967	2,000	0.48	C	1,099	2,000	0.55	C
Departure Road to I-264 East/I-65 from Arrivals (Loc. 2B)	228	1,000	0.23	A	259	1,000	0.26	A
Cargo Road Exit to Crittenden Drive (Loc. 3A)	154	1,000	0.15	A	175	1,000	0.18	A
Cargo Road Entrance from Crittenden Drive (Loc. 3B)	175	1,000	0.18	A	199	1,000	0.20	A
Crittenden Drive Ramp to Airport (Loc. 4A)	126	1,000	0.13	A	143	1,000	0.14	A
I-264 EB Ramp to Airport (Loc. 4B)	70	1,000	0.07	A	80	1,000	0.08	A
Departure Road I-264 West from Garage/Arrivals (Loc. 5A)	121	2,000	0.06	A	138	2,000	0.07	A
Departure Road I-264 West from Departures & RAA Office (Loc. 5B)	86	2,000	0.04	A	98	2,000	0.05	A
Year	2010				2020			
Roadway Segment	Peak Hr. Traffic	Capacity	V/C	LOS	Peak Hr. Traffic	Capacity	V/C	LOS
Access Road to Airport Departures (Loc. 1A)	560	2,000	0.28	A	745	2,000	0.37	B
Access Road to Airport Arrivals (Loc. 1B)	486	3,000	0.16	A	647	3,000	0.22	A
Departure Road to I-264 East/I-65 from Departures/Parking (Loc. 2A)	1,244	2,000	0.62	C	1,656	2,000	0.83	E
Departure Road to I-264 East/I-65 from Arrivals (Loc. 2B)	293	1,000	0.29	B	390	1,000	0.39	B
Cargo Road Exit to Crittenden Drive (Loc. 3A)	198	1,000	0.20	A	264	1,000	0.26	A
Cargo Road Entrance from Crittenden Drive (Loc. 3B)	225	1,000	0.23	A	300	1,000	0.30	B
Crittenden Drive Ramp to Airport (Loc. 4A)	162	1,000	0.16	A	216	1,000	0.22	A
I-264 EB Ramp to Airport (Loc. 4B)	90	1,000	0.09	A	120	1,000	0.12	A
Departure Road I-264 West from Garage/Arrivals (Loc. 5A)	156	2,000	0.08	A	207	2,000	0.10	A
Departure Road I-264 West from Departures & RAA Office (Loc. 5B)	111	2,000	0.06	A	147	2,000	0.07	A
Source: PB Aviation								
Note: Based on LOS Criteria for Multilane Highways with speed of 45 MPH								

The station would most likely be an elevated structure at the departure level to accommodate departing passengers more expeditiously. The station would need to house the platform waiting area, ticket vending machines (TVMs), and potentially a staffed information booth, and have an elevator/escalator to street level with a small waiting area there to facilitate the bus/rail and rail/bus transfer. At least one elevated tangent track section leading to and from the station would be needed to accommodate at least a one-car train (approximately 100 feet) and perhaps a two-car train (200 feet or more), pending outcomes from ridership forecast results and other analyses during the engineering stage. Other design issues include whether to use a side or center platform station, and whether the station can accommodate a single- or a double-tracked tangent guideway/platform section.

Because of the proximity of the station location to the terminal building, normal dwell times, the amount of time the train waits for boarding and alighting passengers at the station, may need to be considerably scaled back for security reasons. Usually, a LRT vehicle dwells at a station for as much as two to three minutes. Given security concerns, the dwell time may be more likely to be only 30 to 60 seconds. Likewise, a planned intermodal (bus-to-air, rail-to-bus) connection on the lower level would also need additional planning and analysis to coordinate the interface of train and bus schedules in light of the above mentioned security concern. The dwell times for the buses are likely to be equally as constrained as those of the rail vehicles, due to security concerns.

Additionally, the station may need to have an attendant on duty staffing an information booth and watching video/security cameras monitoring the platform and station areas. Such operating details would be unique to this station and would need to be refined in discussions with the RAA, the TSA, the FAA, and TARC.

Phase II of the TARC project also continued to examine the clearance requirements in the area of the RPZ near the newer west runway. The preferred alignment exits the proposed station east-to-west and crosses the area of the RPZ before heading parallel to relocated Crittenden Drive or the CSX railroad tracks. More scrutiny of the interface between the rail guideway, the entrance/exit ramps for the Watterson Expressway and the RPZ in this area will be needed during the engineering phase. Care will need to be exercised in this area to develop a design that is both safe from an airport operations standpoint and cost-effective in terms of capital and operations of the LRT system.

5.4.3 Terminal Curbfront Requirements

The departure curb is the curb at which passengers and their well wishers get out of the vehicle in which they rode to the airport and proceed into the airport. Typically, the passengers and their well wishers arrive in one of many different types of vehicles. These range from private cars, trucks and taxis, to hotel shuttle buses, parking lot shuttle buses and city buses. Each of these types of vehicles takes up a different amount of space at the curb and each tends to stay or dwell at the curb for varying lengths of time. All of these factors must be taken into account when determining the length of the departure curb in front of the terminal.

The Airport currently has 660 lineal feet of curb on the departure level. At the current utilization, it was projected that there should be 696 lineal feet of curb on the departure level at the beginning of the study period. This presented a shortage of 36 lineal feet. By 2020, a total of 1,122 lineal feet of departure curb would be required for domestic traffic at Level of Service C.

The arrival curb is that curb at which the passenger and his or her meeters/greeters leave the terminal building and get into a vehicle in preparation for leaving the airport. This curb, at airports the size of Louisville International

Airport, is usually an entirely different curb from the departure curb, and is most often on a different level of both the roadway system and passenger terminal.

As with the departures curb, a variety of vehicles are available to pick the passenger up, from private vehicles to taxis, hotel shuttles, parking lot shuttles and city buses, and each of these types of vehicles tends to stay parked at the curb for varying amounts of time. However, on the arrival level, the vehicles tend to remain parked longer, as the arrival time of the passenger and their baggage is less certain than on the departure level. This tendency to linger longer at the curb often means that the requirements for the arrival curb are greater than the departure curb. Such is the case with the Airport's arrival curb.

Louisville International Airport currently has 1,320 lineal feet of arrival curb with an inner curb for private vehicles and an outer curb for commercial vehicles. In order to achieve a Level of Service C for 2000 traffic levels at the beginning of the study period, 2,008 lineal feet were required, indicating a deficiency of 688 lineal feet. By 2020, a total of 3,235 lineal feet of Arrival Curb would be required.

Some of the arrival and departure curbfront deficits might be made up in the short term with policing of the departure curb to ensure that vehicles are not remaining at the curb for too long a period of time. However, this analysis indicates that the departure and arrival curbs will need to be lengthened within the next five years.

5.5 AIR CARGO FACILITY REQUIREMENTS

The projection of enplaned freight, air mail and express mail indicates that cargo will increase from 1,538,037 tons in 1998 to an estimated 3,652,124 million tons in 2020. Of this tonnage, approximately 1.8 percent will be handled by FedEx, freight forwarders and the passenger airlines, while the remaining 98.2 percent will be handled by UPS. The following sections will analyze future air cargo building and apron requirements for FedEx, freight forwarders and the passenger airlines.

5.5.1 Building Requirements

Currently, the Airport has approximately 137,002 square feet of building area dedicated to the processing of air cargo. This area supports operations by FedEx, freight forwarders and the passenger airlines.

The growth of airline and freight forwarder air cargo is directly tied to the expansion of service at the Airport. As detailed in the activity projections, belly-hold cargo is anticipated to increase from approximately 13,824 tons in 1998 to approximately 15,274 tons in 2020. As illustrated in **Table 5.5-1**, the existing joint-use air cargo facility is currently 54,502 square feet. It is anticipated that the Airport would require 18,220 square feet to process belly hold cargo by 2020. Therefore, no additional air cargo facilities would be required.

Future facility requirements for FedEx are based upon a combination of individual industry standards, utilization rates at the Airport, and air cargo tonnage projections. As shown in **Table 5.5-2**, a sample of 10 major U.S. airports indicates that an average of 1.3 square feet per annual enplaned ton is an industry average. For the purpose of determining air cargo building requirements at the Airport, a mix of existing and anticipated utilization rates was used. For these analyses, the resultant rate is 1.5 square feet per annual enplaned ton. Using this requirement, the Airport will need an estimated 34,586 square feet of air cargo building facilities by the end of the planning period. The Airport currently offers 137,002 square feet of air cargo facilities. Therefore, no additional air cargo facilities would be required. The reason for the large surplus is that the FedEx facility, which is an air cargo building, is also used as a truck hub. A breakout of future building requirements throughout the planning period is presented in Table 5.5-1.

TABLE 5.5-1					
Louisville International Airport					
AIR CARGO FACILITY REQUIREMENTS					
	Existing	2000	2005	2010	2020
Air Cargo Building (s.f.)					
All-Cargo Carriers ¹					
Office		753	1,087	1,317	1,637
Warehouse		6,779	9,781	11,856	14,729
Total	82,500	7,532	10,868	13,173	16,366
Passenger Airlines and Freight Forwarders					
Office		1,047	1,339	1,542	1,822
Warehouse		9,419	12,055	13,882	16,398
Total	54,502	10,466	13,394	15,425	18,220
Airport Total					
Office		1,800	2,426	2,860	3,459
Warehouse		16,198	21,836	25,738	31,128
Total	137,002	17,998	24,263	28,598	34,586
Air Cargo Apron (s.y.)	14,000	14,000	14,000	14,000	21,000

Source: PB Aviation

Note: ¹ Does not include UPS facilities. The FedEx facility is used as a truck hub in addition to its air freight functions, which these facility requirements do not include.

TABLE 5.5-2			
Louisville International Airport			
COMPARISON OF WAREHOUSE UTILIZATION RATES			
Airport	Cargo Warehouse Space (s.f.)	Freight (tons)	Warehouse Utilization (ton/s.f.)
New York-Kennedy	2,500,000	2,267,652	1.10
Los Angeles International	2,118,712	1,238,198	1.71
Chicago O'Hare International	1,357,000	1,303,663	1.04
Miami International	1,500,000	1,699,763	0.88
Dallas/Fort Worth International Airport	1,348,166	674,189	2.00
San Francisco International	807,725	802,257	1.01
Portland International	175,000	148,128	1.18
Atlanta-Hartsfield	447,000	705,715	0.63
Seattle-Tacoma International Airport	827,398	361,607	2.29
Boston Logan International	725,000	452,579	1.60
Average			1.30

Source: PB Aviation

5.5.2 Air Cargo Aircraft Apron Requirements

Because specific UPS facilities are not included in the Master Plan Update, FedEx is currently the only integrated air freight operator for which apron requirements were calculated. The current FedEx aircraft apron can accommodate two Group III aircraft. It is projected that one additional parking position will be required by 2020. Table 5.5-1 presents aircraft apron requirements during the planning period.

5.6 GENERAL AVIATION REQUIREMENTS

General aviation facility requirements were developed for the Airport based on projected general aviation demand. Facility needs were developed for the following functional areas:

- *Aircraft Storage Buildings*
- *Transient Aircraft Apron*
- *Fixed Base Operation (FBO) Terminal and Administration*

5.6.1 Aircraft Storage Buildings

Storage needs for general aviation reflect local climatic conditions and the size and sophistication of the Airport's based aircraft fleet. Typically, aircraft with higher values are more likely to be stored in larger, more secure facilities.

Existing hangar space at the Airport includes 70,000 square feet used by the FBO and five corporate hangars comprising 121,000 square feet, 36,000 of which are currently vacant. As the Airport serves corporate general aviation, the only based aircraft not kept in hangars are Grand Air's 17 turbojet aircraft, which occupy apron tie-downs. To project future hangar storage requirements, it was assumed that all based aircraft would continue to be stored in hangars, with the exception of the proportion of Grand Air's fleet kept on the apron.

Using average square footage per aircraft type and the projected based aircraft fleet mix, the total required hangar space requirements were calculated. The existing single-tenant corporate hangars were considered to be fully utilized, since these are private facilities. As presented in **Table 5.6-1**, the hangar space requirement at the beginning of the planning period was approximately 151,520 square feet, compared to the inventory of 191,000 square feet. This surplus was consistent with existing vacant hangar space at the Airport. By 2020, the hangar space requirement would increase to 213,000 square feet, indicating a deficiency of 22,000 square feet, or the equivalent of one additional hangar.

5.6.2 Aircraft Parking Apron

The aircraft parking apron is required for loading and unloading of transient aircraft using the FBO terminal, parking for aircraft not based at the Airport while its passengers are visiting the area, and the portion of Grand Air's fleet not kept in the hangar. The existing aircraft parking apron is approximately 25,300 square yards in size.

Future aircraft parking apron requirements were based on the peak-day itinerant aircraft projections and the number of Grand Air aircraft parking on the apron. As presented in Table 5.6-1, at the beginning of the planning period there was a deficiency of 250 square yards, or the equivalent of one parking position. By 2020, 34,300 square yards would be required, indicating a deficiency of 9,000 square yards.

Two additional considerations for transient aircraft apron requirements are special event aircraft parking and the loading of horses for shipment. While it is impractical to construct dedicated aprons for such limited needs, the ability to accommodate demand during these situations with minimal disruption to the operation of the Airport is important.

TABLE 5.6-1				
Louisville International Airport				
GENERAL AVIATION FACILITY REQUIREMENTS				
	2000	2005	2010	2020
Aircraft Hangar Space				
Based Aircraft ¹	43	46	51	61
Hangar Space Requirements (s.f.) ²	151,520	160,600	177,600	213,000
Hangar Surplus/(Deficit) (Existing hangar space = 191,000 s.f.)	39,480	30,400	13,400	(22,000)
Aircraft Parking Apron³				
Peak Day Itinerant Aircraft	56	59	65	78
Grand Air Aircraft (parked on apron)	17	17	18	20
Aircraft Parking Apron Requirements (s.y.)	25,550	26,600	29,050	34,300
Aircraft Parking Apron Surplus/(Deficit)	(250)	(1,300)	(3,750)	(9,000)
FBO Terminal/Administration Space				
Peak Day Itinerant Aircraft	56	59	65	78
FBO Terminal/Administration Requirements (s.f.)	15,000	15,800	17,200	21,000
FBO Terminal/Administration Surplus/(Deficit)	5,000	4,200	2,800	(1,000)

Source: PB Aviation

Notes: ¹ Does not include Grand Air aircraft parked on the apron.

² Assumes occupied corporate hangars are fully utilized because they are private leases.

³ Special event aircraft parking requirements are presented separately.

During several special events, the Airport closes several taxiways to accommodate general aviation aircraft parking. **Table 5.6-2** lists those events and the number of aircraft associated with each. As indicated, the maximum number of aircraft parked on closed taxiways is approximately 180, which would require 63,000 square yards of apron parking (including taxilanes between rows of aircraft parking).

TABLE 5.6-2 Louisville International Airport SPECIAL EVENTS AND ASSOCIATED AIRCRAFT	
Special Event	Number of Aircraft Parked on Closed Taxiways
Kentucky Derby	180
Breeders Cup	80
Mid-America Truck Show	30
Lawn and Garden Show	30
Thunder over Louisville	25 (military aircraft)
Recreational Vehicle Show	15
Farm and Machinery Show	15-20

Source: RAA records

The transfer of horses from trailer to aircraft is accommodated on the ramp adjacent to the Delta concourse, which is scheduled for hotel and U.S. Customs development. The apron area required for the loading of horses for shipment is approximately 20,000 square yards, which includes apron parking for two Boeing 747 aircraft, parking for 10 trucks and trailers adjacent to each aircraft, and an area to allow a specialized ramp to the aircraft.

5.6.3 FBO Terminal and Administration

The existing FBO terminal and administration building is approximately 20,000 square feet in size and is adjacent to the FBO hangar. Discussions with FBO management indicate that the terminal and administration building operated at 75 percent capacity at the beginning of the study period.

Future terminal and administration building space was projected based on the peak day itinerant aircraft projections (as described in the previous section). Table 5.6-1 presents space requirements through the planning period. By 2020, an additional 1,000 square feet of FBO terminal and administration space would be required.

5.7 SUPPORT FACILITIES

This section examines the requirements of aviation and airport support functions. Comprising this category are:

- *Aircraft Rescue and Firefighting Facilities*
- *Fuel Storage Facilities*
- *Airline Support*
- *Airport Maintenance*

5.7.1 Aircraft Rescue and Firefighting Facilities

Aircraft rescue and firefighting (ARFF) requirements for airports serving air carrier operations are outlined in FAR Part 139, Subpart D, Operations. The criteria set forth in FAR Part 139 regarding ARFF equipment and service resulted from research by the FAA and the International Civil Aviation Organization (ICAO) Rescue and Firefighting Panel (RFFP II). Studies conducted by these two organizations identified the practical and theoretical fire areas of an aircraft and the corresponding amounts of extinguishing agents required to extinguish fires of that size. These data led to the identification of five airport classes referred to as an “index,” and the corresponding ARFF equipment requirements. The applicable airport index is determined by the length of the longest aircraft operated by a passenger air carrier during an average of five scheduled departures per day (computed on an annual basis). Listed in **Table 5.7-1** are the five indices established by the FAA and the corresponding equipment requirements.

The longest aircraft projected to be operated by a passenger air carrier at the Airport, with an average of at least five scheduled departures per day, is the Boeing 757-200. Based on the 757-200 length of 155 feet, 3 inches, the future ARFF requirements for the Airport is Index C. At the beginning of the study period the Airport met ARFF Index C with the equipment described in detail in “Chapter 1.0, Inventory of Existing Conditions”.

TABLE 5.7-1 Louisville International Airport MINIMUM ARFF REQUIREMENTS UNDER FAR PART 139			
Airport Category	Type Aircraft	Vehicle	Extinguishing Agent
Index A	Less than 90'	One lightweight	500 lbs. of dry chemical or 450 lbs. of dry chemical and 50 gals. of water for foam production.
Index B	More than 90' but less than 126'	One lightweight and one self-propelled fire extinguishing vehicle	Same dry chemical requirements as Index A and 1,500 gals. of water for foam production.
Index C	More than 126' but less than 160	One lightweight and two self-propelled fire extinguishing vehicles	Same dry chemical requirements as Index A and 3,000 gals. of water for foam production.
Index D	More than 160' but less than 200'	Same as Index C	Same dry chemical requirements as Index A and 4,000 gals. of water for foam production.
Index E	More than 200'	Same as Index C	Same dry chemical requirements as Index A and 6,000 gals. of water for foam production.

Source: FAR Part 139

The service requirements of FAR Part 139 also specify that at least one firefighting vehicle be capable of reaching the midpoint of the farthest runway from its assigned post, or reaching any other specified point of comparable distance in the movement area which is available to air carriers, and applying extinguishing agent within three minutes from the time of alarm. Within four minutes from the time of alarm, all other required vehicles must reach the above point and begin application of extinguishing agent.

The Airport's existing ARFF station is located so that response times to the midpoint of all existing runways are within allowable limits. The ARFF station under design at the beginning of the planning period is located between the passenger terminal and Runway 11/29 and would also meet response time requirements. Additional ARFF stations may be necessary if additional runways are constructed to points where the existing station cannot meet the response time requirements.

5.7.2 Fuel Storage Facilities

Future fuel storage requirements for the Airport were calculated based on historic fuel sales and operations. UPS handles its own fueling through a pipeline connection to the Ohio River. The remaining fueling activity at the Airport, including passenger airlines, air taxi, general aviation, and military, is handled by FBO AvCenter. This analysis is limited to jet fuel requirements served by FBO AvCenter. Other fuel storage requirements for 100LL avgas, auto gas, and diesel fuel are considered minimal compared to the requirements of jet fuel storage.

The Airport's fuel supply at the beginning of the planning period consisted of eight 12,000-gallon, above ground storage tanks for a total of 96,000 gallons. Fuel is supplied to these tanks via truck transport from the Ashland Oil terminal on the Ohio River, where the reserve supply is also held. From the on-Airport tanks, FBO AvCenter delivers fuel to aircraft with a fleet of aircraft fueling trucks.

Table 5.7-2 presents the fuel storage requirements developed by using projected peak month average day departures and applying an average number of gallons of jet fuel per departure. The average per departure during the peak month at the beginning of the planning period was 490 gallons. This is expected to increase over the planning period due to the use of larger air carrier aircraft, the regional airlines' transition from turboprop aircraft to regional jet aircraft, and increasing load factors.

Under the fueling arrangement in place at the beginning of the planning period, the 96,000 gallons of fuel storage was adequate in 2000, with an anticipated shortfall by 2005. By 2020, an additional 55,322 gallons of fuel storage were needed. This requirement would increase to approximately 605,290 gallons by 2020.

For planning purposes, the number of gallons of jet fuel storage needed to meet requirements with a four-day on-Airport reserve were also calculated. At the beginning of the planning period, approximately 305,425 gallons of jet fuel storage would be needed.

TABLE 5.7-2				
Louisville International Airport				
JET FUEL STORAGE FACILITY REQUIREMENTS				
Year	2000	2005	2010	2020
Peak Month Average Day Departures ¹	156	184	203	252
Average Gallons per Departure	490	525	550	600
Daily Demand	76,356	96,459	111,768	151,322
Fuel Storage Surplus/(Deficit)	19,644	(459)	(15,768)	(55,322)
Four-Day Reserve Requirement ²	305,425	385,837	447,073	605,290

Sources: PB Aviation, FBO records, RAA records

Notes: ¹ Does not include UPS departures or single- or multi-engine piston aircraft.

² Because of the current fuel delivery system, a four-day reserve is not held on the Airport. The requirements presented here are for planning purposes if the four-day reserve requirement is necessary in the future.

5.7.3 Airline Support

The airline support facilities are used for maintenance and storage related primarily to ground service equipment (GSE), such as tugs, baggage carts, and conveyor ramps. Exact space requirements are dependent on specific airline desires; however, typical planning ratios were used to estimate future facility requirements. As presented in **Table 5.7-3**, a deficit of approximately 458 feet over the existing 12,582 square-foot building existed at the beginning of the planning period. By the end of the planning period, approximately 20,560 square feet of airline support building space would be required.

5.7.4 Airport Maintenance

The Airport's maintenance facilities are located north of the Waterson Expressway on J Road. Information provided on airport maintenance buildings in

FAA Advisory Circular 150/5220-18, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, indicates that maintenance building needs are related to pavement area, which in turn is related to aircraft operations.

TABLE 5.7-3				
Louisville International Airport				
PASSENGER AIRLINE SUPPORT FACILITY REQUIREMENTS				
Year	2000	2005	2010	2020
Passenger Airline Operations ¹ (SF)	65,200	76,400	82,800	102,800
Airline GSE Maintenance Building Requirements (SF)	13,040	15,280	16,560	20,560
Airline GSE Maintenance Surplus/(Deficit) (SF)	(458)	(2,698)	(3,978)	(7,978)

Source: PB Aviation

Note: ¹ Air Carrier plus Regional Carrier.

Table 5.7-4 presents the approximate future airport maintenance facility requirements. These requirements are based on projected aircraft operations. By the end of the planning period, the airport maintenance facility would need approximately 37,526 square feet of additional space.

Access between the existing maintenance facilities and the airfield will be considered in the alternatives development. In order for snow removal equipment to travel from the maintenance complex to the airfield, traffic in both directions on Crittendon Drive must be stopped temporarily between those points, as the size of the snowplows is wider than the lanes of traffic in one direction.

5.8 SUMMARY OF FACILITY REQUIREMENTS

The facility requirements presented in this chapter form the basis for the next phase of the master plan. Alternatives to meet the projected demand for each of the functional areas will be developed and undergo preliminary screening based on the visions outlined in Chapter 1.0. The following is a summary of key Airport facility requirements:

- In order to accommodate aircraft takeoff requirements at the Airport, a runway length of 12,000 feet would be needed. The Airport's longest existing runway is 10,000 feet in length.
- As presented in detail, every functional area of the terminal would require additional space through the planning period. The total terminal area requirement for 2020 is 746,484 square feet compared to the terminal area at the beginning of the planning period, which comprised 344,673 square feet.
- Ten additional gates, nine for air carrier aircraft and one for regional aircraft would be required in 2020.
- By 2020, 9,116 parking spaces, or 3,894 more than the existing number of spaces at the beginning of the planning period, would be required for long-term and daily parking. For short-term parking, 785 spaces would be required in 2020. Additional parking would also be required for rental car parking and employee parking.
- Although the Airport's roadway network is projected to have sufficient capacity through the planning period, the impacts of event-related traffic on the adjacent interstate ramps should be addressed in the alternatives development.
- Terminal development alternatives will include the ability to accommodate a light-rail connection under study by TARC.

TABLE 5.7-4				
Louisville International Airport				
AIRPORT MAINTENANCE FACILITY REQUIREMENTS				
Year	2000	2005	2010	2020
Annual Operations (SF)	174,864	200,700	218,616	260,640
Airport Maintenance Building Requirements (SF)	76,500	87,803	95,641	114,026
Airport Maintenance Surplus/(Deficit) (SF)	-	(11,303)	(19,141)	(37,526)

Source: PB Aviation

6.0 ALTERNATIVES IDENTIFICATION AND EVALUATION

The preceding chapters have examined the ability of Louisville International Airport to accommodate projected growth in commercial air passenger, cargo, and general aviation activity over the next 20 years. As indicated in those analyses, a number of improvements will be required to accommodate projected growth. Within 20 years, it will be necessary to provide additional passenger terminal, parking, airport support, general aviation, cargo facilities (exclusive of UPS), and additional runway length for long-haul departures.

This chapter examines alternatives for providing the additional facilities that will be necessary to accommodate projected growth. Alternatives are identified and evaluated to determine the best course of action for meeting future demands. The objective of this step of the Master Plan Update is to assess feasible development options, considering the operational, economic, and environmental implications of these options. Two distinct categories are considered – alternative sites for replacing the existing Airport with a new airport in the Greater Louisville region and alternatives for meeting projected demand at the existing Airport site.

6.1 New Airport Site Alternatives

Because Louisville International Airport is located in a built-up urban environment, several suggestions were received at the Master Plan Update's first public workshop about relocating the Airport entirely. Consequently, the Master Plan Update included an investigation of potential sites suitable for a new airport in the Greater Louisville region. As a first step, a prototype layout of the new airport was developed to ascertain the land envelope required.

6.1.1 Prototype Airport Layout

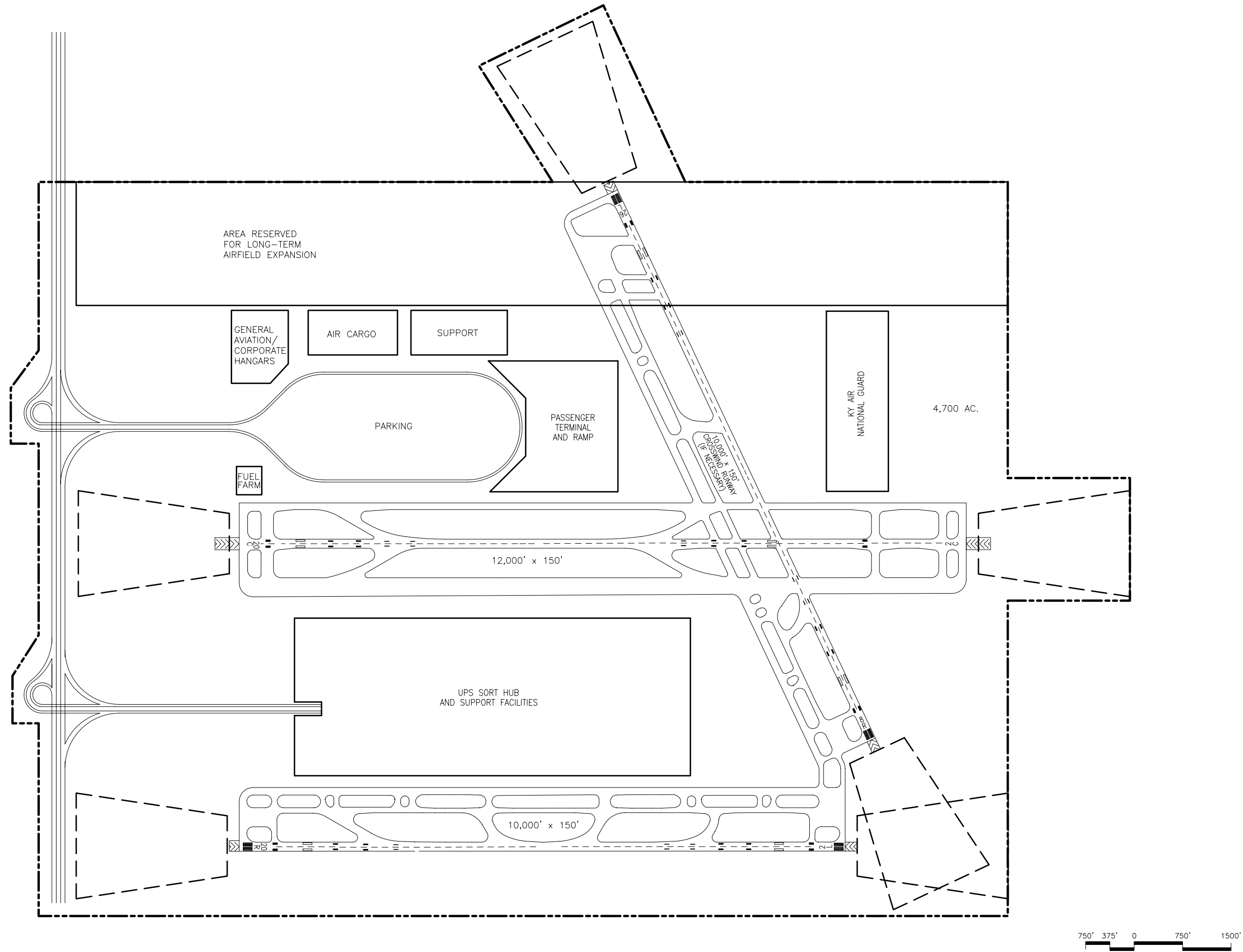
Using the facility requirements presented in the previous chapters, a prototype airport layout was developed to determine the amount of land necessary for a new airport. The prototype airport, as depicted in **Exhibit 6.1-1**, illustrates the airfield layout and generalized functional areas (as opposed to detailed building layouts).

The prototype airport consists of two parallel runways, each separated by 5,000 feet to allow independent IFR operations. Land is reserved for a third parallel runway in the event such capacity is needed. The Airport's functional areas are depicted and include a passenger terminal, general aviation, airport support and the UPS sort hub. A crosswind runway is also included; its need would depend on the specific alignment requirements of individual sites. The activities associated with the UPS sort hub are located between the parallel runways, while the remainder of the Airport's functions, such as the passenger terminal and general aviation, are located between one runway and the area reserved for a third parallel runway.

The approximate size of the land envelope needed to accommodate such a prototype airport is 4,700 acres. This represents the facility itself and related runway protection zones (RPZs) and does not include buffer space for compatible land uses related to aircraft noise. It should be kept in mind that the acreage required is based on this prototype layout and is subject to refinement based on specific site requirements and ultimate design.

6.1.2 New Airport Site Identification

Criteria used to identify potential sites for a new airport were: location (in reference to communities, transportation access and/or industrial/commercial activities); topography; proximity to air trade area; airspace constraints;



PROTOTYPE AIRPORT LAYOUT



manmade features; and environmental considerations. United States Geological Survey (U.S.G.S) maps obtained from the Governor's Office for Technology, Office of Geographic Information, were used to identify the location, physical characteristics, the presence of utilities, the urban/rural landscape and the approximate size of the sites.

Six possible sites were identified based on the criteria presented above. Five of the six sites are considered green field sites while one site is the reuse of a former U.S Army Ammunition Plant. The locations of the six sites are provided in **Exhibit 6.1-2**. The sites include:

- *Plum Creek*
- *Long Run*
- *Utica*
- *Jericho*
- *Pleasant Run*
- *Union*

A brief description of the merits of each site is provided below and the ability of each site to meet the site selection criteria is summarized in **Table 6.1-1**. Appendix B provides a more thorough discussion of each site and its features.

6.1.3.1 PLUM CREEK

Located to the east of Louisville, the Plum Creek site can attract the primary air trade markets of Greater Louisville and Lexington. Its nearby highway access (I-64) enables the efficient movement of people and goods. Its relatively flat topography marginalizes the cost of site preparation. A major concern however, is the impact of airport development on the natural habitat of Plum Creek; the site has a myriad of creeks, lakes and ponds.

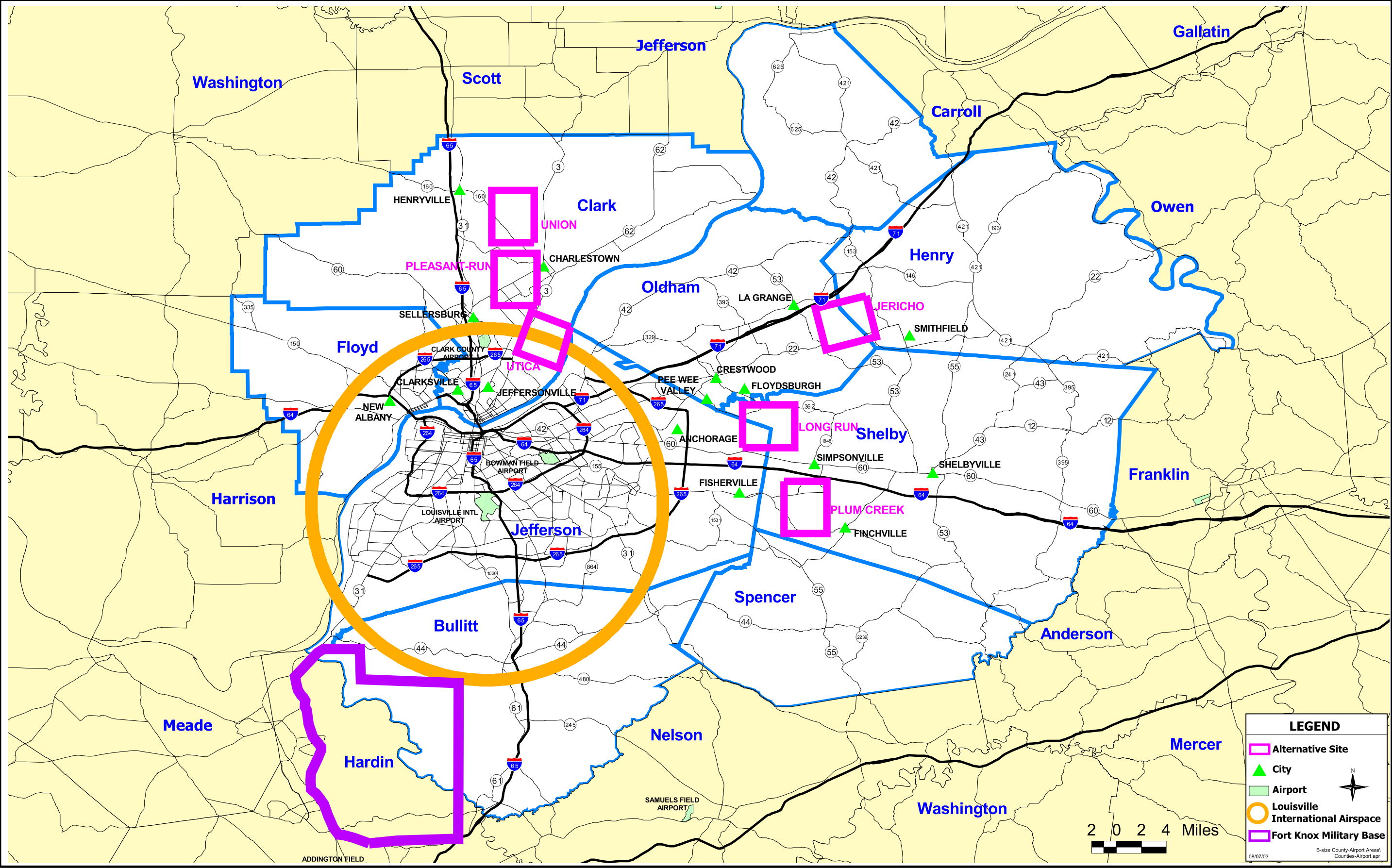


Table 6.1-1**Louisville International Airport****FEATURES OF LOUISVILLE ALTERNATIVE AIRPORT SITES**

	Distance to Downtown Louisville	Primary Access	Topography/ Geography	Airspace constraints	Manmade Features	Environmental Features
Plum Creek	27 miles	I-64	<ul style="list-style-type: none"> Elevation Ranges: 700-850'. Interspersed with streams and ponds. 	<ul style="list-style-type: none"> Telephone towers Private airports 	<ul style="list-style-type: none"> All basic utilities Rail networks Radio networks Underground pipelines 	<ul style="list-style-type: none"> Myriad of waterways
Long Run	26 miles	I-64	<ul style="list-style-type: none"> Elevation Ranges: 654-800'. Rugged relief Presence of waterway 	<ul style="list-style-type: none"> Telephone towers Private airports 	<ul style="list-style-type: none"> All basic utilities Radio networks Underground pipelines 	<ul style="list-style-type: none"> Many streams and waterways. Environmentally sensitive
Jericho	30 miles	I-71	<ul style="list-style-type: none"> Elevation Ranges: 800-850' 	<ul style="list-style-type: none"> Telephone tower 	<ul style="list-style-type: none"> All basic utilities 	<ul style="list-style-type: none"> Waterways which originate from the higher elevations of Jericho
Utica	10 miles	I-265; I-65; US 31	<ul style="list-style-type: none"> Elevation Ranges: 505-550'. Cliff range in the north and eastern edge. Mined quarry in the northern section. Undulating terrain 	<ul style="list-style-type: none"> Clark County Airport airspace. Cliff obstructions of 770'-860'. 	<ul style="list-style-type: none"> Former military ammunitions plant. Old structures and equipment on site. All basic utilities Rail networks Underground pipelines Sewage disposal system 	<ul style="list-style-type: none"> May contain hazardous materials. Further environmental studies required
Pleasant Run	15 miles	I-265; I-65; US 31	<ul style="list-style-type: none"> Elevation Ranges: 450-550' Undulating terrain 	<ul style="list-style-type: none"> Clark County Airport airspace. Communication towers north northwest (712-1298') 	<ul style="list-style-type: none"> All basic utilities Rail networks and underground pipelines 	<ul style="list-style-type: none"> Site is drained by tributaries which flow into the main waterway of Pleasant Run
Union	17 miles	I-265; I-65; US 31	<ul style="list-style-type: none"> Elevation Ranges: 500-530'. Rolling terrain 	<ul style="list-style-type: none"> Clark County Airport airspace. Power transmission unit near Charlestown 	<ul style="list-style-type: none"> All basic utilities Rail networks Underground pipelines 	<ul style="list-style-type: none"> Three main tributaries flow through the site and into Sinking Fork

Source: PB Aviation analysis.

6.1.3.2 LONG RUN

The Long Run site is located to the northeast of Louisville and straddles the borders of Jefferson and Shelby counties. It was chosen because of its distance from heavily populated urban centers and scarcity of nearby development. Its location will capture the primary air trade markets of the Greater Louisville region with limited coverage of Lexington's air trade area. Its nearness to I-64 will be effective for the efficient movement of people and goods. The site's rugged terrain may increase the cost of development. Also, the impact of airport development on the natural habitat of Long Run and the presence of a park would be of concern if this site were chosen for airport development.

6.1.3.3 UTICA

The former U.S. Military Reservation, Indiana Army Ammunitions Plant, is another potential site for airport development. Referred to in this study as Utica, this site is no longer active and redevelopment with another use will stimulate economic benefits to the surrounding community. Its location enables the attraction of primary air trade markets of Greater Louisville and other nearby areas in Indiana. Ground access to the site is not as efficient as that for some of the other potential sites. However, a connector to I-265 is under construction and will improve access in the future. The topography of the site is the most level of all the alternate sites and there is space for further airport expansion in the future.

On the other hand, Utica is restricted in its airspace availability because of the presence of the Clark County Airport. Also, higher topography along the northern and eastern portions of the site would constrain the configuration of an airfield on this site.

The presence of hazardous materials must be assessed prior to affirming the redevelopment potential of the site.

6.1.3.4 JERICO

Located on the Oldham County and Henry County jurisdictional line, Jericho is a potential site because of its proximity to Greater Louisville, its non-restricted airspace, its easy access from I-71, and the availability of utilities. Less favorable features of the site are its rugged terrain and natural environmental features, including many lakes and creeks. The potential for expanding airport facilities at this site is limited because of the site's proximity to the communities of Smithfield and LaGrange and the presence of Capital Lake.

6.1.3.5 PLEASANT RUN

Pleasant Run is located in Indiana. It is a potential site because of its proximity to the Greater Louisville region. The site is 17 miles from downtown Louisville and is six miles from I-65. The site is relatively flat and its environmental features do not appear to be a critical limitation to development. Its easy access from I-65 expands its air trade area further into the interior of the State of Indiana. Less favorable features include its potential airspace conflict with Clark County Airport and a few tall towers to the north. Limited space to the north and constrained space on the east and west restrict further expansion, unless roads and waterways are rerouted.

6.1.3.6 UNION

The Union site is also in Indiana and is proximate to the Greater Louisville air trade area and other areas of Indiana. Its rolling topography, lack of significant water resources, and presence of utility services make it a suitable site for development. Its easy access from I-65 opens up a larger air trade area further into the interior of the State of Indiana. Unlike Pleasant Run, Union's airspace is less restrictive. Space is available for further expansion to the north and northeast, but will require reconfiguration of the road network.

6.1.3 New Airport Feasibility

The preceding step identifies several sites in the Greater Louisville region that are worthy of further consideration for a potential new airport, assuming that environmental approvals and public acceptance could be attained. However, a review of the financial implications of constructing a new airport quickly reveals a new airport clearly is not an economically viable alternative to improving the existing facilities at Louisville International Airport.

It is estimated that a new airport would cost at least \$5 billion, and possibly \$7 billion or more, based on conservative cost estimates for constructing the prototype airport. Presented in **Table 6.1-2**, the estimates include land acquisition and relocation for the airport site, but do not include noise or environmental mitigation or the cost of retiring existing airport debt. These costs

could vary considerably, by as much as 30 percent, because they are not detailed design estimates.

<p align="center">Table 6.1-2 Louisville International Airport NEW AIRPORT COST ESTIMATE</p>	
Item	Cost
Land Acquisition and Relocations	\$325,000,000
Airport Construction (Site preparation, runways, taxiways, parking access roads, support facilities)	\$1,555,609,000
UPS Facilities ¹	\$1,950,000,000
Engineering design, construction management, and testing	\$785,275,000
Estimated Construction Cost	\$4,615,884,000 ²
Total Estimated Cost (with allowances)	\$5,000,000,000

Source: PB Aviation

Notes: ¹ Figure provided by UPS.

² Does not include mitigation of noise or environmental impacts or retirement of existing debt.

The Airport recovers much of its construction costs for terminal and airfield facilities through fees charged to the airlines; therefore, the cost of a new airport would increase rental rates and landing fees. This significant increase would, in turn, hinder the Airport's efforts to retain and attract airline service, particularly that of low-fare carriers. **Table 6.1-3** presents the financial impact of constructing a new airport on a per passenger basis. At the 3 million enplanement level, the cost per passenger would increase to \$112.66 over the \$6 level currently paid by the airlines for the recovery of the cost of current facilities at the existing Airport. Consequently, this analysis concludes that improvement to the existing Airport represents the most feasible option for accommodating projected levels of demand over the next 20 years.

Table 6.1-3 Louisville International Airport NEW AIRPORT COST ANALYSIS	
Total Cost	\$5,000,000,000
FINANCING	
FAA Grants	\$ 500,000,000
Louisville International Airport Sale	\$ 100,000,000
BondsT	\$4,400,000,000
TOTAL	\$5,000,000,000
Annual Debt Service	\$ 337,900,000
Estimated Passenger Boardings	3,000,000
Cost per Passenger	\$ 112.66
Current Cost Per Passenger	\$ 6.00

Source: PB Aviation

6.2 Preliminary Airport Improvement Alternatives

Preliminary alternatives for meeting projected aviation demand at the existing Airport were developed for the terminal and for roadway access. As indicated in *Chapter 4.0, Airfield Capacity*, the Master Plan alternatives do not include a new runway at this time. The airfield improvements under consideration are limited to the extension and widening of Runway 17R/35L and taxiway additions and modifications, elements common to all of the alternatives under consideration. These airfield improvements are described in detail in Section 6.4, Description of Detailed Alternatives.

The terminal and access alternatives are combined into logical concepts and then ranked using the “visions for the Airport’s future” established at the beginning of the Master Plan Update. The highest-ranking concepts are then refined to detail the location of support facilities and identify the long-term acquisition areas. The resulting airport alternatives are then compared with a detailed evaluation.

6.2.1 Terminal Area Alternatives

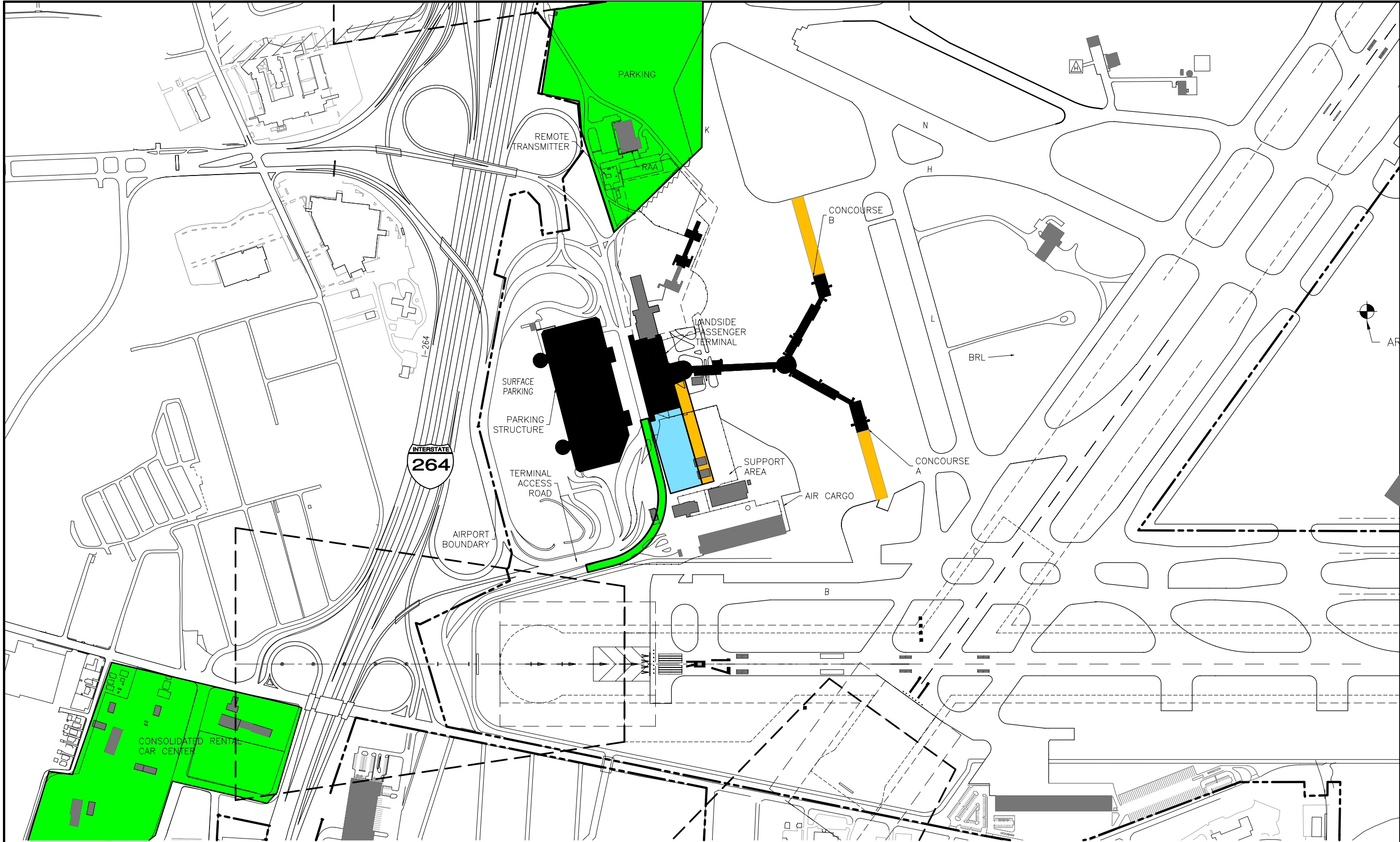
Five alternatives were developed for terminal area facilities at the Airport including aircraft gates, terminal space, vehicle parking, and support facilities. These alternatives represent development options ranging from incremental expansion of the existing terminal to an alternative for relocating the terminal complex from its existing location.

6.2.1.1 Terminal Alternative T1: Expand Existing Terminal

Terminal Alternative T1 meets the terminal facility requirements by expansion of the landside terminal (ticketing and baggage claim) to the west (**Exhibit 6.2-1**). Roadways approaching the terminal would be modified to accommodate extension of the two-level curbside associated with the landside terminal expansion. Additional gates and departure lounge areas would be provided by extending the existing Concourses A and B and by adding a new five-gate concourse adjacent to the extended landside terminal.

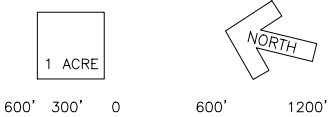
6.2.1.2 Terminal Alternative T2: Reconfigure Existing Terminal as a Linear Terminal

Terminal Alternative T2 was designed in an effort to increase the area available for landside uses (i.e., parking, rental car, hotel) by constructing a new landside terminal adjacent to extended concourses. As depicted in **Exhibit 6.2-2**, the terminal circulation roadway is shifted out to the new terminal, making more area available within the terminal envelope. A parking structure across the terminal roadway would provide short-term parking, while the existing structure would be used for long-term parking. In order to efficiently connect the new terminal building, the hotel and the existing parking garage, an elevated walkway is included to provide a climate-controlled environment with moving walkways. The walkway would minimize the need for shuttle bus service to the existing parking structure and reduce travel times from parking and the hotel to the terminal.



ALTERNATIVE FEATURES LEGEND	
ITEM	COLOR
LAND SIDE TERMINAL / PARKING STRUCTURE	
CONCOURSE	
TERMINAL ROAD / SURFACE PARKING	
COVERED MOVING SIDEWALK	
TO BE REMOVED (DEMOLITION)	
TAXIWAY ALIGNMENT / AIRFIELD	
RAILROAD SPUR REALIGNMENT	

DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	
FUTURE AIRPORT PROPERTY LINE	
EASEMENT LINE	
ROAD	
BUILDING	
AIRFIELD PAVEMENT	
BUILDING RESTRICTION LINE	
RUNWAY PROTECTION ZONE	



6.2.1.3 Terminal Alternative T3: New Linear Terminal

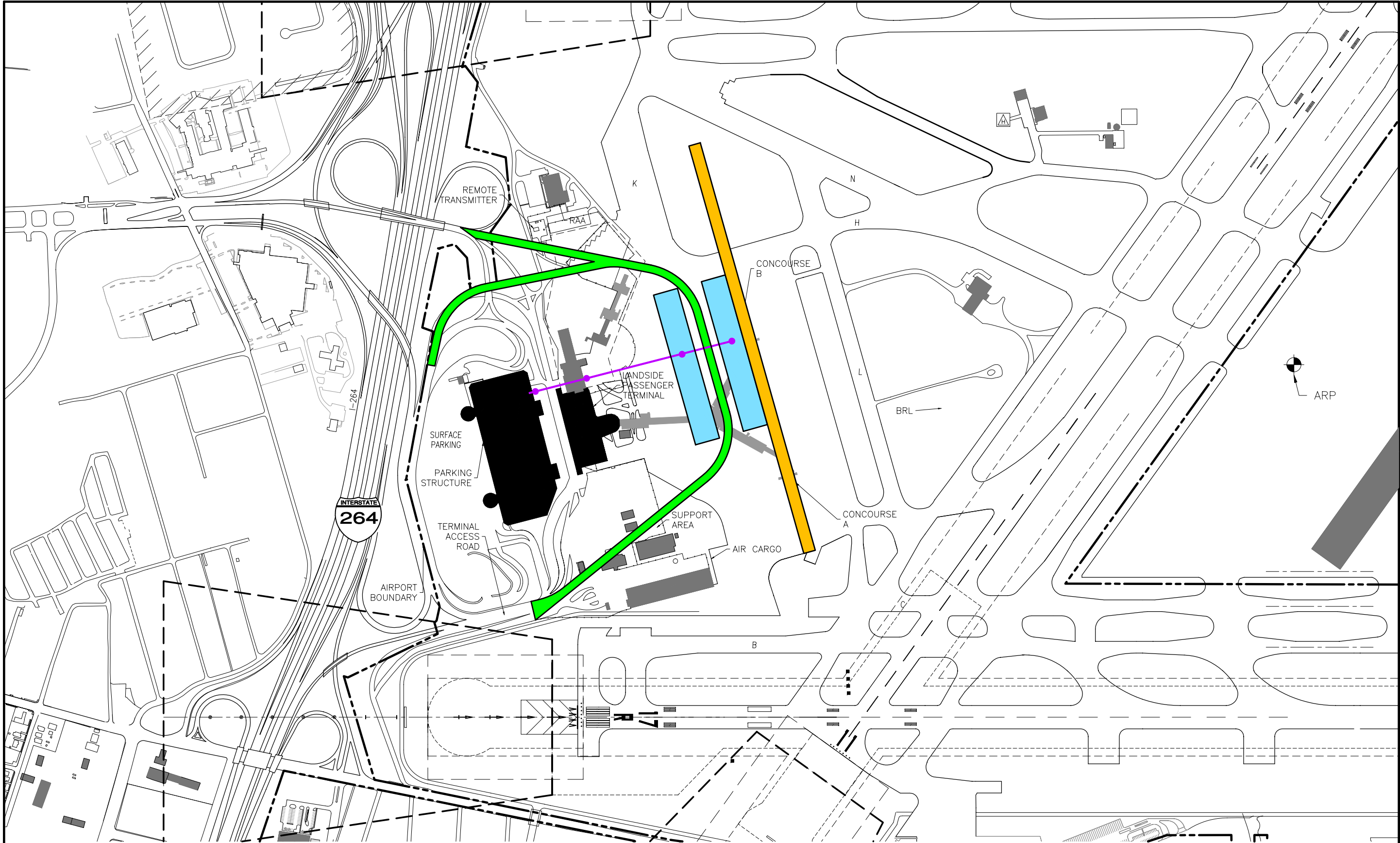
Terminal Alternative T3 seeks to further maximize the landside area by completely relocating the terminal. Depicted in **Exhibit 6.2-3**, the new terminal would be constructed in an orientation parallel and adjacent to Runway 17L/35R. The terminal circulation roadway creates a large loop in which parking would be located along with other terminal-related development.

6.2.1.4 Terminal Alternative T4: Expanded Landside Terminal with Second Concourse and Gates

Terminal Alternative T4, as shown in **Exhibit 6.2-4**, includes extending the existing Concourses A and B to provide additional gates and departure lounge space. Long-term gate requirements would be met with a second concourse. The landside terminal would be expanded to the south and the terminal roadway would be modified to include curb frontage on the south side of the terminal in addition to the existing curb frontage on the north side of the terminal. The expanded landside terminal would be connected to the concourses via an underground walkway with moving sidewalks.

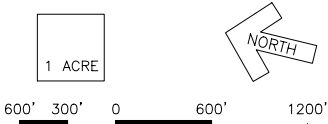
6.2.1.5 Terminal Alternative T5: New South Terminal Complex

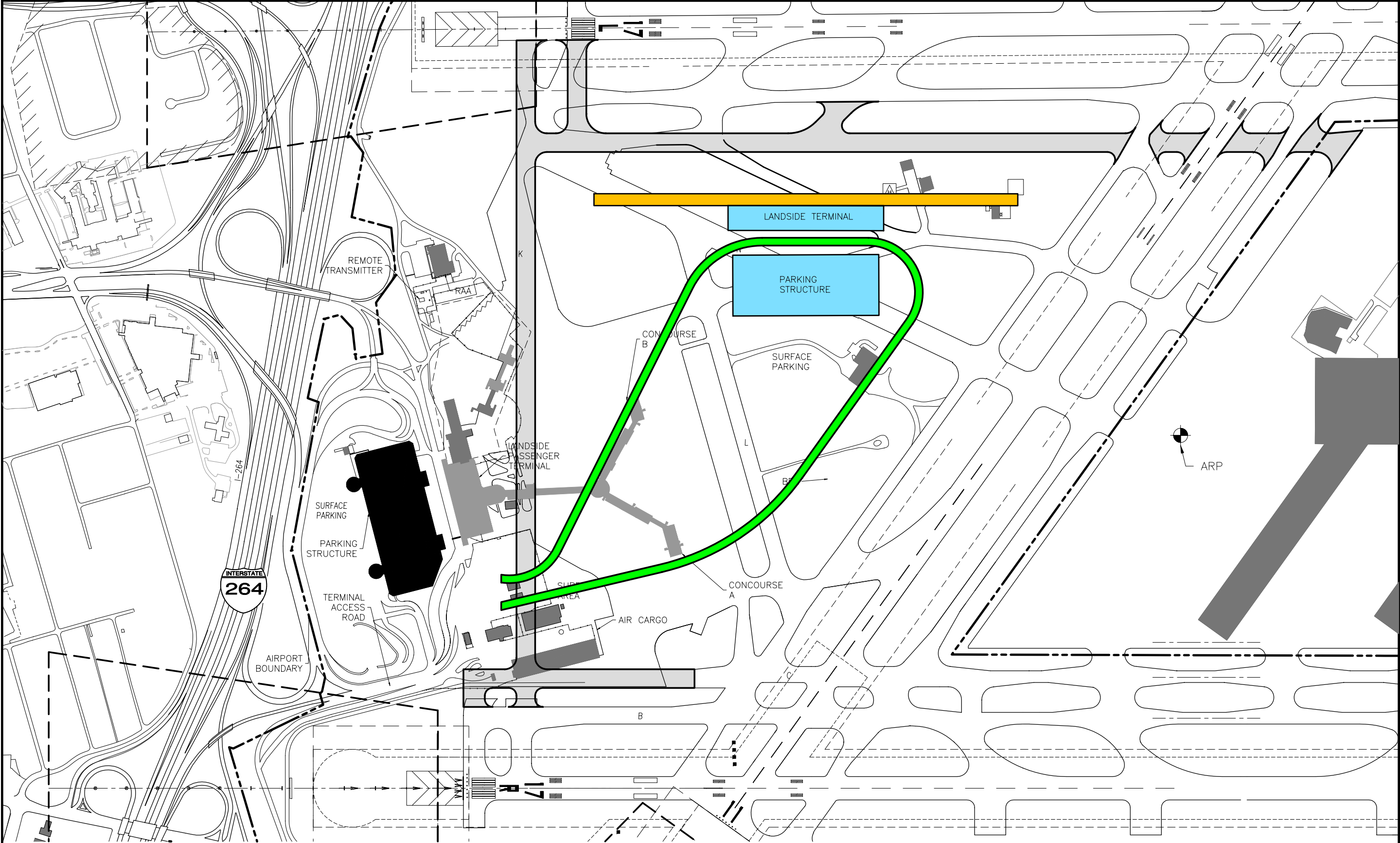
Terminal Alternative T5 is a departure from the previous four alternatives in that it creates a new terminal complex in the area south of the Ford plant known as Knopp-Melton. Included in this area would be a complete terminal with the required space for aircraft gates, departure lounges, ticketing, baggage claim, and other airline functions, as well as auto and rental car parking. The primary access to this new terminal would be from I-65 and the Outer Loop. As **Exhibit 6.2-5** depicts, a taxiway extension from the south end of Runway 17R/35L would provide aircraft access to the airfield. This alternative would allow the existing terminal area to be used for UPS expansion in the event that additional office, parking, and aircraft ramp space are required by this air cargo carrier.



ALTERNATIVE FEATURES LEGEND	
ITEM	COLOR
LAND SIDE TERMINAL / PARKING STRUCTURE	—
CONCOURSE	—
TERMINAL ROAD / SURFACE PARKING	—
COVERED MOVING SIDEWALK	—
TO BE REMOVED (DEMOLITION)	—
TAXIWAY ALIGNMENT / AIRFIELD	—
RAILROAD SPUR REALIGNMENT	—

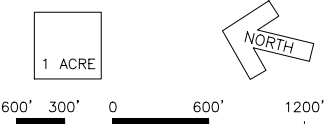
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ITEM	EXISTING
AIRPORT PROPERTY LINE	
FUTURE AIRPORT PROPERTY LINE	
EASEMENT LINE	
ROAD	
BUILDING	
AIRFIELD PAVEMENT	
BUILDING RESTRICTION LINE	
RUNWAY PROTECTION ZONE	

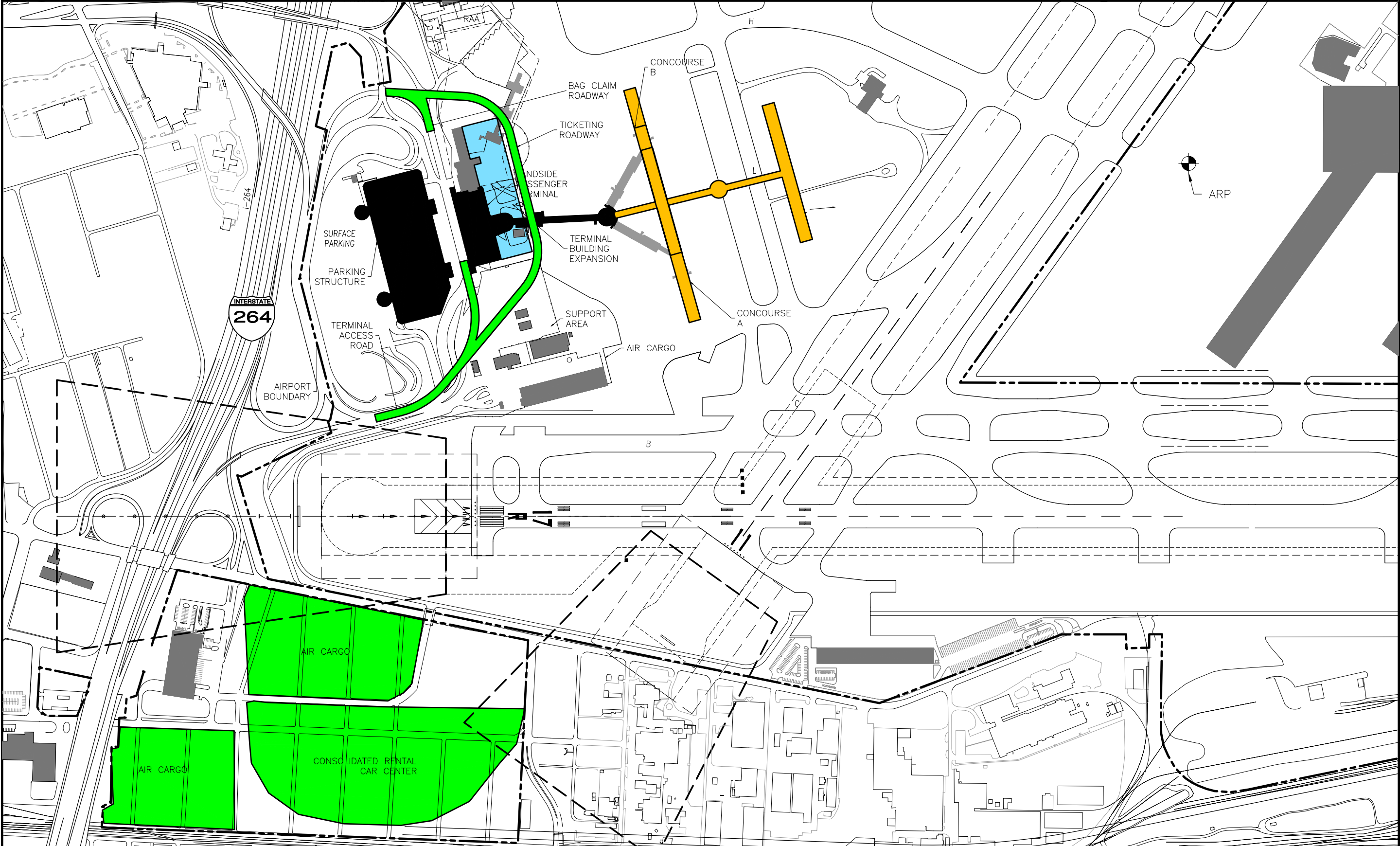




ALTERNATIVE FEATURES LEGEND	
ITEM	COLOR
LAND SIDE TERMINAL / PARKING STRUCTURE	
CONCOURSE	
TERMINAL ROAD / SURFACE PARKING	
COVERED MOVING SIDEWALK	
TO BE REMOVED (DEMOLITION)	
TAXIWAY ALIGNMENT / AIRFIELD	
RAILROAD SPUR REALIGNMENT	

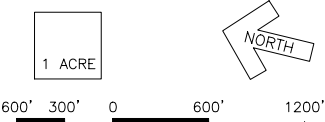
DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	
FUTURE AIRPORT PROPERTY LINE	
EASEMENT LINE	
ROAD	
BUILDING	
AIRFIELD PAVEMENT	
BUILDING RESTRICTION LINE	
RUNWAY PROTECTION ZONE	

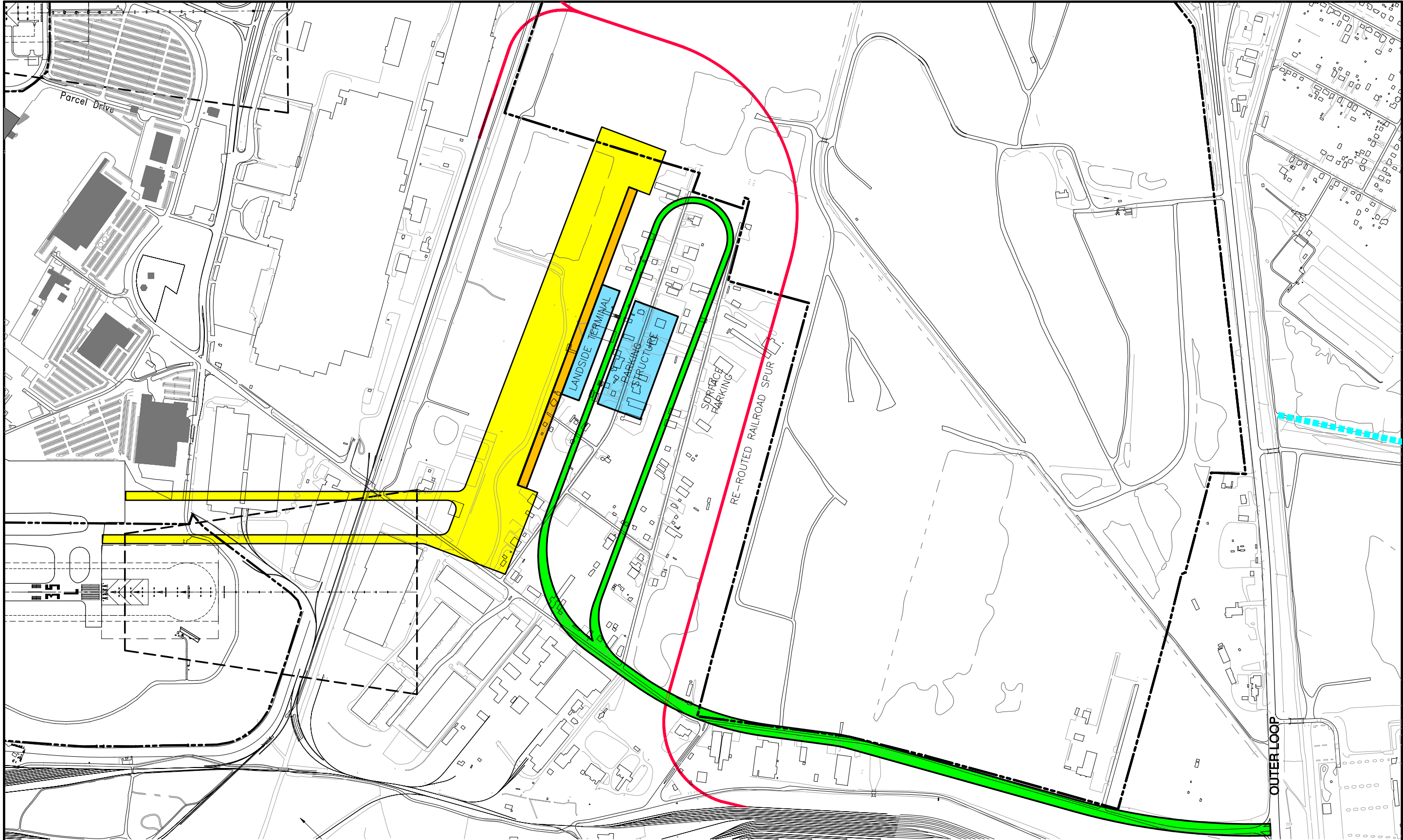




ALTERNATIVE FEATURES LEGEND	
ITEM	COLOR
LAND SIDE TERMINAL / PARKING STRUCTURE	
CONCOURSE	
TERMINAL ROAD / SURFACE PARKING	
COVERED MOVING SIDEWALK	
TO BE REMOVED (DEMOLITION)	
TAXIWAY ALIGNMENT / AIRFIELD	
RAILROAD SPUR REALIGNMENT	

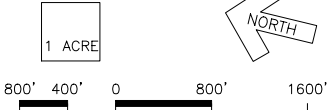
DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	
FUTURE AIRPORT PROPERTY LINE	
EASEMENT LINE	
ROAD	
BUILDING	
AIRFIELD PAVEMENT	
BUILDING RESTRICTION LINE	
RUNWAY PROTECTION ZONE	





ALTERNATIVE FEATURES LEGEND	
ITEM	COLOR
LAND SIDE TERMINAL / PARKING STRUCTURE	
CONCOURSE	
TERMINAL ROAD / SURFACE PARKING	
COVERED MOVING SIDEWALK	
TO BE REMOVED (DEMOLITION)	
TAXIWAY ALIGNMENT / AIRFIELD	
RAILROAD SPUR REALIGNMENT	

DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	
FUTURE AIRPORT PROPERTY LINE	
EASEMENT LINE	
ROAD	
BUILDING	
AIRFIELD PAVEMENT	
BUILDING RESTRICTION LINE	
RUNWAY PROTECTION ZONE	



6.2.2 Access Alternatives

One of the more significant issues in the Master Plan Update is the need to resolve traffic conflicts at ingress and egress points to the passenger terminal during peak periods. Although the terminal area's roadway system is expected to accommodate projected peak travel demands, the mingling of terminal-related traffic with other traffic as it enters the regional highway network is a concern. Five alternatives for resolving this problematic situation are identified below. These alternatives range from better traffic management to the construction of new access ramps to separating airport traffic from other traffic using the regional highway system.

6.2.2.1 Access Alternative A1: Traffic Management Improvements

This alternative attempts to optimize the use of the existing physical infrastructure through increased coordination between the Airport and the Kentucky Fair and Exposition Center (KFEC). Traffic flows and speeds on major roadways, ramps, and weave sections would be monitored. When traffic on a segment exceeds capacity, the segment is said to have reached failure conditions and the speeds and flows through the location can decrease from their maximum values. In the traffic management alternative, traffic flows would be managed to maintain optimum vehicle speeds and throughput. For example, vehicle detectors could be placed on the ramp leading from the KFEC to the Airport's property and on the Airport exit/re-circulation ramps. If the weave section north of the long-term lot was determined to be nearing failure conditions, the exiting flow rates from the KFEC could be regulated at the Phillips Lane intersection. This alternative is targeted at keeping all traffic flowing at optimum speeds and minimizing overall delay to the public.

6.2.2.2 Access Alternative A2: Airport Access from I-264 Interchange with Crittenden Drive

Access Alternative A2 would reconfigure the main terminal access point from the existing ramps to the Crittenden Drive interchange. This alternative is depicted in **Exhibit 6.2-6**. Terminal traffic would continue westbound on the I-264 and exit at an upgraded Crittenden Drive interchange. From this point, a new access tunnel would be required under the approach end of Runway 17R into the terminal area. Similarly, traffic exiting the terminal area would use the tunnel from the terminal area to the Crittenden Drive interchange onto I-264. This alternative would

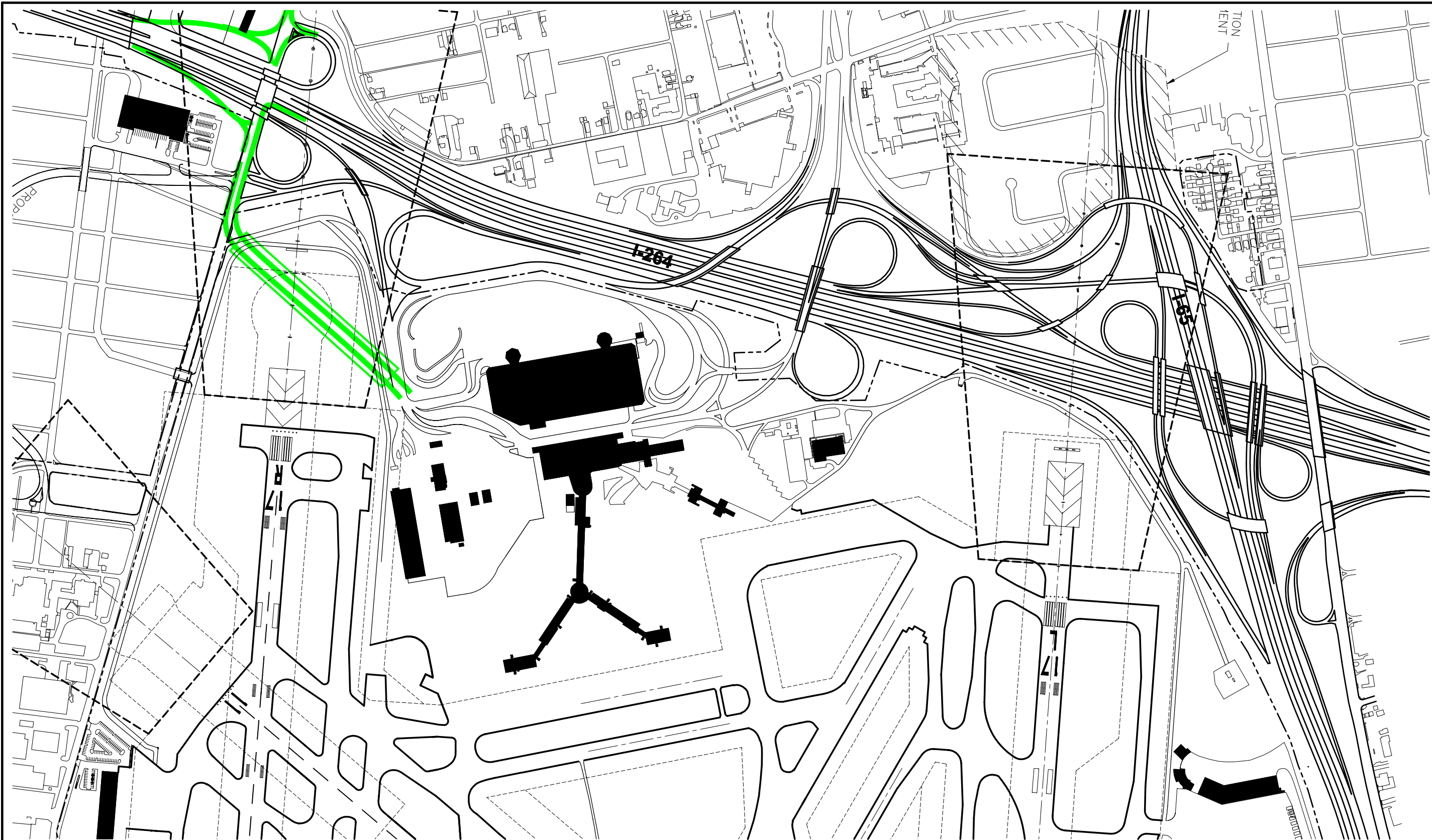
eliminate the traffic conflicts with traffic exiting KFEC, because all terminal traffic would now use Crittenden Drive.

6.2.2.3 Access Alternative A3: KFEC Flyover to I-264 Eastbound Collector/Distributor (CD) Roadway

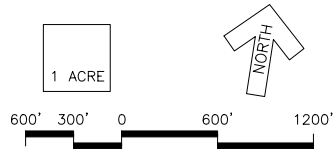
This alternative is depicted **Exhibit 6.2-7** and would construct a new flyover ramp from Phillips Lane to the current CD roadway for I-264 eastbound. Exiting KFEC traffic would use this ramp as the primary route to I-264 eastbound and I-65 north and southbound. Traffic entering the Airport terminal area would remain on the existing ramp system from the interstate, and traffic exiting the terminal area would not have to merge with traffic exiting KFEC.

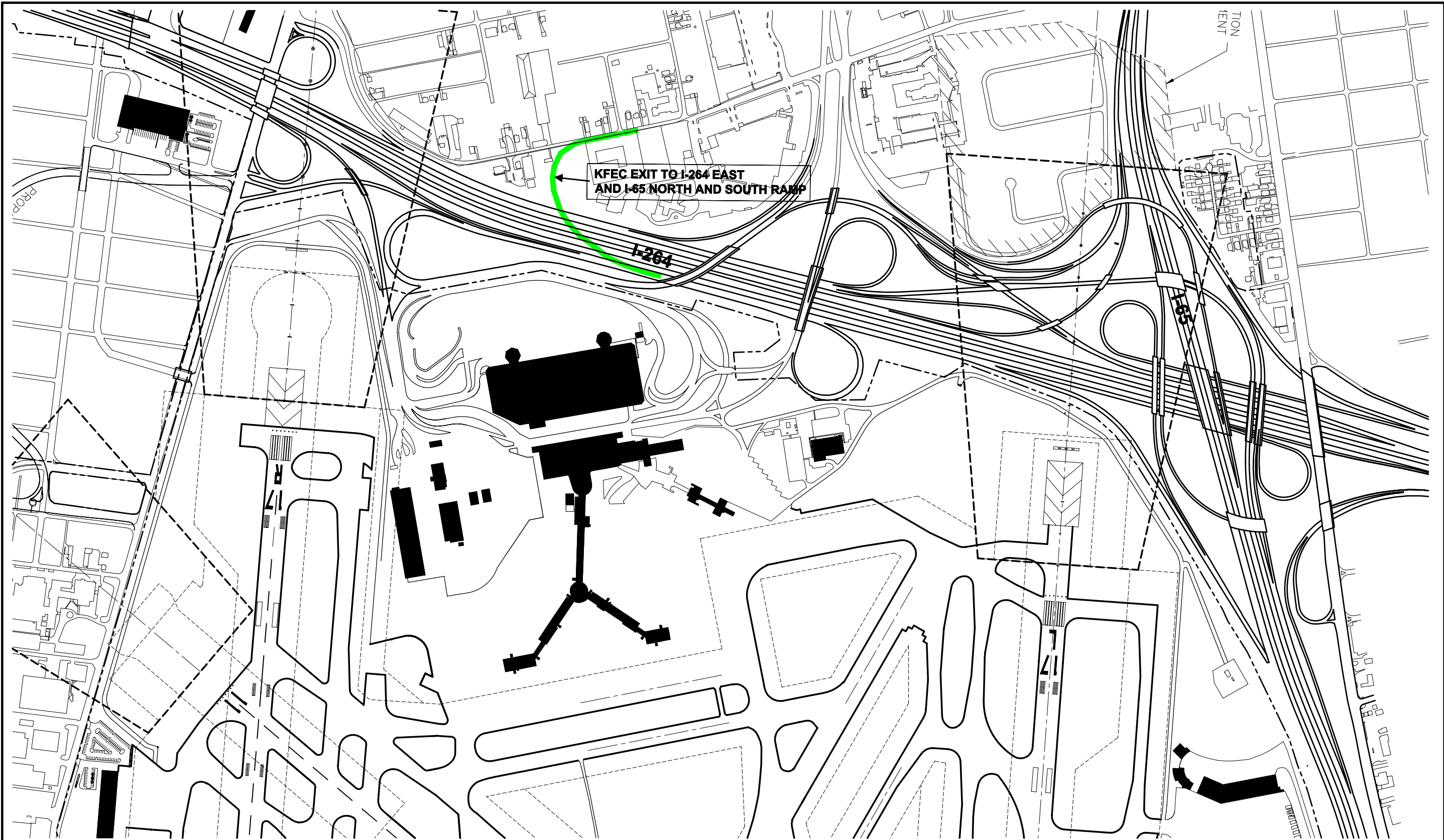
6.2.2.4 Access Alternative A4: New CD Roadway Serving Airport Traffic

Access Alternative A4 involves the construction of a series of ramps to separate traffic flows entering and exiting the Airport terminal area. The improvements required in this alternative are extensive and are depicted in **Exhibit 6.2-8**. First, the existing loop-ramp from KFEC to I-264 eastbound would become an exclusive ramp for KFEC traffic. A barrier would separate this traffic from I-264 and I-65 traffic bound for the Airport terminal. A new ramp for traffic from eastbound I-264 to I-65 would be constructed on Airport property south of I-264, and would be grade separated from other traffic flows. A slip ramp from the existing CD roadway would provide access to this ramp for traffic exiting KFEC to I-65 north and south. Likewise, a ramp from the terminal area would link to this ramp for Airport traffic exiting to I-65 north and south. Finally, a ramp from the terminal area to I-264 eastbound would be constructed to provide a direct link for eastbound traffic exiting the Airport (rather than the current configuration where eastbound traffic has to travel westbound to reach the eastbound ramp). **Table 6.2-1** summarizes the traffic flows for this alternative.



DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	---
FUTURE AIRPORT PROPERTY LINE	---
EASEMENT LINE	---
ROAD	---
BUILDING	█
AIRFIELD PAVEMENT	---
BUILDING RESTRICTION LINE	---
RUNWAY PROTECTION ZONE	---





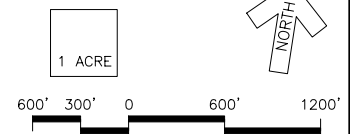
KFEC EXIT TO I-264 EAST
AND I-65 NORTH AND SOUTH RAMP

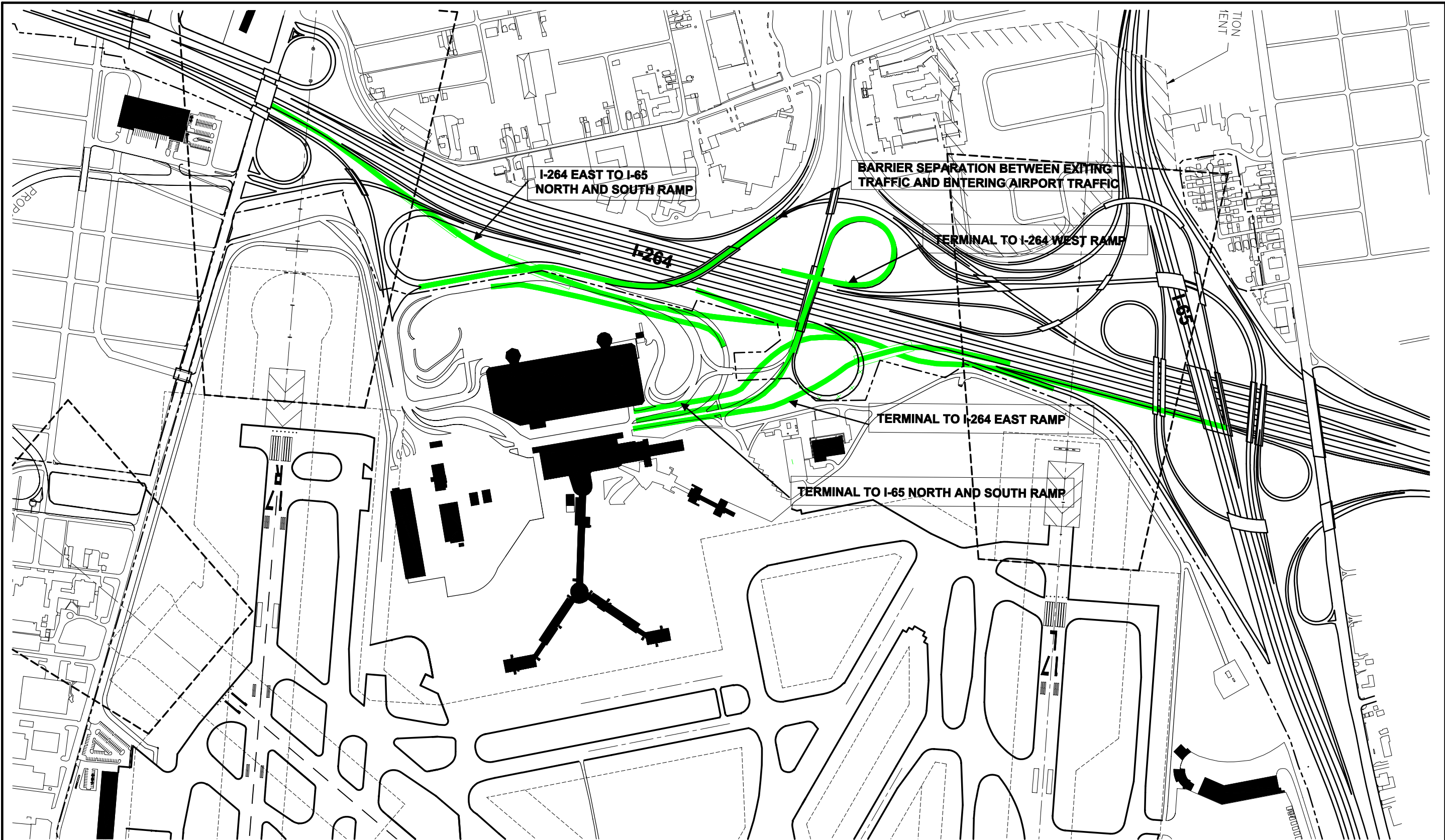
I-264

I-65

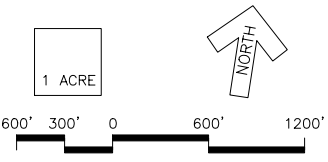
DRAWING LEGEND

ITEM	EXISTING
AIRPORT PROPERTY LINE	---
FUTURE AIRPORT PROPERTY LINE	---
EASEMENT LINE	---
ROAD	---
BUILDING	■
AIRFIELD PAVEMENT	---
BUILDING RESTRICTION LINE	---
RUNWAY PROTECTION ZONE	---





DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	---
FUTURE AIRPORT PROPERTY LINE	---
EASEMENT LINE	---
ROAD	---
BUILDING	■
AIRFIELD PAVEMENT	---
BUILDING RESTRICTION LINE	---
RUNWAY PROTECTION ZONE	---



<p align="center">Table 6.2-1 Louisville International Airport ACCESS ALTERNATIVE A4 TRAFFIC FLOWS</p>					
From		To			
		I-65 North	I-65 South	Watterson East	Watterson West
	Airport	New connector to new I-65 N/S ramp	New connector to new I-65 N/S ramp	New ramp onto mainline Watterson	Existing route
	KFEC	Existing exit ramp ¹ with crossover to new I-65 N/S ramp	Existing exit ramp ¹ with crossover to new I-65 N/S ramp	Existing route	Existing route
	Watterson Eastbound	New I-65 N/S ramp separating traffic from existing road	New I-65 N/S ramp separating traffic from existing road	Existing lanes	N/A

Source: PB Aviation

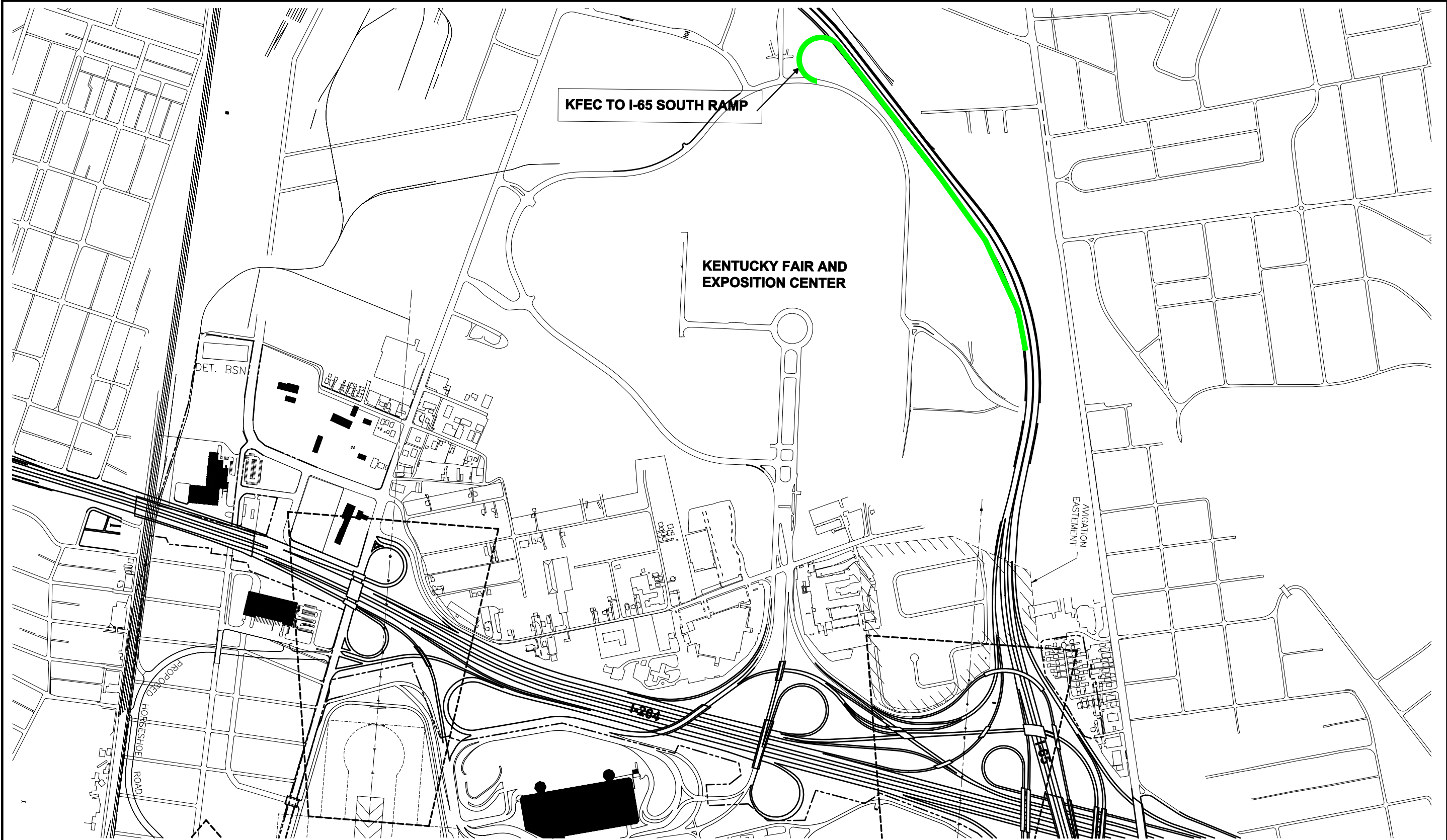
Notes: ¹ The KFEC/Airport weave area is eliminated by barrier separation of traffic flows. The new ramps for exiting terminal traffic would allow terminal-bound traffic to continue into the Airport without weaving with exiting traffic.

6.2.2.5 Access Alternative A5: New I-65 Ramps from KFEC

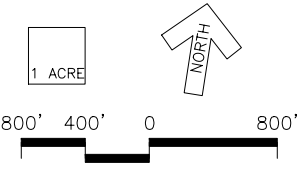
Depicted in **Exhibit 6.2-9**, this option would construct new ramps from the KFEC to I-65 northbound and southbound between or near Bradley Avenue and Hart Avenue. These ramps could potentially take the place of the current ramp leading to the CD roadway. Alternatively, these ramps could be constructed and the remaining traffic (using the current ramp to the CD roadway eastbound) could be managed using the techniques discussed in Alternative A1 to ensure that Airport traffic has priority and always flows at good levels of service.

6.2.3 Summary of Preliminary Alternatives

Complementary alternatives for improving the terminal area and its access system were combined to form 13 distinct, preliminary alternatives. Suitable combinations are presented in **Table 6.2-2**.



DRAWING LEGEND	
ITEM	EXISTING
AIRPORT PROPERTY LINE	=====
FUTURE AIRPORT PROPERTY LINE	-----
EASEMENT LINE	- - - - -
ROAD	=====
BUILDING	█ █ █
AIRFIELD PAVEMENT	=====
BUILDING RESTRICTION LINE	-----
RUNWAY PROTECTION ZONE	=====



**Louisville International Airport
Master Plan Update**

AIRPORT ACCESS ALTERNATIVE 5

6.2-9

PB AVIATION, INC.

AirAccessAccess_Alt_14.dwg

Table 6.2-2 Louisville International Airport TERMINAL AND ACCESS COMBINATIONS						
	Terminal Area Alternatives	Access Alternatives				
		A1: Traffic Management Improvements	A2: Airport Access from I-264 Interchange with Crittenden Dr.	A3: KREC Flyover to I-264 Eastbound	A4: New C/D Roadway for Airport Traffic	A5: New I-65 Ramps from KREC
T1: Expand Existing Terminal		●		●	●	
T2: Reconfigure Existing Terminal as a Linear Terminal		●	●	●	●	
T3: New Linear Terminal			●	●		
T4: Expand Landside Terminal and Construct Second Concourse and Gates		●	●	●	●	
T5: New South Terminal Complex ²						

Notes ¹ Alternative A5 was eliminated from further consideration.

² Terminal Alternative T5 requires access from the Outer Loop and is not used in combination with Access Alternatives A1, A2, A3, A4 or A5

Source: PB Aviation

Access Alternative A5 was not combined with any of the terminal alternatives. During a review of this access alternative with Airport staff, it was determined that Access Alternative A5 does not provide a significant improvement to traffic flows and would not be used by traffic destined for the Airport.

Terminal Alternative T5 was not combined with any of the access alternatives because of its location on the south side of the Airport. A separate access alternative from the Outer Loop was developed for Terminal Alternative T5 and became the 14th preliminary alternative.

The 14 preliminary alternatives were screened to determine the best three or four alternatives for improving the Airport's terminal area and access system. This screening is presented in the following section.

6.3 Screening of Preliminary Alternatives

As the first level of evaluation, preliminary alternatives were screened to identify those alternatives that have the most potential for fulfilling the vision of Louisville International Airport. The visions were established at the onset of the Master Plan Update to guide the Master Plan Update Study's analyses, particularly those analyses leading to the selection of a preferred development plan. The visions are very comprehensive, and address operational aspects of the Airport as well as its mission to promote economic development and minimize environmental impacts. Discussed in detail in Chapter 1.0, the visions describe the desired future state of the Airport in 20 years and assert that Louisville International Airport:

- *Accommodates projected growth*
- *Is financially independent*
- *Is efficient*
- *Has a competitive advantage*

- *Is an economic catalyst*
- *Has a strong link with the convention industry*
- *Balances expansion needs with environmental concerns*
- *Provides opportunities for noise-compatible land development*
- *Takes advantage of technology advancements*
- *Protects its airspace*
- *Recognizes the importance of the “airport system”*

The Level 1 evaluation process examines each preliminary alternative with respect to its ability to fulfill 10 of these visions. Two of the visions listed above, airspace protection and recognition of the importance of the airport system, are not readily applied to an assessment of the Airport’s physical layout. Consequently, the Level 1 evaluation focuses on the first 10 visions listed above.

Using professional judgment, the evaluation assesses whether a preliminary alternative represents a:

- *Positive step toward meeting the vision,*
- *Negative step toward meeting the vision, or*
- *Neutral step, i.e., does not influence or relate to the vision.*

Table 6.3-1 summarizes the Level 1 evaluation. Explanations for the ranking are provided below for each vision.

6.3.1 Accommodates Projected Growth

The challenge of the future is to improve services and facilities for all customers of the Airport. Adequate airside and landside capacity should be provided to accommodate projected passenger and cargo demand.

Those alternatives that included the A1 access option, using the existing access system with increased coordination with the KFEC, were ranked as

TABLE 6.3-1
Louisville International Airport
PRELIMINARY ALTERNATIVES SCREENING

<i>VISION</i>	T1 A1	T1 A3	T1 A4	T2 A1	T2 A2	T2 A3	T2 A4	T3 A2	T3 A3	T4 A1	T4 A2	T4 A3	T4 A4	T5 --
Accommodates projected growth	0	+	+	0	+	+	+	-	-	0	+	+	+	+
Is financially independent	+	+	-	0	-	0	-	-	-	+	-	+	-	-
Is efficient	0	+	+	0	+	+	+	0	0	0	0	0	0	0
Has competitive advantage	+	+	+	+	+	+	+	-	-	+	+	+	+	+
Is an economic catalyst	-	-	-	0	0	0	0	0	0	-	-	-	-	+
Has a strong link with the convention industry	-	0	0	0	+	+	+	0	0	0	+	+	+	0
Balances expansion needs with environmental concerns	-	+	+	0	-	+	+	-	0	0	-	+	+	0
Provides opportunities for noise-compatible development	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Takes advantage of technology enhancements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total +	2	5	4	1	4	5	5	0	0	2	3	5	4	3

neutral. The on-Airport roadways would accommodate the projected terminal traffic, but as discussed in Chapter 5.0, the combination of existing KFEC traffic and entering terminal traffic causes traffic congestion that is not fully solved with this access alternative.

Alternatives T3-A2 and T3-A3 were graded with a negative for this vision. Both alternatives would accommodate the 20-year projection for terminal facilities but any terminal expansion beyond that requirement would be limited. Flexibility to accommodate increased demand, beyond that projected, and to adjust to changing operational characteristics would be limited with these two alternatives.

6.3.2 Is Financially Independent

Through sound fiscal policy and increased revenue generation, the Airport has positioned itself to take advantage of financing mechanisms and minimized reliance on federal grants. This is achieved by providing facilities for a diverse group of aviation-related enterprises that need to be located on the Airport. Correspondingly, the Airport has decreased its reliance on federal funds and minimized its debt exposure.

The general perception of comparative development costs was the primary factor in evaluating this vision against the preliminary alternatives. Consideration also was given to potential operating and maintenance costs associated with each preliminary alternative.

Those alternatives meeting the financially independent vision and ranked with a "+" were T1-A1, T1-A3, T4-A1, and T4-A3. Alternatives T2-A1 and T2-A3 were ranked as neutral because the higher costs of the terminal improvements were not accompanied by high costs for their associated access improvements. The remainder of the alternatives were ranked as a "-" given the comparative

cost of the highway and ramp system in the A4 alternatives and the costs associated with constructing a new terminal over expanding the existing terminal, as is the case in the T3 and T5 alternatives.

6.3.3 *Is Efficient*

The efficiency vision is important from the perspective of the passenger. Travel through the airport system should be as seamless as possible. Efficiency is also important to the airlines and tenants at the Airport because of the impacts of increased operating cost.

Alternatives T1-A3, T2-A2, T2-A3, and T2-A4 were ranked with a “+” as meeting this vision. The remainder of the alternatives was ranked as neutral. Although the runway alternatives were not viewed as inefficient, they did not fully meet the intent of the vision.

6.3.4 *Has a Competitive Advantage*

Key factors considered for this vision are maintaining reasonable operating costs and future gate availability, which are essential elements of competitive airline service. Also, the competitive advantage of the Airport would be enhanced if expansion opportunities are provided for UPS, if needed in the future.

All of the alternatives, with the exception of T3-A2 and T3-A3, were ranked as a “+” because of the ability to incrementally add gates without significant duplication of existing terminal facilities, as required in the T3 alternatives. Alternative T5, with a new south terminal, would require rebuilding facilities that exist today; however, the expansion capability this alternative provides to UPS warranted a “+” ranking for the competitive advantage vision.

6.3.5 *Is an Economic Catalyst*

The economic catalyst vision was used to judge whether each alternative allowed for terminal and airport-related development and if it provided any expansion capability for UPS. It was determined that this vision was not met by the T1 and T4 alternatives, primarily because the terminal configuration would not allow for expanded aviation-related development. The constrained terminal area space in alternatives T1 and T4 would necessitate placement of aviation-related development outside the immediate terminal area and preclude any other economic development activities on those sites.

The T5 alternative was ranked most favorably for this vision because of the expansion opportunities created for UPS in the long term. By relocating the terminal to a new location south of the Airport, the existing terminal area could be reused by UPS. Although UPS has not indicated the need for this level of expansion, this alternative merits a “+” because the need could be met if it ever arose.

The T2 and T3 alternatives were ranked neutral because they provided increased terminal development area but did not provide significant potential expansion area for UPS.

6.3.6 *Has a Strong Link With the Convention Industry*

The ability of the Airport to sustain a strong link with the convention industry was assessed in two ways. First, this vision was met if an alternative adequately separated traffic destined for the Airport from traffic destined for the KFEC. A second factor was the flexibility of the alternative to accommodate a potential “focus city” or airline hub operation, which in turn has a positive influence on the convention and tourism industry.

T1-A1 was rated a “-” because its design would not separate traffic or increase flexibility. The other T1 alternatives, along with the T3 alternatives and T5 were rated neutral because they would separate traffic flows but would not increase flexibility for potential focus city or hub operations.

The T2 and T4 alternatives meet both of the criteria fulfilling the vision and were ranked with a “+”.

6.3.7 Balances Expansion Needs With Environmental Concerns

Because a new runway is not included in this Master Plan Update (refer to Chapter 4.0) the vision of balancing expansion needs with environmental concerns looked at any potential environmental changes relating to terminal or access improvements. Air quality impacts associated with reducing vehicular congestion and improving aircraft movements became the principal focus of this criterion.

The alternatives that included A2 access improvements, which shifted vehicles bound for the terminal through a single-point interchange at Crittenden Drive and then into the terminal area through a tunnel, were ranked as a “-” because every vehicle would have to pass through a signalized intersection rather than the free flow ramp system in place now. Alternative T1-A1 was also ranked as a “-” because traffic improvements would not improve congestion significantly.

Alternatives T2-A1, T3-A3, T4-A1, and T5 were ranked as neutral because no significant congestion improvement was noted or because any gain in vehicular congestion improvement was offset by increased taxi times or potential congestion for aircraft.

The remaining alternatives were viewed as providing a significant improvement in vehicular congestion and aircraft operational efficiencies and were ranked as a “+”.

6.3.8 Provides Opportunities for Noise-Compatible Land Development

This vision focused on the property acquired as part of the ongoing noise program and its reuse as compatible land uses. Compatible uses provide economic development stimulating the creation of new jobs and returning this land to the tax rolls. All of the alternatives were assigned a neutral ranking. The terminal and access improvements would not significantly change the Airport’s ability to reuse acquired land for noise-compatible development.

6.3.9 Takes Advantage of Technology Enhancements

Louisville International Airport, along with UPS, continues to be on the forefront of new technology implementation. None of the alternatives ranked better or worse than others because of the ability to integrate technology enhancements into terminal expansion and on the access system.

6.3.10 Level 1 Screening Results

Alternatives T1-A3, T2-A3, T2-A4 and T4-A3 have the greatest potential for fulfilling the vision of Louisville International Airport for 2020. As indicated in Table 6.3-1, all four alternatives would provide the best potential for the Airport to accommodate future growth, to enhance its competitive advantage and to balance expansion needs with environmental concerns. Three of these alternatives (T1-A3, T2-A3 and T2-A4) would contribute positively to the vision of an Airport that moves people and goods efficiently. Two of the four preliminary alternatives (T1-A3 and T4-A3) would have a greater potential for fulfilling the vision of financial independence. Finally, three of these alternatives (T2-A3, T2-

A4 and T4-A3) would be more favorable to maintaining a strong link between the convention industry and the Airport.

Each of the four alternatives that were selected in this Level 1 evaluation would be capable of accommodating future demands through the next 20 years by expanding terminal facilities in their current location. At some point, however, it may become necessary to look beyond the existing site, and Terminal Alternative T5 is the only alternative that would provide an opportunity to relocate the Airport's terminal function elsewhere. Also, Terminal Alternative T5 is the only alternative that would be capable of fulfilling the vision of Louisville International Airport as an economic catalyst, because of its ability to stimulate economic development opportunities in areas south of the Airport. Consequently, Terminal Alternative T5 should be retained as an option for expanding the Airport's facilities beyond the planning period of this Master Plan Update.

6.4 Description of Detailed Alternatives

Once the alternatives to be carried forward were identified, each was detailed as a complete airport alternative to include all of the facility requirements identified in Chapters 4.0 and 5.0. Long-term airport development opportunities for aviation-related uses were also identified in concert with the detailing of complete airport alternatives.

In order to simplify the identification of the alternatives, the naming system combining the terminal and access concepts (e.g., T1-A3) used in the previous sections was revised and the alternatives were renamed as Alternatives 1, 2, 3, and 4.

A number of items are common among all of the alternatives. These common items include improvements to the airfield and development opportunities south of the Airport.

Common airfield improvements include an extension of Runway 17R/35L and three taxiway projects. To meet the future 11,700 – 12,000 runway length requirement, a 900-foot paved overrun is indicated for Runway 17R and a 1,200-foot paved overrun is depicted for Runway 35L.

New taxiways that are depicted in each alternative include:

- Construct Taxiway A west of Runway 17R/35L and extend it south to serve future aviation development in the Knopp-Melton area.
- Extend Taxiway P as a dual parallel taxiway with Taxiway D and close existing Taxiway P.
- Construct Taxiway E extension from Runway 29 to Runway 35R.
- Extend Taxiway D-4 to allow direct access to the terminal for aircraft exiting Runway 17L/35R.

Highways, railroads, and dense urban developments limit the area in which the Airport can expand to the north, east, and west. The only option for expanding aviation and airport-related uses is to the south. Consequently, all the alternatives include future land acquisition between Fern Valley Road and the Outer Loop. This area would be reserved for future aviation uses, such as an aircraft maintenance center, possibly a new passenger terminal, and other aviation-related uses.

Concurrent with the Airport Master Plan Update, the Airport Authority is pursuing a Renaissance Zone bounded by Fern Valley Road to the north, I-65 to the east, the Gene Snyder Freeway (I-265) to the south, and CSX rail lines to the west. This zone, as authorized by state law, operates as a “tax increment financing” district. The incremental taxes raised by new development in this zone are reinvested in infrastructure improvements within the zone to stimulate additional development.

Several future development opportunities were identified south of the Airport and remain the same in each of the alternatives. The area known as Knopp-Melton,

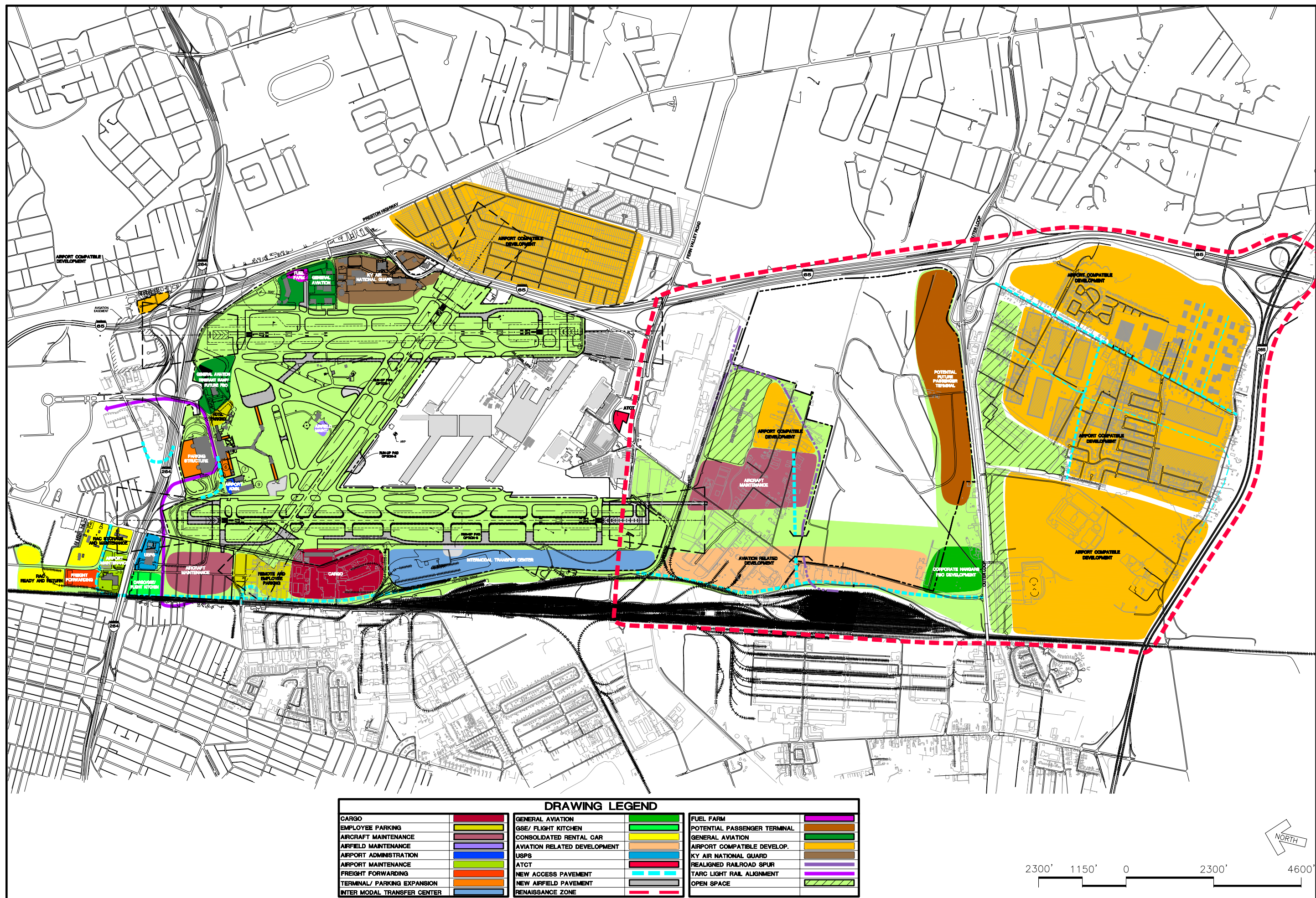
bounded by the Ford plant on the north, the landfill on the south and east, and the CSX railroad line on the west, was identified in the early 1990s as a potential site for a United Airlines maintenance facility. Although that facility was never developed, this area still remains a viable site for long-term aviation development activities and is shown on the alternatives as future aircraft maintenance. Two parallel taxiways would provide access to this area, a southerly extension of Taxiway B and the future Taxiway A (on the west side of Runway 17R/35L). Taxiway A is depicted as extending farther to the south to provide access to other potential development sites.

The remaining specific details for each alternative are described in detail in the following sections.

6.4.1 Alternative 1

Alternative 1 is depicted in **Exhibit 6.4-1** and includes the Terminal Concept T1 and expands the landside terminal (ticketing and baggage claim) to the west. Roadways approaching the terminal would be modified to accommodate extension of the two-level curbside associated with the landside terminal expansion. Additional gates and departure lounge areas would be provided by extending existing Concourses A and B and by adding a new five-gate concourse adjacent to the extended landside terminal. Also included is Access Concept A3, the flyover ramp for traffic exiting KFEC to eastbound I-264. To meet parking requirements, this alternative includes expansion of the existing parking structure by two levels and construction of a second parking garage in the area now used as surface parking.

In order to accommodate the terminal expansion and meet future facility requirements, the flight kitchen, cargo building, and airline maintenance buildings adjacent to the terminal would be relocated to the area east of the terminal now occupied by the Airport Administration building. Two options are available for the expansion and relocation of Airport Administration function: 1) construct



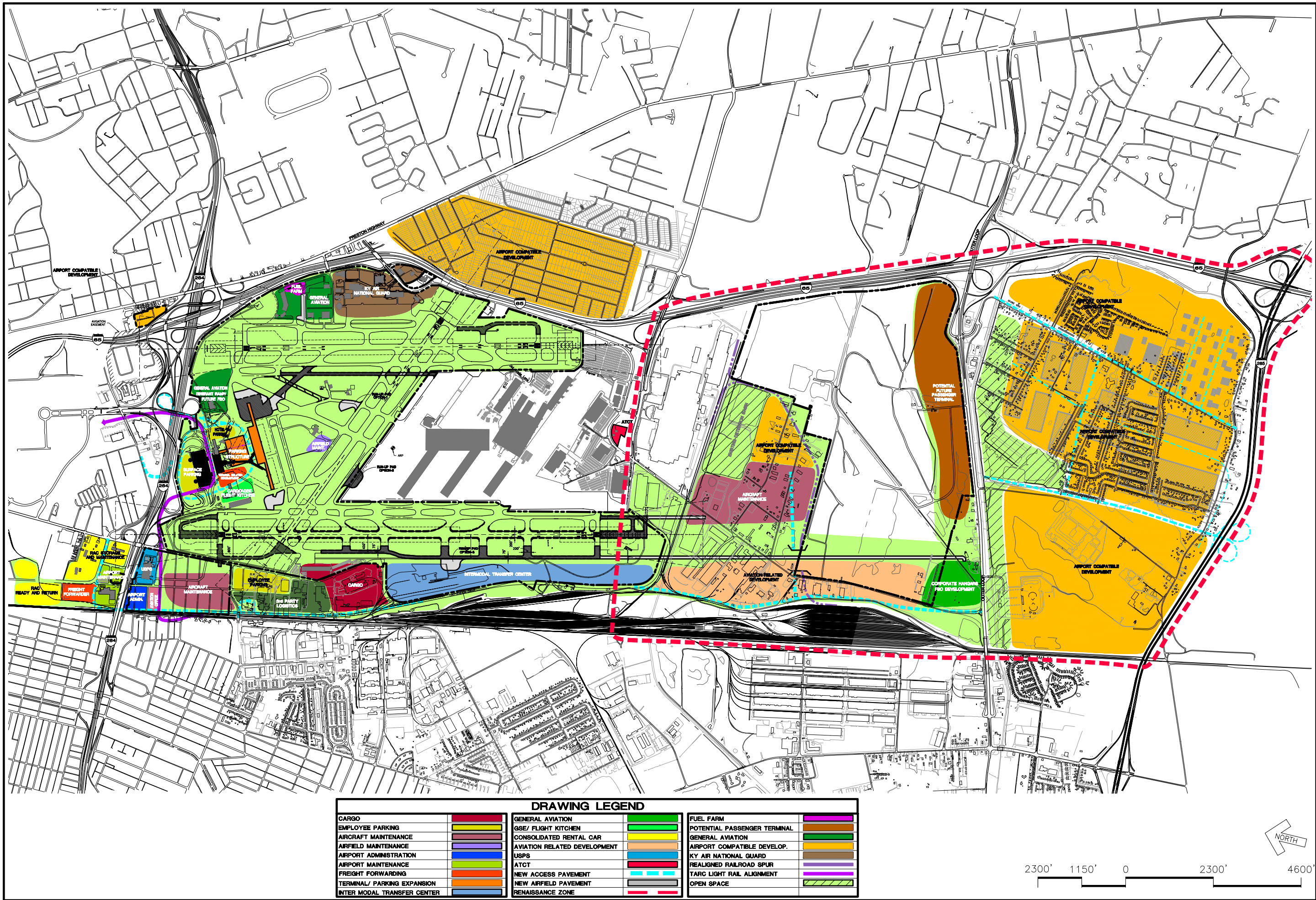
administration offices within the terminal as part of the future expansion, or 2) construct an airport administration building adjacent to the expanded terminal.

A consolidated rental car ready/return center would be included in the northeast corner of the Airport, adjacent to existing rental car agency storage and maintenance. Passengers would be transported between the terminal and the rental car center via shuttle buses. A Light Rail Transit (LRT) system is currently under study and includes an Airport stop. A corridor formulated by the RAA and TARC (Transit Authority of River City) is reserved for future LRT construction in each of the alternatives. This alignment would cross the Watterson Expressway from KFEC, stop in front of the existing terminal (adjacent to the parking garage) and proceed to the east over Crittenden Drive and the CSX rail lines, then turn to the south.

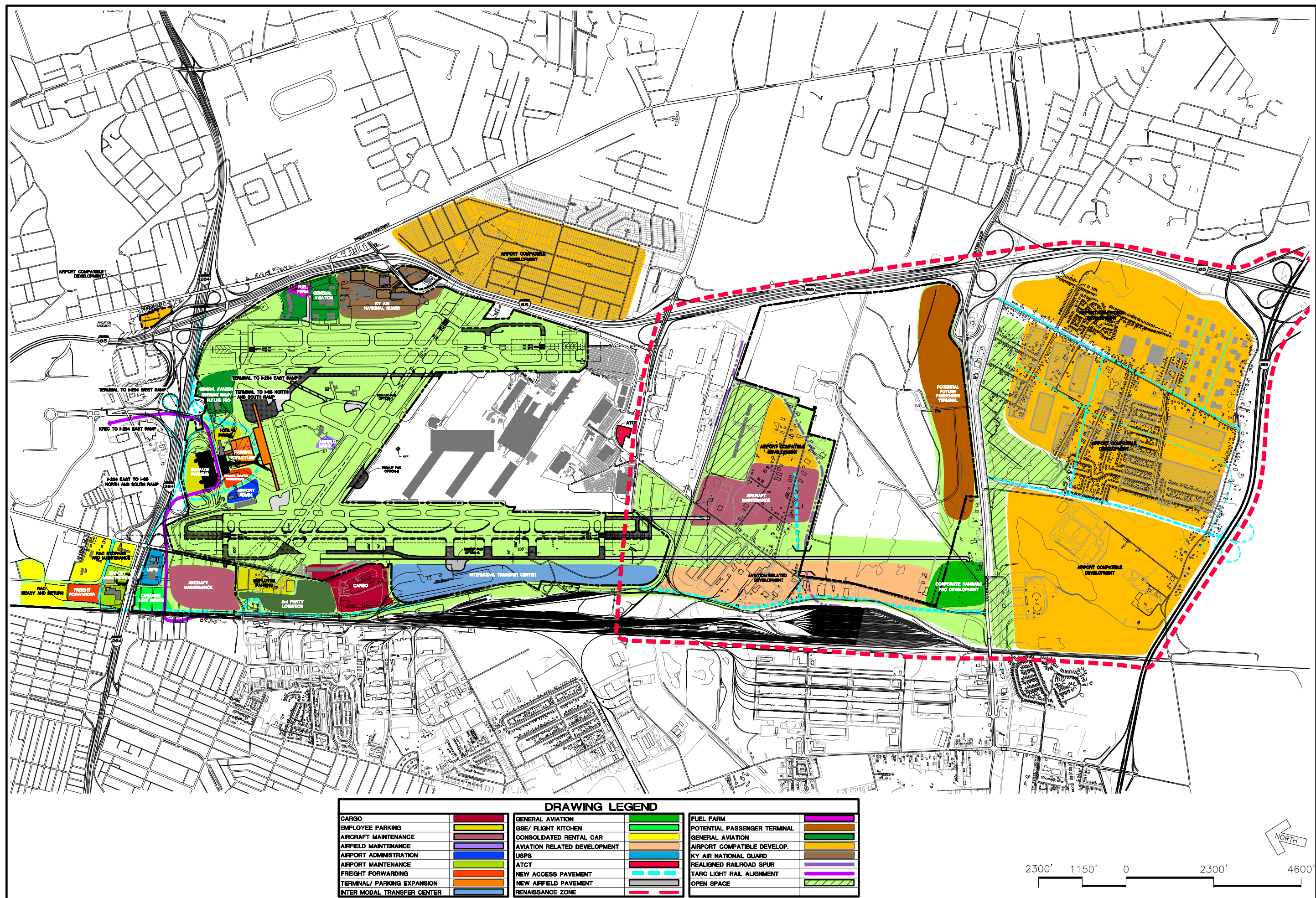
To provide for long-term expansion of airside facilities on the west side of the airport, this alternative includes acquisition of the industrial and commercial properties between the Airport and the CSX railroad line. Crittenden Drive would be relocated to run from its existing intersection north of the Watterson toward the CSX railroad line, then turn south and run parallel to the railroad line until rejoining the portion of Crittenden Drive currently under construction. Aircraft maintenance, remote and employee parking, and air cargo land uses are depicted in the area to be acquired. Further south, the area known as the Brown Foundation property would be used as an intermodal transfer center for shipping containers.

6.4.2 Alternatives 2 and 3

Alternatives 2 and 3 are depicted in **Exhibits 6.4-2** and **6.4-3**. The two alternatives are described together in this section, as the only difference between them is the terminal access element. Alternative 2 includes the flyover ramp for traffic exiting KFEC to eastbound I-264 as the single access improvement.



DRAWING LEGEND					
CARGO		GENERAL AVIATION		FUEL FARM	
EMPLOYEE PARKING		GSE/ FLIGHT KITCHEN		POTENTIAL PASSENGER TERMINAL	
AIRCRAFT MAINTENANCE		CONSOLIDATED RENTAL CAR		GENERAL AVIATION	
AIRFIELD MAINTENANCE		AVIATION RELATED DEVELOPMENT		AIRPORT COMPATIBLE DEVELOP.	
AIRPORT ADMINISTRATION		USPS		KY AIR NATIONAL GUARD	
AIRPORT MAINTENANCE		ATCT		REALIGNED RAILROAD SPUR	
FREIGHT FORWARDING		NEW ACCESS PAVEMENT		TARC LIGHT RAIL ALIGNMENT	
TERMINAL/ PARKING EXPANSION		NEW AIRFIELD PAVEMENT		OPEN SPACE	
INTER MODAL TRANSFER CENTER		RENAISSANCE ZONE			



Alternative 3 proposes the system of access ramps designed to separate traffic exiting KFEC and Airport traffic entering and exiting the terminal as well as provide a more direct connection from the terminal to I-264 east and I-65 north and south.

The terminal configuration for these alternatives, the T2 concept, relocates the landside terminal from its existing location to the south, adjacent to the concourses, which are extended to provide additional gates and departure lounge space. This expanded terminal envelope would allow additional parking to be located within walking distance of the terminal. Approximately 7 acres of property are available in this alternative for development as revenue-generating uses that support terminal activity. So that the existing parking structure and the hotel can continue to operate with the terminal reconfiguration, an overhead, enclosed walkway with moving sidewalks is depicted connecting the terminal, a new short-term parking structure, the hotel, and the existing parking structure.

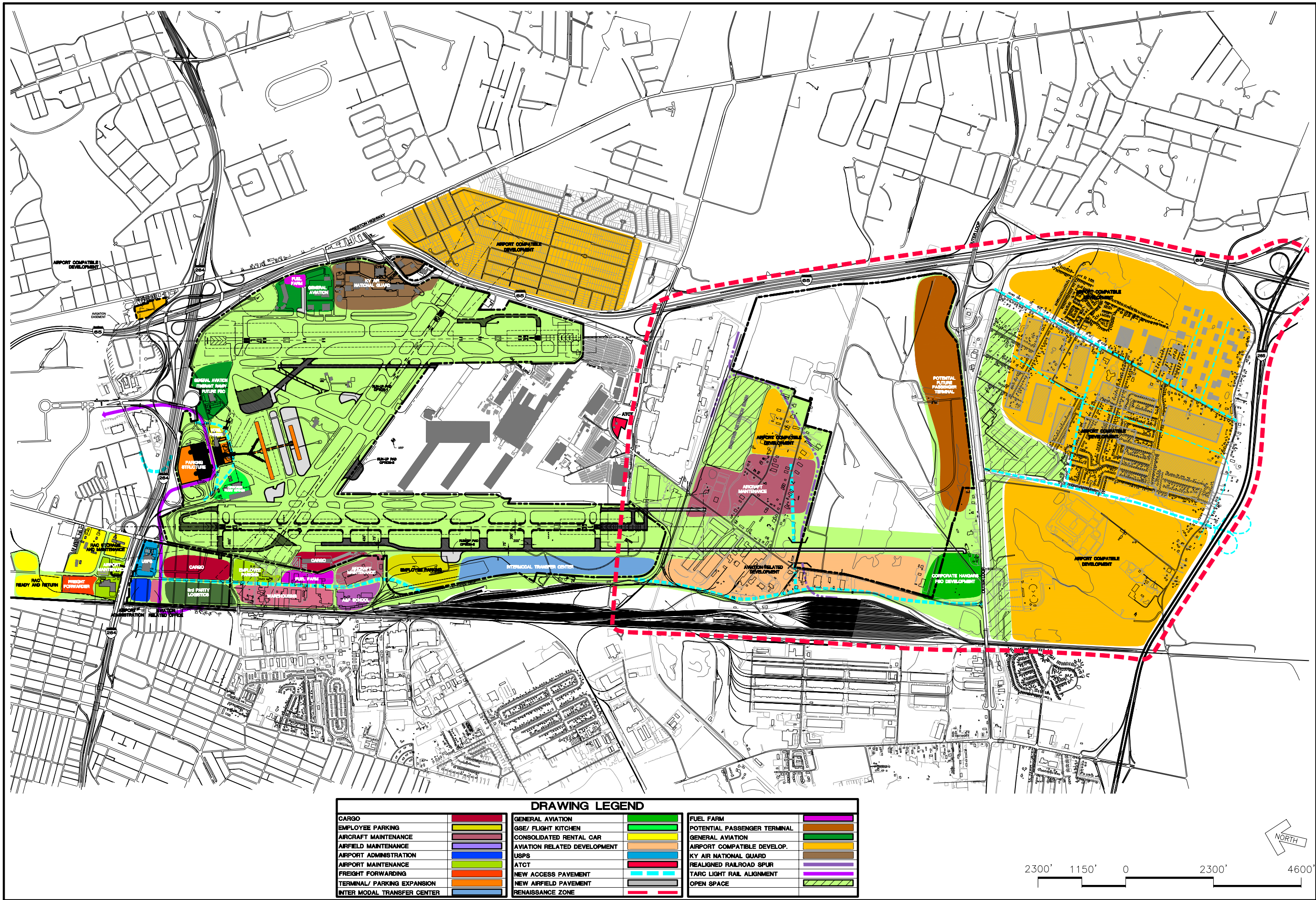
Like Alternative 1, these alternatives include long-term acquisition of the industrial and commercial properties on the west side of the Airport between the Airport and the CSX railroad line. Crittenden Drive would be relocated to run from its existing intersection north of the Watterson west toward the CSX railroad line, then turn south and run parallel to the railroad line until rejoining the portion of Crittenden Drive currently under construction. Land uses anticipated in this area are airport administration and aviation-related office space, aircraft maintenance, employee parking, third-party logistics, and air cargo. The area known as the Brown Foundation property would be used as an intermodal transfer center for shipping containers.

6.4.3 Alternative 4

As shown in **Exhibit 6.4-4**, Alternative 4 joins the A3 access concept of a new ramp to serve traffic exiting KFEC to I-264 east and the T3 terminal concept. Terminal expansion would be accomplished by extending the landside terminal to the south and adding a second curbfront on the south side of that landside terminal. Passenger access to the concourse would be via an underground walkway. A linear concourse would be created by connecting the existing ends of Concourses A and B and, near the end of the planning period, a second concourse would be constructed. Terminal support functions would remain in their existing location, but would require reconstruction to accommodate the changes to the terminal roadway.

Additional automobile parking in the terminal area would be achieved by adding two levels to the existing parking structure and by constructing a second parking garage in the area now used as surface parking. The rental car ready/return center would be in the same location as the previous alternatives, north of I-264 adjacent to the CSX railroad line, with a shuttle bus connection to the terminal. The LRT alignment mirrors that found in the other alternatives.

Crittenden Drive is realigned approximately 750 feet to the west in this alternative to provide for long-term aviation-related uses, such as air cargo and aircraft maintenance. The area between the relocated Crittenden Drive and the CSX railroad line was identified for potential aviation-related uses that do not require direct airfield access, i.e., third-party logistics, warehousing, and airframe and powerplant (A&P) mechanics school. Further south, the Brown Foundation property was identified as an intermodal transfer center for shipping containers.



6.5 Evaluation of Alternatives

Twenty-four technical criteria were used to conduct a comparative evaluation of the detailed alternatives for the Airport. These criteria were based on three broad categories: operational, environmental, and economic factors. The evaluation provides valuable, comparative information to assist in selecting a preferred alternative. The evaluation is also useful in identifying any critical problem areas that will need to be resolved in the refinement of the preferred alternative.

The results of the evaluation are summarized in **Table 6.5-1** and are described by criterion in the following sections.

6.5.1 Walking and Travel Distance

The walking and travel distance criterion compares the terminal facility arrangement's efficiency for passenger movements. Walking and travel distance are important from a passenger convenience standpoint. If a passenger has a longer walking distance than accustomed to, the money spent on improvements to the terminal may not be perceived as improvements. Additionally, if certain groups, such as the elderly or families with young children, are unwilling or unable to traverse the distances required, other airports or modes of transportation become more attractive.

In order to compare the four alternatives, travel distance was measured in segments from the farthest parking space to the terminal entrance, and from the terminal entrance through security to the farthest gate. This would represent the most arduous trip a passenger would experience. **Table 6.5-2** presents the comparison of walking distances and travel times. To calculate estimated travel

Table 6.5-1 Louisville International Airport SUMMARY OF ALTERNATIVE EVALUATION				
	Alternative 1 (T1-A3)	Alternative 2 (T2-A3)	Alternative 3 (T2-A4)	Alternative 4 (T4-A3)
Walking and Travel Distance (Distance/Time)	3,800'/18 min.	3,400'/18 min.	3,400'/18 min.	3,925'/23 min.
Vertical Movements (elevator or escalator)	3	3	3	5
Ease of Phasing for Construction	Easiest Phasing	Most Significant Phasing	Most Significant Phasing	Significant Phasing
Aircraft Taxi-Pushback Conflicts	4.5 min. per gate per day	4.5 min. per gate per day	4.5 min. per gate per day	3.3 min. per gate per day
Flexibility to Accommodate an Airline Hub or Focus City	Limited flexibility	Limited flexibility	Limited flexibility	Most flexibility
Ease of Constructing Gates to Accommodate New Entrants	All gate expansion is incremental	Some gate expansion is incremental	Some gate expansion is incremental	New concourse required for long-term gate additions
Ability to Expand Beyond the 20-Year Forecast	Expansion Potential	Expansion Potential	Expansion Potential	Expansion Potential
Ease of Public Transit Access	Moderate	Moderate	Moderate	Highest with separation at curbfront
Ease of Access and Wayfinding	Easiest	Easiest	More decision points with access changes	Moderate with curbfront split
Available Curbfront	Meets Requirements	Meets Requirements	Meets Requirements	Exceeds Requirements
Travel Time Between Terminal and Rental Cars	12 minutes	12 minutes	12 minutes	12 minutes
Ease of Terminal Ramp Access for Belly Cargo (Tug Distance)	4,600'	1,000'	5,200'	1,000'
Ease of Highway Access for Belly Cargo	Direct access from Crittenden Drive	Shared access with terminal traffic	Direct access from Crittenden Drive	Shared access with terminal traffic
Airfield Maintenance Access	Closest with midfield location	Closest with midfield location	Closest with midfield location	Farthest with existing location

Table 6.5-1 (Continued) Louisville International Airport SUMMARY OF ALTERNATIVE EVALUATION				
Airfield Security	Relocated Crittenden Drive separates public from aviation uses	Relocated Crittenden Drive separates public from aviation uses	Relocated Crittenden Drive separates public from aviation uses	Aviation uses separate public from airfield
Terminal Security	Interior security enhancements through retrofit	Additional security enhancements with parking and light rail farther from terminal	Additional security enhancements with parking and light rail farther from terminal	Interior security enhancements through new design
Anticipated Reduction in Vehicle Congestion (Air Quality)	Some reduction, no change in route distance	Some reduction, longest route	Highest reduction, shorter route	Some reduction, no change in route distance
Aircraft Noise	No difference in alternatives	No difference in alternatives	No difference in alternatives	No difference in alternatives
Land Acquisition	No further residential acquisition necessary	No further residential acquisition necessary	No further residential acquisition necessary	No further residential acquisition necessary
Alteration to Surface Transportation Patterns	Additional traffic on Phillips Lane	Additional traffic on Phillips Lane	Retains dedicated KFEC exit to I-264	Additional traffic on Phillips Lane
Concession Revenue Generation	High exposure/limited flexibility	Highest exposure/highest flexibility	Highest exposure/highest flexibility	Moderate exposure/duplication necessary
Maintains Currently Programmed Terminal Improvements	Long-term compatibility	Short-term compatibility only	Short-term compatibility only	Partial compatibility (landside)
Non-Aviation Revenue General Potential	Limited	7 acres in the terminal complex	7 acres in the terminal complex	Limited
Estimated Project Cost	\$714,387,000	\$900,930,000	\$970,447,000	\$993,484,000

Source: PB Aviation

time, total travel distance is separated into walking distance at 250 feet per minute and moving sidewalk distance at 120 feet per minute. For Alternative 1, the moving sidewalks between the parking structure and the terminal and in the terminal from security checkpoint to the rotunda area were assumed to remain in place. Alternatives 2 and 3 assume the inclusion of moving sidewalks in the walkway from the existing parking structure to the new landside terminal. Alternative 4 assumes that the moving sidewalks between the parking structure

and the terminal remains in place and that the walkway tunnels between the terminal and concourses are equipped with moving sidewalks.

Alternatives 2 and 3 have the shortest total travel distance at 3,400 feet, requiring approximately 18 minutes to traverse. This travel time is comparable to Alternative 1 because of the difference in moving sidewalk distance, which increases travel time. Alternative 4 would have a travel distance comparable to Alternative 1, but a longer travel time because of the moving sidewalk distance.

<p align="center">Table 6.5-2 Louisville International Airport COMPARISON OF WALKING DISTANCES AND TRAVEL TIMES</p>						
Alternative	Farthest Parking Space to Terminal (in feet)	Terminal Entrance to Farthest Gate (in feet)	Total Travel Distance (in feet)	Walk Distance (in feet)	Moving Sidewalk Distance (in feet)	Estimated Travel Time (in minutes)
1	1,400	2,400	3,800	3,250	550	18
2/3	2,150	1,250	3,400	2,400	1,000	18
4	1,400	2,525	3,925	2,250	1,675	23

Source: PB Aviation

6.5.2 Vertical Movements

The criterion for comparing vertical movements is the maximum number of such movements that the passenger may be subjected to for each alternative. These vertical movements are primarily by escalator, with a comparatively small number by elevator, and represent an interruption or change in transportation mode within the terminal. This change is not a desirable event in an airport environment where passengers flow in surges.

Alternative 4 would require the most number of vertical movements (five), primarily because of those required to descend/ascend from the underground walkway to the concourses. The maximum number encountered in Alternatives 2 and 3 is three vertical movements. Arriving passengers would move from the

concourse level to the baggage claim level, then to the second level walkway to the hotel and existing parking structure, followed by traveling to the desired floor of the garage. Alternative 1 is comparable in that three vertical movements are the maximum number anticipated: from the concourse level to the baggage claim level, from the baggage claim level to the existing underground walkway to the parking structure, and then to the desired floor of the structure.

6.5.3 Ease of Phasing for Construction

Each terminal alternative was evaluated for ease of phasing for construction or the extent to which improvements can be constructed without: 1) interfering with the ongoing operations of the Airport, or 2) requiring significant investment in order to maintain operations during construction of improvements.

Alternative 1 ranks the highest for ease of construction phasing. The existing support facilities and rental car pickup/return parking adjacent to the landside terminal would require relocation prior to landside terminal expansion. Construction of the landside terminal could take place without disruption of the existing terminal. The design of the existing terminal curbside will allow the extension to be constructed with little impact on curbside capacity. The concourse extensions associated with this alternative would require minor changes in aircraft traffic flows during construction, but like the landside terminal, could be completed with minor impacts. The major access improvement, the ramp from Phillips Lane and KFEK to I-264 eastbound, would require lane closures and intermittent full road closures for installation of bridge components.

Alternative 4 ranks second for the construction phasing criterion. The expansion of the landside terminal on the south side would require modifications to the interior of the existing terminal and more attention to the maintenance of passenger flows where the terminal would be constructed in place of the existing concourse walkway past security. The underground walkways to the concourses

would require portions of the aircraft apron to be closed for extended periods of time, requiring modifications to aircraft parking configurations and taxi flows.

Construction phasing becomes increasingly difficult with Alternatives 2 and 3, with the difference between these alternatives being access improvements. Both have the same issues with regard to the terminal reconfiguration. The existing landside terminal will have to be fully operational until the time that the new landside terminal is complete. To achieve this and maintain access to the concourses would require the construction of the concourse extensions as the initial phase of construction. The overhead walkway that would ultimately connect the existing parking garage to the new landside terminal would be the next phase of construction, and would provide access from the existing landside terminal, allowing the existing concourse "Y" to be demolished and construction to proceed on the new landside terminal and two-level access roadway. Once that construction is complete, terminal operations would transition to the new landside terminal and the existing landside terminal would be demolished.

During the transition period where the overhead walkway serves as the access from the landside terminal to the concourses, the security checkpoint would have to operate from the corner of the terminal from which that walkway would extend.

Alternative 2 has the same access improvement and minor maintenance of traffic issues as the previous alternatives with the A3 scheme. Alternative 3, however, is much more complex because of the scope of improvements. The system of new ramps and access points would require additional maintenance of traffic, both on I-264 and within the terminal area.

6.5.4 Aircraft Taxi-Pushback Conflicts

Aircraft taxi-pushback conflicts occur in the terminal area when aircraft pushing back from the gate (for departure) cause interruptions to other aircraft taxiing to or from a gate along the apron taxilane. A constrained terminal environment with limited taxi routes and high numbers of aircraft movements in the terminal area can lead to taxi-pushback conflicts. This criterion is evaluated with SIMMOD, the airfield simulation model used to estimate airfield and airspace delay (described in detail in *Chapter 4.0, Airfield Capacity*). Each terminal configuration was simulated using the 24-hour aircraft schedule developed for the aviation demand projections that are presented in Chapter 3.0. The model identifies taxi-pushback conflicts and provides output in number of minutes aircraft are delayed.

Alternatives 1, 2 and 3 had comparable taxi-pushback conflict delay times, averaging 4.5 minutes per gate per day. Alternative 4 ranks considerably higher, with average daily per gate delay of 3.3 minutes, primarily because of the taxi-through capabilities between the landside terminal and concourse and between the two concourses. These comparisons assume that each gate is used six times per day. Consequently, the average delay per aircraft is minimal. This favorable result is expected because each alternative is designed to accommodate the required number of gates.

6.5.5 Flexibility to Accommodate an Airline Hub or Focus City Operation

This criterion compares the ability of the terminal layout to accommodate an airline hub or focus city operation. The aviation market is dynamic and the ability to respond with such facilities is important. Each alternative is looked at in terms of how efficiently a hub or focus city could operate, particularly the ability to have gates in close proximity so that transfer time for passengers changing planes is minimized.

Alternatives 1, 2 and 3 could accommodate a small airline hub or focus city reasonably well because the concourse extensions could be dedicated to a single user whose traffic is split between origin/destination passengers and transfer passengers. However, Alternative 4 would best serve a hub or focus city operation larger than eight to ten gates. The second concourse could be dedicated to that larger operation and would allow very reasonable walk distances between gates for transfer passengers. Typically, hubs operate in “banks” of aircraft arriving in a short time period, allowing passengers to transfer, and departing in a second short time period. Alternative 4 would provide flexibility in aircraft taxiing, with dual taxilanes between the concourses. This would allow two-directional taxiing along the concourse, whereas the other alternatives require aircraft to taxi around the concourse to proceed to the opposite runway.

6.5.6 Ease of Constructing Gates to Accommodate New Entrants

The availability of aircraft gates is often cited as a limiting factor for an airline attempting to start service in a new city. This criterion evaluates each alternative’s ability to quickly construct new gates for additional air service if the need arises.

Because gate additions are made by extending the existing concourses in Alternative 1, this alternative ranks the highest in the ability to add gates for new entrants. Alternatives 2 and 3 also rank high, as the concourse extensions included in these alternatives can be constructed prior to the time demand would require the construction of the new landside terminal. Alternative 4 ranks the lowest of the alternatives, as it is cost-prohibitive in providing gates for new entrants. The reason for this ranking is that as the extensions to the first concourse are built out, the ability to incrementally expand the concourse will require the construction of the second concourse and associated underground

walkway. Thus, the construction of these gates would be more expensive than the previous incremental expansion.

6.5.7 Ability to Expand Beyond the 20-Year Forecast

The Master Plan Update is focused on the 20-year horizon for planning airport facilities. However, it is important to provide expansion capability beyond that time period, if required. Each alternative is ranked according to its ability to expand to meet long-term demand.

All of the alternatives rank relatively the same for expansion capabilities. Alternative 1 could be expanded by further extending the landside terminal to the west and constructing a second concourse and gates. Alternatives 2 and 3 could be expanded by construction of two “L” concourses running south from the existing landside terminal or by construction of a second concourse similar to Alternative 4. Alternative 4 is expandable by extending the concourse for additional gates and extending the landside terminal to the east for additional ticketing and baggage claim facilities.

6.5.8 Ease of Public Transit Access

As presented in the description of the detailed alternatives, a Light Rail Transit (LRT) line to the Airport is under consideration. Because all alternatives include the LRT station at the terminal, the ease of LRT access is equal among alternatives.

For conventional public transportation, including scheduled bus service and hotel shuttles, Alternative 4 ranks higher than the other alternatives, because the separation of traffic between curbside areas would make access to the curbside less congested. In this alternative, private vehicles would operate on a curbside separate from that used by commercial vehicles and public transportation.

6.5.9 *Extent of Access and Wayfinding*

This criterion is intended to assess both the relative amount of additional signage required to guide motorists destined for the Airport to the appropriate location and the corresponding confusion that may result from the number of decision points along the route. In Alternatives 1 and 2, travel from I-65 and I-264 to the terminal curbside and parking would remain relatively unchanged, and the decision points for travel to parking and either level of the terminal curbside, although relocated, would not require additional signage.

Alternative 4 ranks slightly lower than 1 and 2 because of additional signing required approaching the terminal to separate commercial vehicles and private vehicles to their respective curbsides on each side of the terminal.

Alternative 3, with a new access system, would require additional signing for traffic exiting the terminal area, as the decision point for I-264 eastbound, I-65 north and southbound and returning to the terminal would be located in the terminal area rather than on the existing C/D road. Leaving the terminal, drivers would have approximately 800 feet in which to select the appropriate lane to exit the Airport. This alternative ranks the lowest in signing required.

For all alternatives, additional signage would be required for rental car pickup and return with the proposed location. Drivers returning rental cars would have two options for proceeding to the rental car return area: proceed directly to the rental car area to drop the car and continue to the terminal via shuttle bus, or drop off passengers at the terminal before proceeding to the rental car area for return. Therefore, appropriate signage must be in place: 1) on I-264 eastbound and westbound, informing drivers to proceed to the Crittenden Drive exit for rental car return, and 2) from the terminal exit roadways to the I-264 frontage road to Crittenden Drive for rental car return.

6.5.10 Available Curbfront

The available curbfront criterion compares alternatives in their provision of curbfront access to the private vehicles, taxis, commercial, hotel, and rental car shuttle buses, and tour buses. All alternatives would provide the 20-year curbfront requirement. However, Alternative 4 would provide much more flexibility in curbfront use, as the split curb on both sides of the terminal allows private vehicles to operate on one side of the terminal while commercial vehicles (which typically require more curb space to maneuver and have longer dwell times at the curb) operate on the other side. Arrival and departure curbs would be on separate levels in this alternative.

6.5.11 Travel Time Between Terminal and Rental Cars

Travel time to rental cars is an important criterion in passenger convenience. Shuttle bus travel time to the rental car facility was calculated for each of the alternatives by measuring the distance required by the route and applying an average speed (20 mph) to pass from the rental car center through the Crittenden Drive interchange and across Martha Maloney Drive to the terminal. All of the alternatives were comparable, with travel times of 12 minutes.

6.5.12 Ease of Terminal Ramp Access for Belly Cargo

This criterion ranks each alternative for its ease of access to the terminal from cargo and USPS facilities. This is an important consideration, as inefficiencies in belly hold operations will result in lower yields for the airlines and a delay in loading cargo will cause a delay in passenger operations.

For all alternatives, the USPS facility would function as it does currently, with access to the terminal ramp through a secure tug road with a tunnel under

Crittenden Drive. At the point when Crittenden Drive is relocated, a new tunnel would have to be constructed to maintain this access. Alternatives 2 and 4 rank the highest for this criterion, because the cargo building remains in its current location, with an average 1,000-foot tug distance to the terminal. Alternatives 1 and 3 rank lower, because the new location would require a longer tug distance to the terminal at 4,600 feet and 5,200 feet, respectively.

6.5.13 *Ease of Highway Access for Belly Cargo and Mail*

Like the need for access to the terminal ramp, cargo operators require access from the cargo buildings to the highway. Because the Airport is located at the interchange of I-65 and I-264, ease of access for each alternative is based on moving from the Interstate system to the belly cargo building.

Alternative 1, 3, and 4 rank the highest for this criterion, because the cargo location is accessed from the Crittenden Drive interchange, with limited city driving distance. Alternative 2 ranks lower, because although the location of the cargo building is unchanged, trucks have to enter the terminal area.

6.5.14 *Airfield Maintenance Access*

This criterion ranks the ability of airfield maintenance to access the airfield to perform maintenance and snow removal operations. The movement of large equipment from the existing maintenance facility to the airfield requires the closure of a portion of Crittenden Drive. Alternatives 1, 2, and 3 include a satellite airfield maintenance facility located near mid-field and rank the highest for this criterion. Alternative 4 would retain all maintenance operations at the existing location, and therefore ranks lower.

6.5.15 Airfield Security

Following the events of September 11, 2001, security at airports is evolving at a rapid pace. The purpose of this criterion is to identify potential changes to airfield security due to changes in surrounding land use and development, and to rank the alternatives accordingly.

With the exception of the improvements proposed on the west side of the airfield, the existing configuration would remain essentially as it is today. In all four alternatives, aviation-related land uses are proposed on the west side with access to the airfield. Alternatives 1, 2, and 3 would relocate Crittenden Drive to the west, along the CSX rail lines, passing under the Watterson and then turning back to its present location north of the interchange. Alternative 4 would relocate Crittenden Drive to the west, but leave aviation-related development between the new alignment and the rail lines.

All four alternatives offer an improvement to security on the west side of the airfield by moving non-secure, public uses further from the flight line. Alternatives 1, 2, and 3 rank slightly higher than Alternative 4, because Crittenden Drive would be relocated further to the west, and this would allow the U.S. Postal Service facility to be part of a contiguous secure area.

6.5.16 Terminal Security

Because security regulations are currently in flux and likely to change over the 20-year planning horizon, specific security enhancements are not included in the Master Plan Update. The purpose of this criterion is to evaluate the alternatives regarding their ability to adapt to changing regulations and future security requirements.

Alternatives 2 and 3 rank the highest for this criterion, because the relocation of the ticketing and baggage claim portions of the terminal would allow security elements to be designed into the original construction. Additionally, the location of future parking in these alternatives would meet future setback requirements from the terminal. Alternatives 1 and 4 rank lower because the terminal addition would allow for security elements to be included in the design, but the existing terminal would require retrofit improvements to meet requirements.

6.5.17 Anticipated Reduction in Vehicle Congestion (Air Quality)

As described in Chapter 5.0, vehicle congestion in the terminal area is not projected to be serious problem. However, during peak periods of exiting traffic from KFEC traveling to I-264 and I-65, impacts to terminal traffic would result.

Alternative 3 ranks the highest for reduction of vehicle congestion and associated air quality impacts, because of the separation of traffic flows. Additionally, this alternative would shorten the distance required to reach I-264 and I-65 from the terminal. In Alternative 2, traffic exiting the terminal would travel approximately 6,100 feet from the terminal to the I-65/I-264 split on the C/D road. Alternative 3's new system of ramps would shorten that distance to approximately 2,400 feet, a difference of 3,700 feet or 0.7 miles. Alternatives 1 and 4 rank the next highest for this criterion, because of the separation of traffic from KFEC with no improvement in travel distance for terminal traffic. Alternative 4 ranks the lowest because the distance between the terminal and the I-264/I-65 split, as described above, is the longest of the alternatives.

6.5.18 Aircraft Noise

The aircraft noise criterion is used to compare the differences between the alternatives regarding noise impacts. However, the four alternatives have common airfield improvements with the addition of overruns on Runway 17R/35L

and several taxiway additions and modifications. Therefore, for the aircraft noise criterion, the alternatives share an equal rank. In the environmental overview element of the Master Plan Update the 2020 noise contours will be prepared to incorporate the infrequent use of overruns on Runway 17R/35L by select aircraft enroute to long-haul destinations such as the Pacific Rim. The 2020 noise contours will be compared to the 2006 noise contours.

6.5.19 Land Acquisition

Each alternative includes the same land acquisition requirements, primarily related to aviation-related development opportunities rather than expansion to provide the facilities required to meet aviation demand. The only exception is the area identified for the rental car ready/return center and the LRT station; this area is composed of undeveloped parcels adjacent to a railroad spur. The alternatives are therefore ranked equally for this criterion. All of the areas identified are commercial or industrial land uses, and no residential property would be acquired.

Once the preferred alternative is selected, the environmental overview element of the Master Plan Update will quantify the number of properties to be acquired for long-term aviation development south and west of the existing Airport property. This study will not quantify or depict land acquisition necessary for noise mitigation as determined in the ongoing Part 150 Study.

6.5.20 Alterations to Surface Transportation Patterns

The criterion relates to the alteration of surface transportation patterns and ranks the alternatives on the extent to which they significantly alter traffic on local roads.

The primary difference between the alternatives is terminal access. Alternative 3 ranks higher than the other alternatives because KFEC traffic would continue to use its direct access ramp to the I-264. The other three alternatives would alter the local traffic pattern slightly, with additional traffic on the segment of Phillips Lane between the KFEC exit and the flyover ramp to I-264. Local traffic on Phillips Lane between Preston Highway and Crittenden Drive would encounter more KFEC traffic along Phillips Lane associated with KFEC.

To provide airfield access for long-term aviation development west of Crittenden Drive, each alternative depicts Crittenden Drive relocated to the west of its existing alignment. A connector ramp is included to maintain traffic flows from Crittenden Drive to Woodlawn Avenue on the west side of the CSX railroad line. As aviation-related uses are developed south of the Airport, Grade Lane would need to be relocated to provide taxiway access. A relocated Grade Lane is shown connecting Crittenden Drive to the Outer Loop. This would provide a continuous route between I-264 and the Outer Loop.

6.5.21 Concession Revenue Generation

This criterion ranks the alternatives on the potential impacts to concession revenue generation in the terminal. While the ultimate terminal expansion design will include a detailed concessions program analysis, it is an important consideration at the master plan level. Each terminal concept offers a differing level of exposure to concessions, and revenue generation relates to the number of people passing concessions, so a high concentration is desirable.

Alternatives 2 and 3 rank the highest for this criterion for two reasons. First, the terminal design is flexible, allowing a central concessions area to be located on either side of the security checkpoint. If, at the time the new landside terminal is constructed, the Airport is operating as a hub or focus city, the concentration of concessions beyond security to take advantage of transfer

passenger flows could be considered. The second reason for this ranking is that with concessions concentrated before or after security, exposure is maximized, as all O&D passengers would travel through that area toward the gates.

With the next highest ranked alternative, Alternative 1, all passengers would pass through the concessions area in the landside terminal. With the exception of passengers using the five-gate concourse adjacent to the landside terminal, all passengers would pass through the rotunda concessions area.

Alternative 4 ranks the lowest for this criterion. The passenger concentration for concessions located in the landside terminal would continue to offer the same exposure as it does today. However, passengers moving between the landside terminal and the future second concourse via the underground walkway would not pass through any concessions in the first concourse. Therefore, a duplication of concessions would be required.

6.5.22 Maintains Currently Programmed Terminal Improvements

Two terminal improvement projects have been planned for implementation in the near-term: a terminal interior renovation and regional jet holdrooms and gates. This criterion ranks the alternatives to the extent that those improvements are retained for their useful life.

Alternative 1 ranks the highest, because the 20-year terminal expansion includes the continued use of the existing terminal and concourse expansion would not result in impacts to the location of the regional jet gates. Alternative 4 ranks second, because improvements to the concourses and the regional jet gates would result in impacts from the concourse and gate construction. However, the landside improvements to ticketing and baggage claim would not be subject to severe impacts from the landside expansion. Alternatives 2 and 3 rank the lowest, because they would only be compatible with the programmed

improvements over the short-term. Major terminal reconfiguration ultimately would require the demolition of much of the existing terminal.

6.5.23 *Non-Aviation Revenue General Potential*

The non-aviation revenue generation potential judges each alternative's ability to provide opportunities for supplemental growth. As all of the alternatives are similar in their provision of flexible long-term development west and south of the Airport, this criterion is based on opportunities provided within the terminal area.

Alternatives 2 and 3 rank higher than the other two alternatives because of the area made available with the reconfiguration of the terminal. These alternatives would offer approximately 7 acres of revenue-generating space in a high-visibility area. Potential uses include corporate office space, hotel and conference facilities, or restaurant and lounge establishments.

6.5.24 *Estimated Project Cost Estimates*

A comparative evaluation of the project cost estimates for the four alternatives indicates that substantial investment is required over the 20-year planning horizon to expand Airport facilities to accommodate future demand levels. **Table 6.5-3** compares the project estimates for the alternatives and indicates that total costs range from \$714 million to \$993 million. The comparative estimates are based on 2001 dollars and include allowances for engineering design, program management and construction management, testing, insurance, and contingencies.

<p align="center">Table 6.5-3 Louisville International Airport PROJECT COST ESTIMATES</p>				
	Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Airfield	\$114,255,000	\$118,484,000	\$118,478,000	\$131,962,000
Terminal	\$320,354,000	\$465,011,000	\$464,990,000	\$610,722,000
Access	\$31,699,000	\$31,365,000	\$100,822,000	\$31,699,000
Parking and Rental Car	\$148,158,000	\$186,221,000	\$186,212,000	\$147,968,000
Support Facilities	\$99,921,000	\$99,950,000	\$99,945,000	\$75,218,000
TOTAL	\$714,387,000	\$900,930,000	\$970,447,000	\$993,484,000
Note: Planning level cost estimates include construction design, PM/CM, testing, insurance, and contingencies.				

Source: PB Aviation

Airfield estimates do not vary significantly because the improvements were similar for the four alternatives. The primary difference in the costs is related to the amount of apron pavement required for the various terminal layouts.

The terminal estimates vary significantly in cost for the alternatives: Alternative 1 at \$320 million, 2 and 3 at \$465 million, and 4 at \$611 million. Relocation of the landside terminal in the T2 alternatives is the primary difference for the increase over Alternative 1, where the existing landside terminal would be retained. The second concourse and required underground walkway contributes significantly (approximately \$125 million) to the difference in terminal cost for Alternative 4.

Access cost estimates were comparable for Alternatives 1, 2, and 4, which shared the ramp from KFEC and Phillips Lane, along with the Crittenden Drive relocation and the Crittenden-Woodlawn connector. All three were in the \$22 million to \$31 million range. Given the level of ramp modifications and additions in Alternative 3, it is not surprising that this alternative's access cost would be \$101 million, or over three times that of the other alternatives.

Support facilities cost estimates, including cargo/freight forwarders building, flight kitchen, airline maintenance, general aviation ramp and hangars, fuel farm, and airport administration building are comparable at \$99 million for Alternative 1, 2, and 3. Alternative 4 is less costly at \$75 million because it would retain the existing cargo facilities. Flight kitchen and airline maintenance facilities would be retained at their existing location.

In conclusion, Alternative 1 clearly ranks the highest for this criterion because it has the lowest overall capital cost. Alternatives 2 and 4 rank next highest with comparable estimated cost. Alternative 3 ranks the lowest as it has the highest estimated cost.

6.6 Selection of Preferred Alternative

The four alternatives and the comparative evaluation were presented to the Technical Work Group (TWG) for input regarding the alternatives and the evaluation criteria. The TWG indicated those evaluation criteria that were most important in determining a preferred alternative. The criteria selected as most important and the corresponding comparison are presented in **Table 6.6-1**.

The alternatives and comparative evaluation were also presented at a public workshop held in February 2002. Comments were received regarding the alternatives and were taken into consideration in the selection of the preferred alternative.

Based on the comparative evaluation, TWG input, and public response from the workshop, Alternative 1 is recommended as the preferred development plan for the Airport. Alternative 1 is clearly the highest ranking in terms of construction phasing, ease of constructing gates to accommodate new entrants to the market, maintaining currently programmed terminal improvements, and estimated project cost. Alternative 1 also ranked high in ease of public transit access, ease of access and wayfinding, and ease of highway access for belly cargo.

<p align="center">Table 6.6-1 Louisville International Airport KEY ALTERNATIVE EVALUATION CRITERIA</p>				
	Alternative 1 (T1-A3)	Alternative 2 (T2-A3)	Alternative 3 (T2-A4)	Alternative 4 (T4-A3)
Ease of Phasing for Construction	Easiest Phasing	Most Significant Phasing	Most Significant Phasing	Significant Phasing
Flexibility to Accommodate an Airline Hub or Focus City	Limited flexibility	Limited flexibility	Limited flexibility	Most flexibility
Flexibility to Accommodate an Airline Hub or Focus City	Limited flexibility	Limited flexibility	Limited flexibility	Most flexibility
Ease of Constructing Gates to Accommodate New Entrants	All gate expansion is incremental	Some gate expansion is incremental	Some gate expansion is incremental	New concourse required for long-term gate additions
Ease of Public Transit Access	Moderate	Moderate	Moderate	Highest with separation at curbfront
Ease of Access and Wayfinding	Easiest	Easiest	More decision points with access changes	Moderate with curbfront split
Ease of Highway Access for Belly Cargo	Direct access from Crittenden Drive	Shared access with terminal traffic	Direct access from Crittenden Drive	Shared access with terminal traffic
Airfield Security	Relocated Crittenden Drive separates public from aviation uses	Relocated Crittenden Drive separates public from aviation uses	Relocated Crittenden Drive separates public from aviation uses	Aviation uses separate public from airfield
Terminal Security	Interior security enhancements through retrofit	Additional security enhancements with parking and light rail farther from terminal	Additional security enhancements with parking and light rail farther from terminal	Interior security enhancements through new design
Anticipated Reduction in Vehicle Congestion (Air Quality)	Some reduction, no change in route distance	Some reduction, longest route	Highest reduction, shorter route	Some reduction, no change in route distance
Alteration to Surface Transportation Patterns	Additional traffic on Phillips Lane	Additional traffic on Phillips Lane	Retains dedicated KFEC exit to I-264	Additional traffic on Phillips Lane
Maintains Currently Programmed Terminal Improvements	Long-term compatibility	Short-term compatibility only	Short-term compatibility only	Partial compatibility (landside)
Estimated Project Cost	\$714,387,000	\$900,930,000	\$970,447,000	\$993,484,000

Source: PB Aviation

Note: Blue indicates highest ranking.

In terms of flexibility to accommodate an airline hub or focus city, the TWG noted that the Airport has the flexibility with Alternative 1 to incorporate elements of Alternative 4, if necessary, to meet the needs of such a scenario.

Each alternative included three options for the location of an aircraft run-up pad, or a designated location where aircraft engines are tested during maintenance. Option 1 would locate the run-up pad between the parallel runways, north of Runway 11/29. Option 2 would locate this facility south of Runway 11/29 between Taxiway F and the UPS sort facility. Finally, Option 3 would locate the run-up pad on the west side of Runway 17R/35L, on the Brown Foundation property.

The selection of a preferred run-up pad location is based on proximity to sensitive land uses and the number of runway crossings required to reach the runup pad from UPS (the primary aircraft maintenance operation at the Airport), in order to minimize the potential for runway incursions. Based on these criteria, Option 2 is the recommended location for the aircraft engine run-up pad. This location requires no runway crossings and its midfield placement would reduce the potential impact on residential land uses west of the Airport. Option 1 would also minimize potential noise impacts, but would require one runway crossing. Option 3, on the west side, is closer to sensitive land uses and would require a runway crossing.

Based on the results of the comparative evaluation, Alternative 1 will be the focus of the remainder of the Master Plan Update. A capital improvement plan (CIP) will be developed that ties the need for facilities directly to activity levels. An environmental review will be conducted to identify those projects that will require more detailed environmental assessments, and the Airport Layout Plan (ALP) will be prepared for submittal to the FAA.

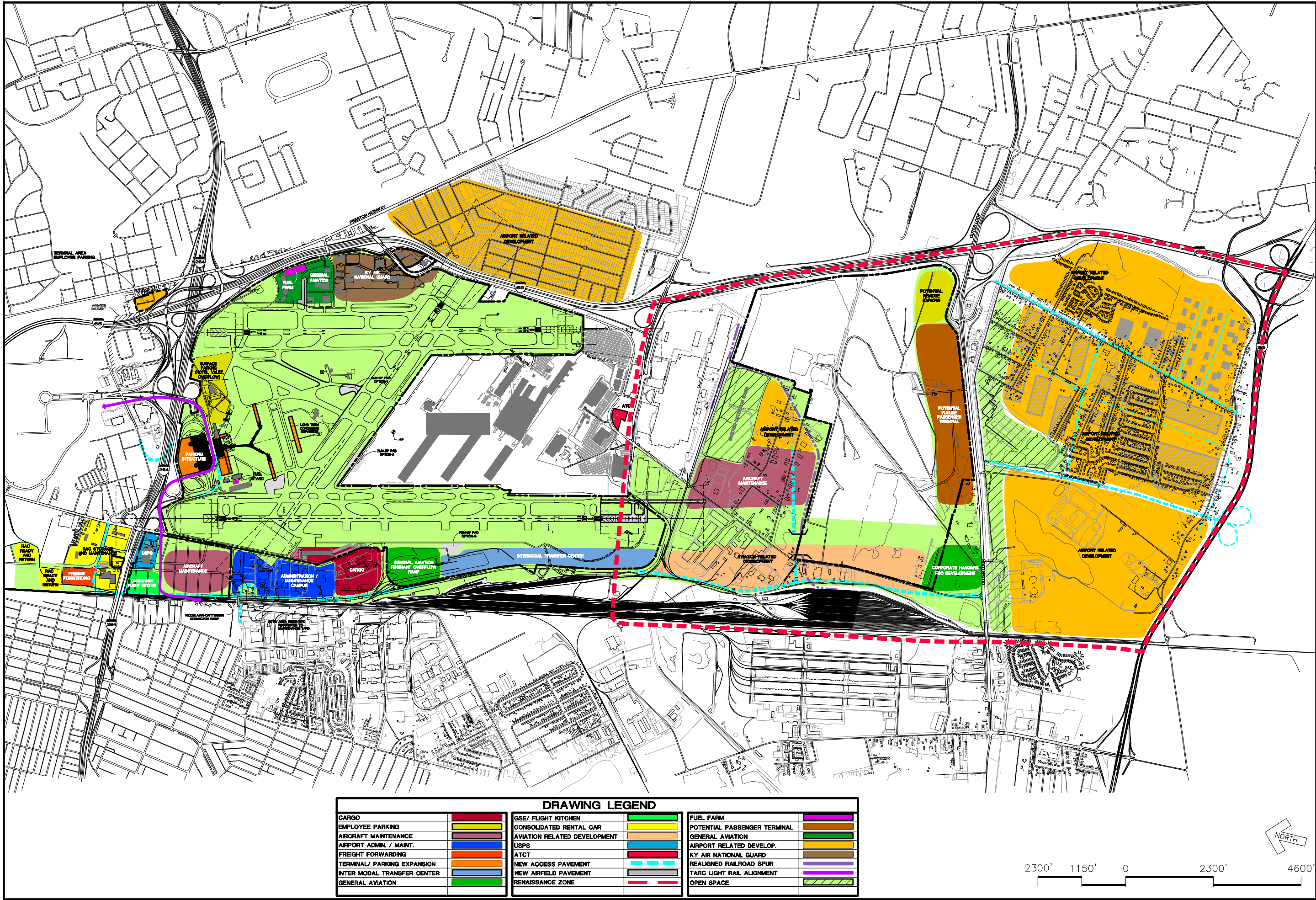
7.0 ENVIRONMENTAL REVIEW

This chapter presents an environmental overview that describes the existing environmental conditions at and around Louisville International Airport and the potential environmental impacts, environmental issues, and environmentally sensitive areas that may be affected by the Preferred Alternative. **Exhibit 7.0-1** presents the Preferred Alternative described in detail in Chapter 6.0, *Alternatives Identification and Evaluation*. This overview provides a preliminary indication of the environmental factors involved with the implementation of the Preferred Alternative, but does not provide a complete investigation sufficient for obtaining environmental permits or compliance with environmental documentation under the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended.

Previous environmental documentation was reviewed and the relevant environmental regulatory agencies were contacted and consulted to identify potential impacts related to the implementation of the Preferred Alternative. The environmental impact categories are based on guidelines provided in the *FAA Order 50504.A, Airport Environmental Handbook*. The purpose of this review is to identify projects that can be categorically excluded, and identify those projects that will require an Environmental Assessment (EA) or an Environmental Impact Statement (EIS).

The environmental categories examined in this chapter are:

- *Aircraft Noise*
- *Compatible Land Use*
- *Social Impacts*
- *Induced Socioeconomic Impacts*
- *Air Quality*
- *Water Quality*
- *DOT Act, Section 303(c) (formerly Section 4(f))*
- *Historic, Architectural, Archeological, and Cultural Resources*



- *Biotic Communities (including flora and fauna)*
- *Endangered and Threatened Species of Flora and Fauna*
- *Wetlands*
- *Floodplains*
- *Coastal Zone Management*
- *Coastal Barriers*
- *Wild and Scenic Rivers*
- *Prime and Unique Farmland*
- *Energy Supply and Natural Resources*
- *Light Emissions*
- *Solid Waste Impact*
- *Construction Impacts*
- *Hazardous Materials*
- *Environmental Justice.*

7.1 Noise

Simply defined, sound is the sensation perceived by the sense of hearing. Sound may be considered beautiful, desirable, or unwanted, depending on the listener's point of view. The undesirable sound is considered noise. An airport sound environment is comprised of a series of individual aircraft operations. These operations may occur frequently or there may be a relative quiet between events, reflecting the ambient (background) noises comprised of various noises throughout the community.

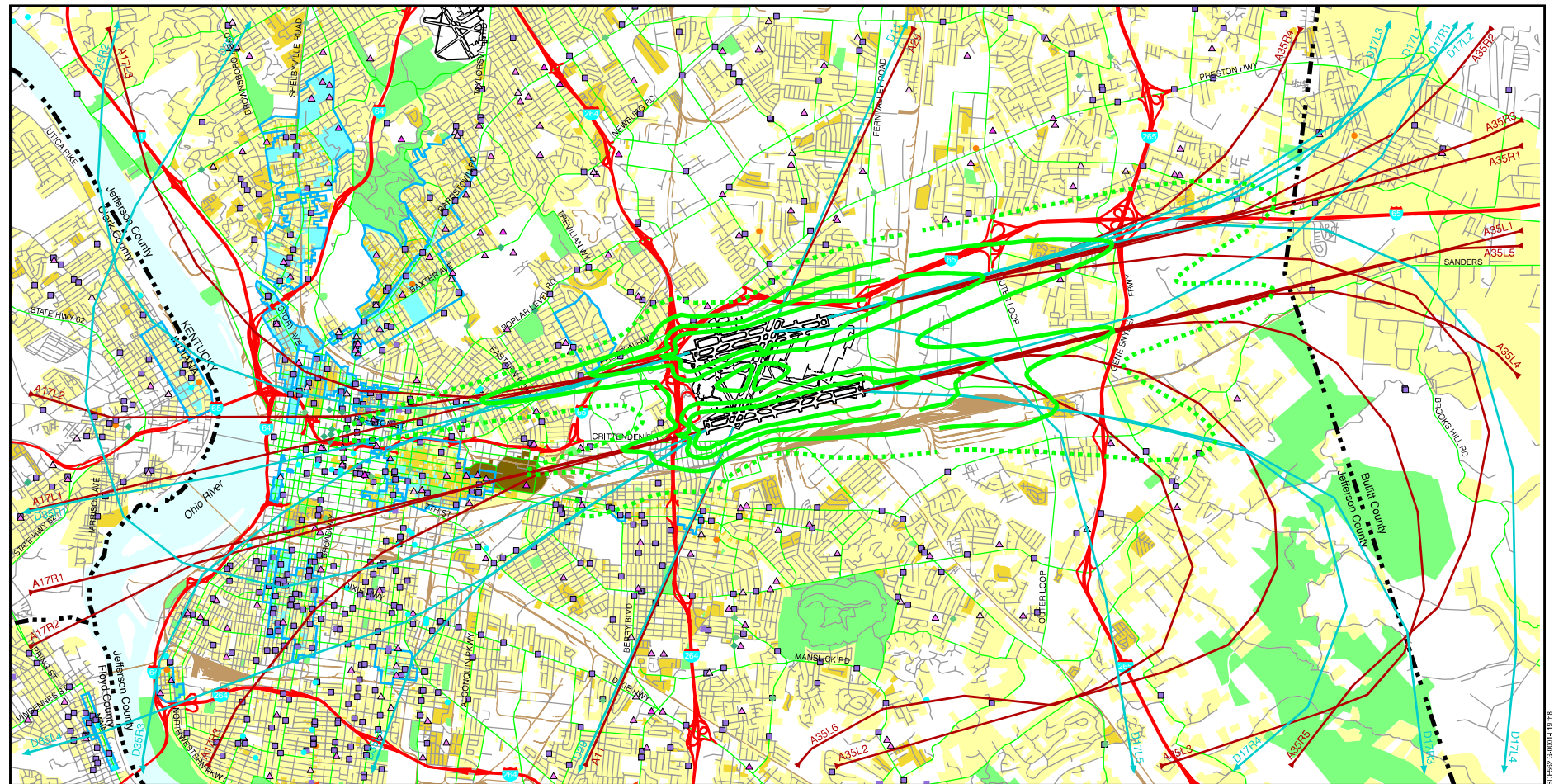
The effect of aircraft noise on people who live and work near airports is an issue of national concern. Expansion of U.S. airports to meet growing transportation demands, combined with increased residential development in many communities, has created the need to coordinate airport planning with community development planning.

Federal Aviation Regulation (FAR) Part 150, *Airport Noise Compatibility Planning*, was enacted in 1984 to require airport operators to work with their surrounding communities to address the noise impacts of aircraft operations. FAR Part 150 established a single system for determining the exposure of people to noise, as well as a standardized noise compatibility planning program. The Part 150 process is structured around the development of two key study products: Noise Exposure Maps (NEMs), which depict existing and future aircraft noise levels around the airport, and a Noise Compatibility Program (NCP), which sets forth recommended measures to reduce noise and increase airport/land use compatibility.

The Master Plan Preferred Alternative will not appreciably change the existing noise impacts of the Airport, because no new runways are being constructed, and the landing thresholds do not change with the construction of the paved overruns. Therefore, for reference purposes, the NEM and the NCP elements of the recent Part 150 Study are presented to recognize the overall noise impact of the Airport and the proposed plan to mitigate that impact.

7.1.1 Noise Exposure Maps (NEMs)

The Regional Airport Authority (RAA) is currently in the process of undergoing a Part 150 Study and updating its NEM. The NEMs used in the Part 150 Study depict the existing conditions (2002) as well as the future conditions (2007), as shown on **Exhibit 7.1-1** and **Exhibit 7.1-2**. The 2002 NEM is based on actual aircraft operations through the end of 2001¹. The operations were reviewed with respect to the effects of September 11, 2001 and other factors affecting air transportation in the last quarter of 2001. The base case scenario (2005) used in the current Part 150 Study is the 2003 existing conditions with no mitigation measures enforced.



LEGEND

- Single family residential land use
- Multi-family residential land use
- Preschool/school/university
- Hospital/nursing homes
- Library
- Historic site
- Historic district
- Park
- Religious facility
- University of Louisville
- Noise contour
- DNL = Day-night average sound level
- Generalized departure flight track
- Generalized arrival flight track
- State/county boundary

Note: Blue shaded areas within historic district are developed as non-residential, non-recreational land use.

Sources: Base Map—Skees Engineering, Inc.
Land Uses and Noise Sensitive Facilities—Compiled and updated by HNTB Corporation, July 1999.
Noise Contours—Leigh Fisher Associates, August 2002.

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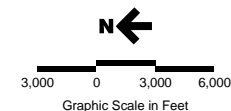


Figure 10-1
NOISE EXPOSURE MAP—2003
FAR Part 150 Noise Compatibility Study
Louisville International Airport
August 18, 2002

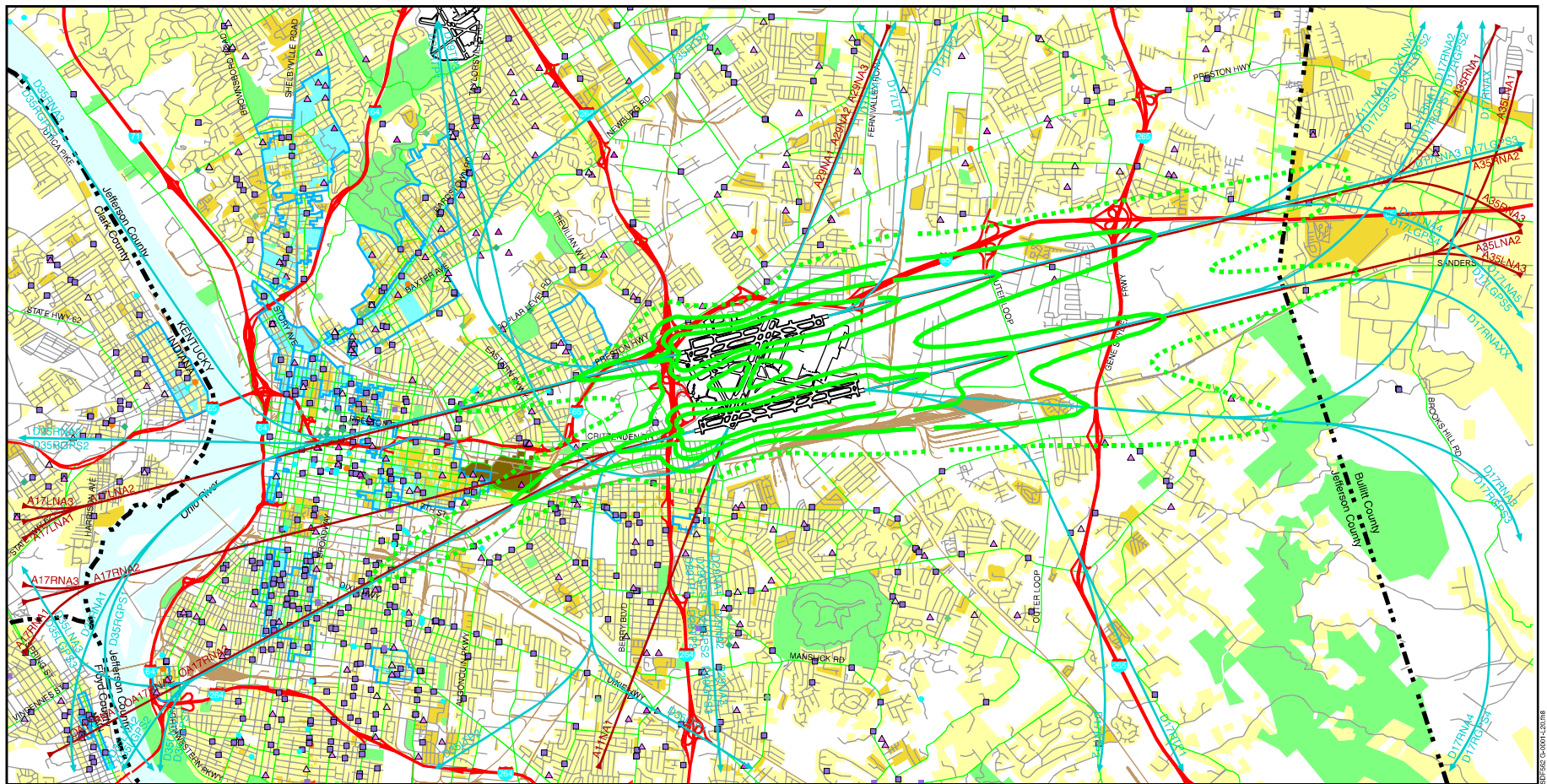


Louisville International Airport Master Plan Update

2003 NEM

EXHIBIT

7.1-1



LEGEND

- Single family residential land use
- Multi-family residential land use
- Preschool/school/university
- Hospital/nursing homes
- Library
- Historic site
- Historic district
- Park
- Religious facility
- University of Louisville
- Noise contour
- DNL = Day-night average sound level
- Generalized departure flight track
- Generalized arrival flight track
- State/county boundary

Note: Blue shaded areas within historic district are developed as non-residential, non-recreational land use.

Sources: Base Map—Skees Engineering, Inc.
Land Uses and Noise Sensitive Facilities—Compiled and updated by HNTB Corporation, July 1999.
Noise Contours—Leigh Fisher Associates, December 2002.

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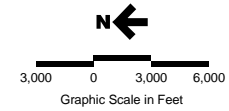


Figure 10-2
NOISE EXPOSURE MAP—2008
FAR Part 150 Noise Compatibility Study
Louisville International Airport
December 17, 2002



Louisville International Airport Master Plan Update

2008 NEM

EXHIBIT

7.1-2

7.1.2 Noise Compatibility Program (NCP)

The second key study element of a Part 150 Study is the NCP. Under the provisions of the FAR Part 150, the NCP is intended to eliminate or reduce noncompatible land uses identified in the NEM, which depicts the existing and the future noise exposure conditions and identifies noncompatible land uses around an airport. The NCP is based upon data for current air traffic and runway usage as well as projections for future aircraft traffic.

Under the provisions of FAR Part 150, the NCP's goal is to achieve elimination or reduction of noncompatible land use in existing and future conditions. The current Part 150 Study recommends 41 noise compatibility measures for implementation in the NCP. They are:

- Noise abatement measures (18 total)
- Noise mitigation measures (17 total)
- Program management measures (6 total).

Noise abatement measures refer to strategies to reduce or eliminate aircraft noise at the source. Typically, these are altering aircraft operations procedures or changes to facilities at the airport. The current Part 150 Study's 18 recommended noise abatement measures include air traffic control measures, approach and departure procedures, operator procedures, and airport policies and regulations. Examples of several noise abatement measures are:

- Maintain South Flow Runway Preference (day)
- Reverse East-West Runway Preference (day and night)
- Morning North Flow Runway Preference
- Southbound Divergence by Destination
- Offset Arrival/Departure Runway 17R/35L
- Arrival/Departure Tracks for Large Aircraft.

Noise mitigation measures are intended to remedy aircraft noise exposure in noise-sensitive areas and to minimize the development of noise-sensitive land uses within areas exposed to significant levels of aircraft noise. A standard threshold level of 65-decibel average Day Night Level (DNL) has been established by the FAA as a means to determine whether noise mitigation measures may be appropriate. Examples of noise mitigation measures include remedial measures, preventive measures, and compensatory measures. These measures include:

- Current Voluntary Acquisition Program
- Expanded Voluntary Acquisition Program
- Residential Soundproofing (DNL 65+)
- Institutional Soundproofing (DNL 65+)
- Residential Sales Assistance (DNL 65+)
- Compatible Land Use Planning
- Conventional Zoning
- Subdivision Regulations
- Avigation Easements (DNL 65+)

Program management measures supplement and enhance noise abatement measures and noise mitigation measures by providing noise abatement staff, stakeholder involvement, noise monitoring, flight tracking systems, and public information programs.

7.2 Compatible Land Use

A land use compatibility assessment determines the suitability of existing and planned land uses in the vicinity of the Airport as it relates to noise impacts associated with the Airport. Non-compatible land uses generally include residential areas and

noise-sensitive facilities, such as schools, churches, hospitals, and libraries, located within the 65 DNL noise contour.

Exhibit 7.1-1 shows that within the DL 65 dB a large continuing area of noise exposure south of the Airport, reflects the existing NCP's emphasis on south flow and nighttime contraflow operations, with mitigation efforts already well along. Exhibit 7.1-1 also shows that without corrective action, noncompatible areas north of the Airport not covered by the existing NCP's approve NEM, and hence unmitigated to date, remain exposed to noise levels exceeding federal standards. The DNL 65 dB contours in the 2008 NEM (Exhibit 7.1-2) encompass less than half the population in the 2003 NEM; a significant noise reduction is therefore anticipated with the proposed measures. Population and housing changes taken from the Part 150 Study, are illustrated in **Table 7.2-1**.

As described in Section 7.1.2 population exposure in the Preferred Alternative would be less than half the population in the NEM for 2003. Examination of the population for the 2005 scenarios reveals that the vast majority of that reduction is due to the recommended noise abatement measures. This result is of special significance in that the proposed program reduces noise exposure in heavily populated areas to levels comparable to those forecast in the 1993 Study, but generates almost no new noncompatible land use. Changes in the fleet mix, specifically increased use of regional jets in lieu of narrow body jets are responsible for the additional reduction in noise exposure.

Table 7.2-1			
CHANGES IN POPULATION AND HOUSING			
Population (65 DNL)			
	North side	South side	TOTAL
Base Case	2,883	1,240	4,123
Proposed Alternative	590	1,031	1,621
Difference	2,293	209	2,502
Housing (65 DNL)			
	North side	South side	TOTAL
Base Case	1,407	483	1,890
Proposed Alternative	292	401	693
Difference	1,115	82	1,197

Source: Louisville International Airport, FAR Part 150 Study, 2002

7.3 Social Impacts

FAA Order 5050.4A states that the principal social impacts which need to be considered are those associated with relocation or other community disruptions that may be caused by the Airport development recommendations. Types of impacts considered include the following:

- Relocation of any residence or business
- Surface transportation pattern alterations
- Disruption or division of established communities
- Disruption of orderly, planned development
- Appreciable changes in employment
- Potential changes in tax base.

The land acquisition that will be necessary to accommodate the Preferred Alternative includes the Knopp-Melton area and the area west of the Airport between the CSX railroad tracks and Crittenden Drive. (Refer to **Exhibit 7.3-1** for the parameters of the land acquisition areas.) These two areas are comprised solely of businesses. There

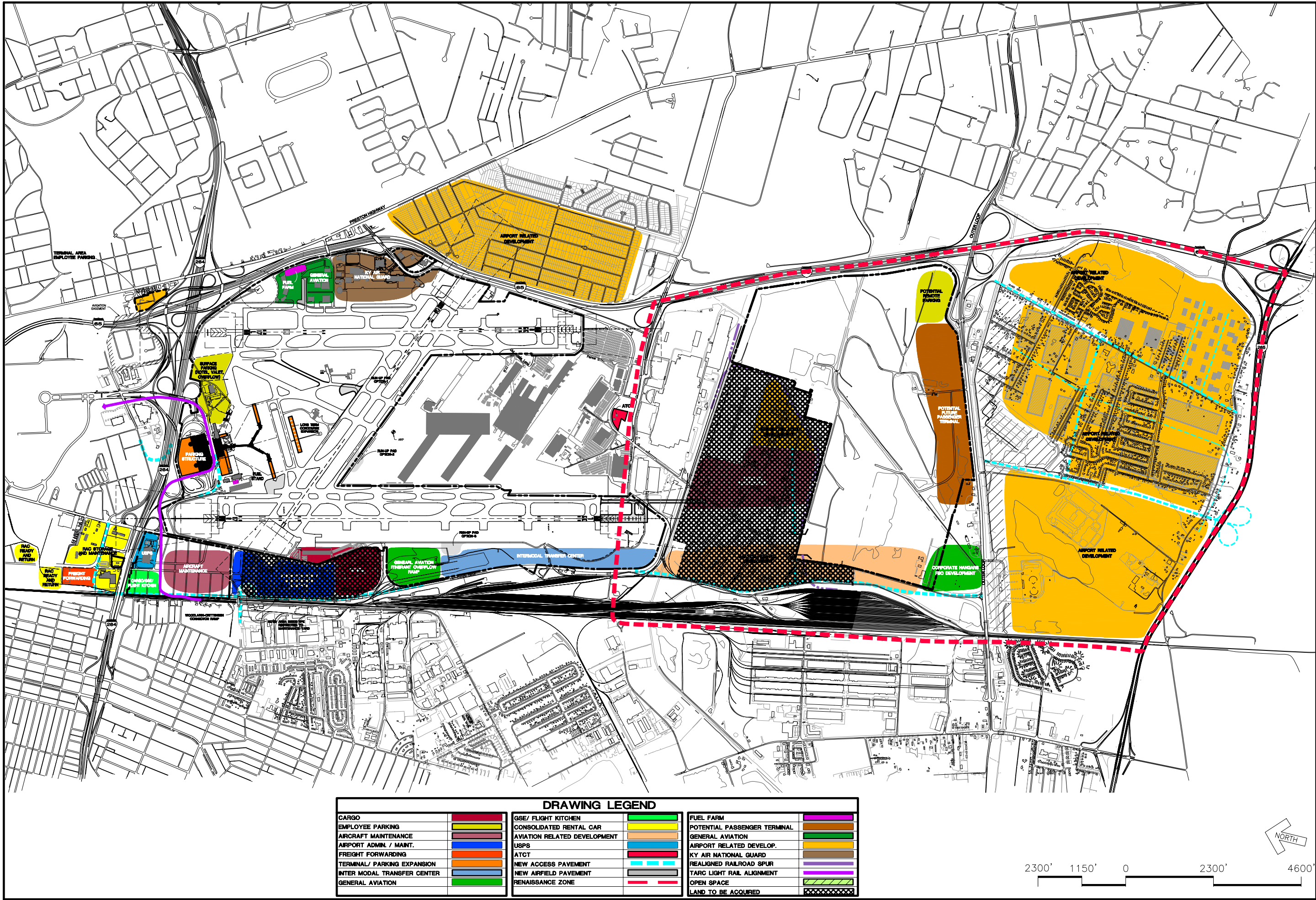
are approximately 70 businesses that will be affected by the preferred alternative. The businesses consist of warehouse storage facilities, auto salvage yards, recycling centers, and heavy equipment sales. The provisions of the Uniform Assistance and Real Property Acquisition Policies Act of 1970 must be met during the acquisition of this land. As depicted in Exhibit 7.0-1, the areas south of the Outer Loop identified as “Airport Compatible Development” are either privately owned commercial property or residential properties being acquired through the Airport’s noise abatement program.

The proposed improvements south of Fern Valley Road will alter the surface transportation network, but only to a minor degree. The majority of the roads in the area serve as ingress/egress for existing businesses that are slated for removal, and will not affect the transportation network. However, Grade Lane, used as a connection between Fern Valley Road and Outer Loop Road, will be closed. The proposed improvements to Crittenden Drive will replace Grade Lane as the connection to Outer Loop Road. The proposed improvements will not cause disruption or division of established communities or disruption of orderly, planned development. Refer to **Exhibit 7.3-2** for a depiction of the surface transportation changes.

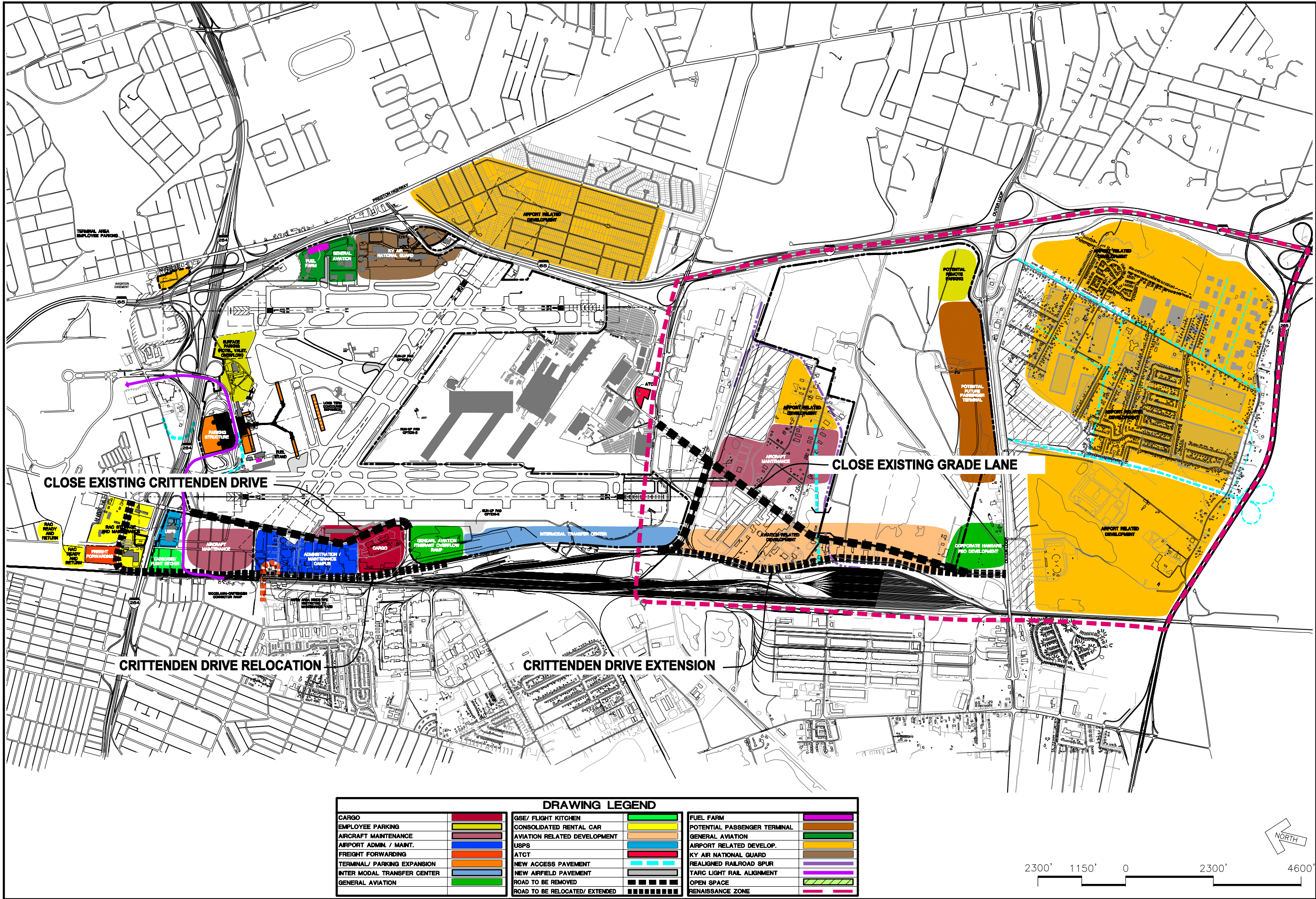
An appreciable change in employment resulting from the preferred alternative is not expected. The types of businesses located in the improvement area provide minimal employment numbers because they are non-labor intensive. Short-term employment increases due to construction jobs related to airport expansion and future aviation-related developments that would presumably create new jobs (thereby increasing the tax base) are likely to occur.

7.4 Induced Socioeconomic Impacts

Induced or secondary impacts are those factors that affect surrounding communities, such as shifts in patterns of population movement and growth, public service



DRAWING LEGEND					
CARGO		GSE/ FLIGHT KITCHEN		FUEL FARM	
EMPLOYEE PARKING		CONSOLIDATED RENTAL CAR		POTENTIAL PASSENGER TERMINAL	
AIRCRAFT MAINTENANCE		AVIATION RELATED DEVELOPMENT		GENERAL AVIATION	
AIRPORT ADMIN. / MAINT.		USPS		AIRPORT RELATED DEVELOP.	
FREIGHT FORWARDING		ATCT		KY AIR NATIONAL GUARD	
TERMINAL/ PARKING EXPANSION		NEW ACCESS PAVEMENT		REALIGNED RAILROAD SPUR	
INTER MODAL TRANSFER CENTER		NEW AIRFIELD PAVEMENT		TARC LIGHT RAIL ALIGNMENT	
GENERAL AVIATION		RENAISSANCE ZONE		OPEN SPACE	
				LAND TO BE ACQUIRED	



demands, and changes in business and economic activity to the extent influenced by the airport development. Induced impacts will normally not be significant, except where they are also significant in other categories, especially noise, land use, or direct social impacts.

The proposed improvement will not cause any shifts in patterns of population movement or growth. The improvement area consists of businesses or uses that have a negligible effect on population, which will cause little change in public service demands. The shift in business activity will be minimal. The existing businesses, which consist of warehouse storage facilities, auto salvage yards, recycling centers, and heavy equipment sales, can be relocated within the City of Louisville.

7.5 Air Quality

Section 176(c) of the Clean Air Act Amendments of 1977 states in part that no Federal agency shall engage in, support in any way, or provide financial assistance for license or permit, or approve any activity which does not conform to a State Implementation Plan (SIP) after it has been approved or promulgated under section 110 of that Act.

The Clean Air Act, as amended, deals primarily with ground transportation-related activities such as highway improvement projects. However, specific requirements for conforming to the Clean Air Act are detailed for all federally approved projects. The requirements define conforming to a SIP as:

- Conforming to the SIP's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and
- Not causing or contributing to a new violation, increasing the frequency or severity of an existing violation, delaying attainment of a standard, or delaying a required emission reduction.

The U.S. Environmental Protection Agency (EPA) in June 2001 re-designated the Louisville area as “attainment” of the national air quality standard. This was based on three continuous years of complete quality-assured outdoor air monitoring of 1998, 1999 and 2000. The Louisville ozone non-attainment area includes Jefferson County, parts of Bullitt County and Oldham County in Kentucky and Clark County and Floyd County in Indiana.

Specific to the Preferred Alternative, the runway paved overruns, the parking garage expansion, and the roadway access improvements will require further evaluation to determine that the change in transportation patterns and construction-related impacts do not adversely affect air quality. An air quality conformity analysis should be conducted to determine if further environmental analysis for air quality should be conducted.

7.6 Water Quality

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (commonly referred to as the Clean Water Act), provides the authority to establish water quality standards, control discharges into surface and subsurface waters, develop waste treatment management plans and practices, and issue permits for discharges (Section 402) and for dredged and fill material (Section 404).

Under the previous environmental studies, the RAA has corrected any water quality issues pertaining to past expansion projects at the Airport. The sewer lines of the Louisville/Jefferson County Metropolitan Sewer District (MSD) have all been extended to serve all the new buildings. Wastewater generated by new facilities that is not suitable for discharge into MSD sewers is contained and properly disposed of at a certified facility.

Drainage improvements have been constructed at the Airport to minimize downstream flooding of stormwater runoff. At aircraft fueling stations, new drainage facilities have been built with fuel separators to capture spilled fuel. Wastewater from

aircraft washing facilities has been directed to MSD sewers and where deicing chemicals are used.

The Preferred Alternative will increase the amount of impervious surfaces by increasing paved areas. Prior to construction, the capacity of existing water retention areas and future water retention plans should be analyzed to determine if the capacity is adequate to handle the amount of water runoff. Review and coordination with the U.S. Fish and Wildlife Service, the Corps of Engineers, and the EPA will be required prior to the initiation of any construction of the proposed improvements.

7.7 Department of Transportation Act, Section 303

The Department of Transportation Act, Section 303 states that any program or project which requires the use of any publicly-owned land, including public parks, recreation areas, or any land from a historic site of national, state, or local significance, shall not be approved unless there is no feasible and prudent alternative to the use of such land, and such program includes all possible planning to minimize harm. A Section 303 statement will not be required because no park or recreation areas, wildlife refuges, or federal or state parks will be impacted by the preferred alternative.

7.8 Historic, Architectural, Archaeological and Cultural Resources

Based on the National Historic Preservation Act of 1966 and the Archaeological and Historic Preservation Act of 1974, any undertaking which is federally funded, permitted or licensed is subject to Section 106 review to ensure that properties or data which have historic, scientific, prehistoric, archaeological, or paleontological significance are surveyed, recovered or preserved.

Previous environmental studies that were conducted for the Airport's expansion program determined that impacts to archaeological and historic resources were due primarily to an increase of noise. Coordination with the appropriate agency and mitigation

measures, such as Phase II Surveys and a Memorandum of Agreement, were implemented before any construction was started.

It is not probable that any structures would be impacted by the Preferred Alternative, because the proposed alternative will not modify aircraft noise impacts. Areas that were declared significant in the previous studies have been mitigated and are now disturbed by grading or paving. Should any property or area be discovered that would be eligible for the National Register, proper coordination and mitigation, such as walk over surveys, Phase I, and Phase II Surveys, would take place prior to development.

7.9 Biotic Communities

As outlined in FAA Order 5050.4A, "If the proposal would impact only man-dominated areas such as previously disturbed airport property, populated area, or farmland, it may be assumed that there would be no significant impact on biotic communities."

The Airport, being located on the northern edge of a flat, poorly drained area, was first used for agricultural activities, then for residential purposes; it now supports industrial use. These activities have displaced indigenous biotic communities and introduced post-agricultural habitat. Future developments would therefore not produce significant impacts on biotic communities, due to the area being previously disturbed.

7.10 Endangered and Threatened Species of Flora and Fauna

Section 7 of the Endangered Species Act, as amended, requires each Federal agency to ensure that "any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee...".

There is habitat at the Airport and surrounding areas that the Kentucky Nature Preserves Commission and the Kentucky Department of Fish and Wildlife Resources identified for two sensitive species. These two species, the common barn owl (*Tyto alba*) and the Kirtland Water Snake (*Clonophis kirtlandii*) are not listed federally as threatened or endangered species. The suitable habitat areas of the common barn owl are large cavity trees and abandoned buildings. The 1990 Final Environmental Impact Statement (FEIS) found evidence of these species around the Airport area and surrounding neighborhoods, but could not document any actual nesting areas. The barn owls forage for both rodents and pigeons, keeping these animal populations at normal levels. The FEIS noted that the proposed action would not subject the barn owl population to significant impacts on its foraging habitat, as substantial open grassland would remain.

There are city topographic maps that plot the habitat areas of the Kirtland Water Snake around the Airport area. The habitat areas were found to be in the areas south of the Airport. The habitat areas are made up of sparsely wooded fields which are wet in spring and dry in summer and support a substantial population of earthworms.

Other threatened or endangered species identified by the U.S. Fish and Wildlife Service that may be found within the Airport area are:

- Indiana Bat - *Myotis sodalist*
- Gray Bat - *Myotis grisescens*
- Short's Goldenrod - *Solidago shortii*
- Running Buffalo Clover - *Trifolium stoloniferum*.

A biological walk over survey should be conducted for areas to the south that were not investigated in 1990 prior to development.

Should these threatened or endangered species be identified on Airport property during the implementation of the Preferred Alternative, the appropriate agency would be contacted to determine the mitigation for the species.

7.11 Wetlands

Department of Transportation Order 5660.1A, Preservation of the Nation's Wetlands, implements Executive Order 11990, Protection of Wetlands. The identification of wetlands is partially based upon soils identified as hydric by the National Resources Conservation Service (formerly known as Soil Conservation Service). The U.S. Army Corps of Engineers defines a wetland as having three characteristics: wetland hydrology, hydric soils, and characteristic wetland vegetation.

In general, Section 10 of the Rivers and Harbors Act of 1899 prohibits work in navigable waters of the U.S. without a Department of the Army (DA) permit. Section 404 of the Clean Water Act prohibits the discharge of dredged and/or fill materials into waters of the United States, including wetlands, without first obtaining a DA permit.

The designated areas of "Airport-related Development", "Future Passenger Terminal" and "Remote Parking" on Exhibit 7.0-1, Preferred Alternative were observed by the U.S. Fish and Wildlife Service as overlying natural forested and managed wetlands created under the Clean Water Act. Therefore, under the legally binding long-term protectionary enactments, for future development to occur, further agency coordination with the Army Corps of Engineers and the Metropolitan Sewer District are necessary. See **Appendix C** for agency correspondence.

7.12 Floodplains

Executive Order 11988, Floodplain Management, defines floodplains as "the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year;" i.e., the area that would be inundated by a

100-year flood. As shown in **Exhibit 7.12-1**, portions of the Airport property are within the areas designated as 100-year floodplains, including the paved overruns for Runway 17R/35L.¹ Analysis of the encroachment on the base floodplain was conducted in the 1989 EIS for airport expansion.

The reconstruction of Crittenden Drive, and future plans for “Aviation-related Development” areas encroach on the base floodplain area. This encroachment does not reflect significant potential for water disruption and there is no significant risk to life or property, since there is no backwater flooding. This floodplain is not perennially wet and does not provide any significant natural nutrient absorption for the surrounding areas.

7.13 Coastal Zone Management Program

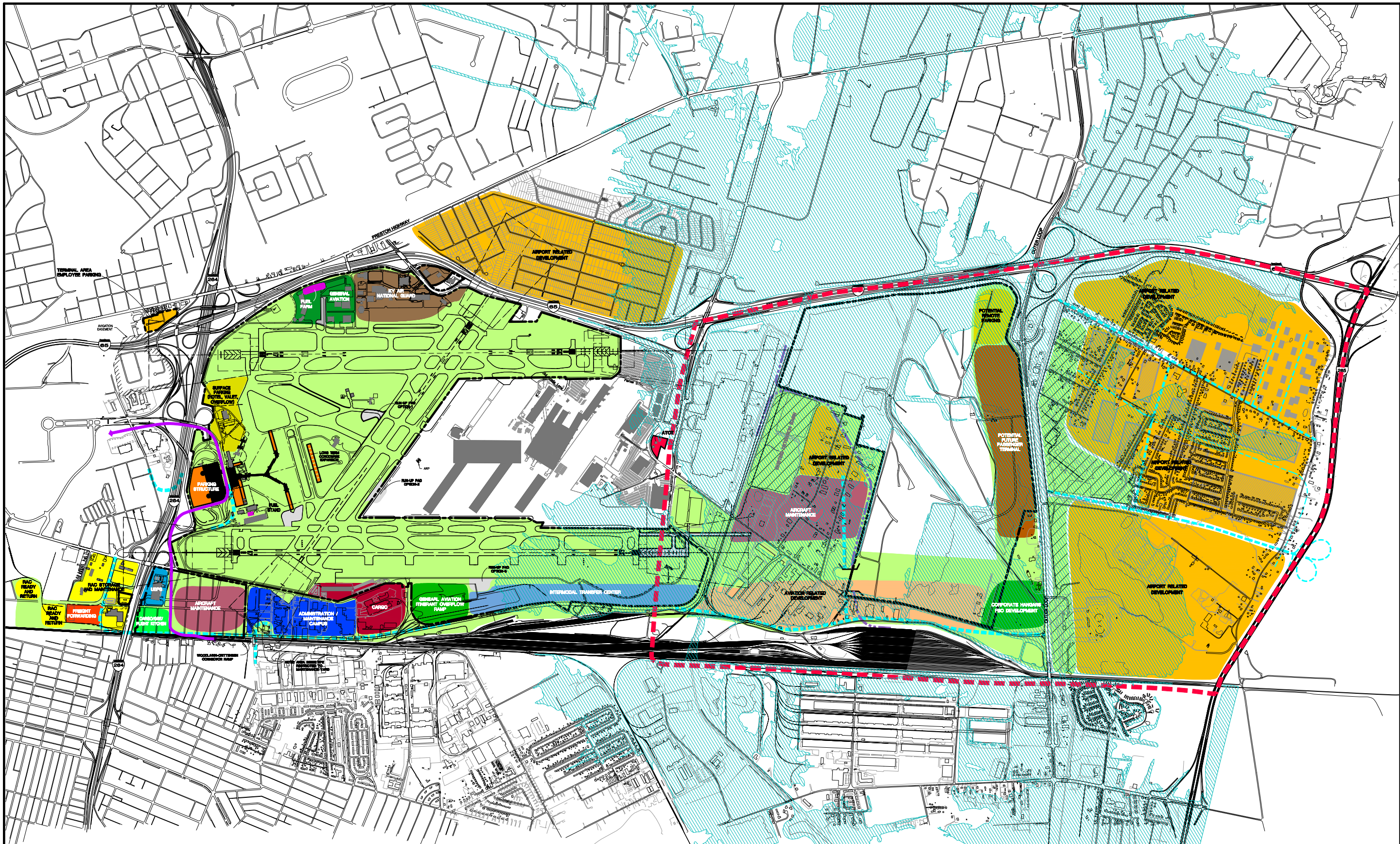
The National Oceanic and Atmospheric Administration (NOAA) Regulations (15 C.F.R. Part 930) require an analysis of any action affecting the coastal areas along the Atlantic and Gulf Coasts. Louisville International Airport is not located on the Atlantic or Gulf Coast, and hence, needs no such analysis.

7.14 Coastal Barriers

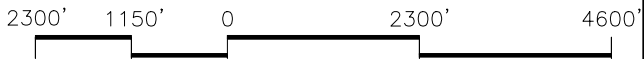
The Coastal Barriers Resources Act of 1982, PL 97-348 (CBRA), prohibits, with some exceptions, federal financial assistance for development within the Coastal Barrier Resources System, which consists of undeveloped coastal barriers along the Atlantic and Gulf coasts. Because the Airport is not located in a coastal area, the CBRA does not apply.

7.15 Wild and Scenic Rivers

There are no rivers listed on the U.S. Department of the Interior inventory of National Wild and Scenic Rivers in the vicinity of the Airport. Consequently, impacts on designated wild and scenic rivers resulting from future development plans are not anticipated.



DRAWING LEGEND					
CARGO		GSE/ FLIGHT KITCHEN		FUEL FARM	
EMPLOYEE PARKING		CONSOLIDATED RENTAL CAR		POTENTIAL PASSENGER TERMINAL	
AIRCRAFT MAINTENANCE		AVIATION RELATED DEVELOPMENT		GENERAL AVIATION	
AIRPORT ADMIN. / MAINT.		USPS		AIRPORT RELATED DEVELOP.	
FREIGHT FORWARDING		ATCT		KY AIR NATIONAL GUARD	
TERMINAL/ PARKING EXPANSION		NEW ACCESS PAVEMENT		REALIGNED RAILROAD SPUR	
INTER MODAL TRANSFER CENTER		NEW AIRFIELD PAVEMENT		TARC LIGHT RAIL ALIGNMENT	
GENERAL AVIATION		RENAISSANCE ZONE		OPEN SPACE	
				100 YEAR FLOOD PLAIN	



7.16 Prime and Unique Farmland

The Farmland Protection Policy Act (FPPA), P.L. 97-98, authorizes the U.S. Department of Agriculture (USDA) to develop criteria for identifying the effects of federal programs on the conversion of farmland to nonagricultural uses. Following coordination with the United States Department of Agriculture (USDA) Natural Resources Conservation Service (Refer to **Appendix C**), it was determined that the area encompassed under the Louisville International Airport Master Plan does not contain prime or unique farmland.

7.17 Energy Supply and Natural Resources

According to *FAA Order 50504a, Airport Environmental Handbook*, an impact to energy resources would result if there is a change in demands for stationary facilities, or if there should be a significant increase in the movement of air and ground vehicles.

The proposed development is not expected to have a significant impact on the demand for stationary facilities (airfield lighting, terminal heating and air conditioning, etc.). There will be a few minor increases in energy demand due to additional runway and taxiway lighting, as well as heating, cooling, and lighting additional terminal space. However, this increase will be minimal in the total system usage. There will be no need for unusual natural resources or materials in short supply at the site during construction activities.

7.18 Light Emissions

This section explores the extent to which any lighting associated with an airport action will create an annoyance to people in the vicinity of the installation. A special study and a more detailed examination of the alternative within an environmental impact statement is necessary only in unusual circumstances, such as high intensity strobes shining into people's homes. The preferred alternative improvements are not expected to result in any significant increase of light emission from the existing levels.

Conversely, the Airport will need to continue to monitor potential operational impacts of lighting from Kentucky Kingdom Amusement Park located north of the Watterson Expressway. Future construction at Kentucky Kingdom will require review and approval of the Kentucky Airport Zoning Commission which will take into consideration light impacts to airport operations. For example, pole mounted lights should be white in color, angled toward the ground and shielded on top so that they do not shine upward toward approaching aircraft. The use of high-pressure sodium lighting, neon, flashing, or intermittent lights should be avoided.

7.19 Solid Waste Impacts

This evaluation factor focuses on projected changes in quantity or type of solid waste generated, and identifies the location of solid waste facilities within 1,500 meters (approximately 4,921 feet) of all runways to be used by piston-type aircraft, and within 3,000 meters (approximately 9,843 feet) of runways to be used by turbojet aircraft. Preliminary study of all disposal sites within the above distances should determine if a potential bird hazard exists.

A large landfill is located immediately south of the existing Airport boundary, and expansion proposed in this Master Plan Update Study will adjoin the landfill. The landfill is in non-compliance of the FAA minimum distance standards recorded under FAA Order 5200.5A. In 1989, the RAA sponsored a bird activity survey which developed a Wildlife Hazard Management Plan and the formation of a permanent Wildlife Hazard Management Task Force. The FAA has determined, following the study and the Wildlife Hazard Management Task Force, that there is an acceptable relationship between the Airport and the landfill. This determination, however, should not be recognized as a change in FAA policy. Close coordination will be required with the landfill operators, as future landfill expansion could encroach on Airport areas. Should future development occur along the Outer Loop, identified conceptually as "Potential Future Passenger Terminal" and

“Parking” as shown on Exhibit 7.0-1, impacts to the existing landfill would require mitigation. The future development would occur in the vicinity of the existing landfill.

Presently (2003), Waste Management of Kentucky (WMK) has petitioned the Kentucky Division of Solid Waste for an extension to its operating permit.

As a condition of that permit, the Federal Aviation Administration and the Kentucky Airport Land Use Zoning Commission required that certain special conditions be placed on Waste Management of Kentucky’s permit. These conditions include specific requirements pertaining to continued and expanded wildlife management practices as well as an agreement with the Louisville Regional Airport Authority (LRAA) to conduct at least annual reviews of operational issues for both the landfill and the Louisville International Airport. Specifically, this agreement requires that WMK advise the RAA when the eastern cell of the landfill (Cell 5) approaches 593’ above mean sea level (MSL) so the impacts of further raising of the cell can be evaluated.

7.20 Construction Impacts

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

Prior to any construction activities, a Maintenance of Traffic Plan should be developed to minimize short-term inconveniences to the public. The pollution control provisions of FAA Advisory Circular 150/5370-10 *Standards for Specifying Construction of Airports* and the Kentucky Department of Transportation Standard Specification for road and bridge construction should be adhered to where other construction impacts surface.

7.21 Hazardous Waste

Any hazardous substances encountered will be appropriately controlled in accordance with applicable federal, State and local laws. This will include the

containment and transfer of substances to a certified receiving agent, and only by a licensed and bonded remediation contractor. Potential areas likely to have hazardous substances are the future “Administration Maintenance Campus” (shown on Exhibit 7.0-1) adjacent to Crittenden drive. The second area is the Knopp-Melton area, which includes a “Future Aircraft Maintenance” site and an existing detention basin and airport-related development area. The next area is south of the landfill site, shown on Exhibit 7.0-1, Preferred Alternative as “Potential Future Passenger Terminal” area. The final area is the “Aviation-related Development” area adjacent to the railway lines.

7.22 Environmental Justice

On February 11, 1994 President Clinton issued Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”. This Executive Order both reinforces and improves upon existing pieces of legislation, namely Title IV of the Civil Rights Act (1964), the Fair Housing Act (1968), and the National Environmental Policy Act. Historically, these Acts were put in place to “...prohibit discriminatory practices in programs receiving federal funds”, “...prohibit discrimination with respect to the acquisition and/or financing of housing”, and “...set policy goals for the protection, maintenance, and enhancement of the environment”, respectively. The premise of Environmental Justice is to prevent negative impacts on a community, instead of waiting until such impacts are established to address them. Now, in accordance with Executive Order 12898, federal agencies must revise existing policies and programs concerning human health or the environment to meet the following criteria:

- Revise and promote enforcement of all health and environmental statutes in areas with minority and low-income populations
- Ensure greater public participation
- Improve research and data collection relating to the health and environment of minority and low-income populations

- Identify patterns of consumption of natural resources among minority and low-income populations.

Although existing businesses would be relocated as a result of the proposed airport development, nearby residential populations not already participating in a relocation program would not be impacted. Therefore, it does not appear that minority and low-income populations will be affected.

Of the four points listed above, the one that seems most relevant to this study would be ensuring public participation. Those potentially affected by the proposed expansion should have an appropriate opportunity to participate in decisions guiding the various phases of assessing impacts. The concerns of all participants involved should be considered, and could influence the regulatory agency in the decision-making process. Finally, the decision-makers should actively seek out and facilitate the involvement of those who may be affected by the planning recommendations.

7.23 Summary

The above overview shows that implementation of the Preferred Alternative within the 20-year planning period has the potential to impact the following environmental categories:

- *Air quality* – Further analysis will required to determine the impacts when implementing parking garage expansions and roadway projects
- *Archaeological* – Further surveys will possibly be required, as archaeological sites may exist within proposed development areas
- *Endangered species* – Habitat that harbor endangered species are in the vicinity of the study area. Further surveys possibly will be required prior to development.
- *Wetlands* – Further surveys may be required prior to development.

- *Floodplains* – Encroachment exists on the 100-year floodplain. Further analysis may be required prior to development.

Prior to development, further analysis for the above-stated environmental categories will possibly be required. Agency coordination and additional surveys should be conducted to determine what aspects of the Preferred Alternative development will have significant environmental impacts.

ENDNOTES

Louisville International Airport

¹ FAR Part 150 Study, Chapter 10, Section 10.1

² FAR Part 150 Study, Chapter 10, Section 10.2

³ Floodplain information provided by Louisville/Jefferson County Information Consortium (LOJIC)

8.0 AIRPORT PLANS

This chapter presents the Airport Layout Plans (ALP), a graphic depiction of the future development plans for the Airport. This Chapter includes the ALP package submitted to the FAA for approval. The plan set consists of the following 10 drawings:

- *Existing Airport Layout Plan*
- *Future Airport Layout Plan (2 sheets)*
- *Airport Data Summary*
- *Future Terminal Area Plan*
- *Northwest Development Area Plan*
- *Airspace Plan*
- *Approach Plans (2 sheets)*
- *On-Airport Land Use Plan (2 sheets)*
- *Airport Photograph*

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

8.1 Existing Airport Layout Plan

This plan sheet graphically presents the existing Airport layout as well as off-Airport property surrounding the facility.

8.2 Future Airport Layout Plan

The Airport master planning process culminates with FAA approval of an ALP, which serves as a blueprint for future airport development. These sheets depict improvements planned within the twenty-year planning period as well as land uses south and west of the Airport for potential development beyond twenty

years. The ALP was prepared in accordance with FAA Advisory Circular 150/5300-13 (Change 7), *Airport Design*.

8.3 Airport Data Summary

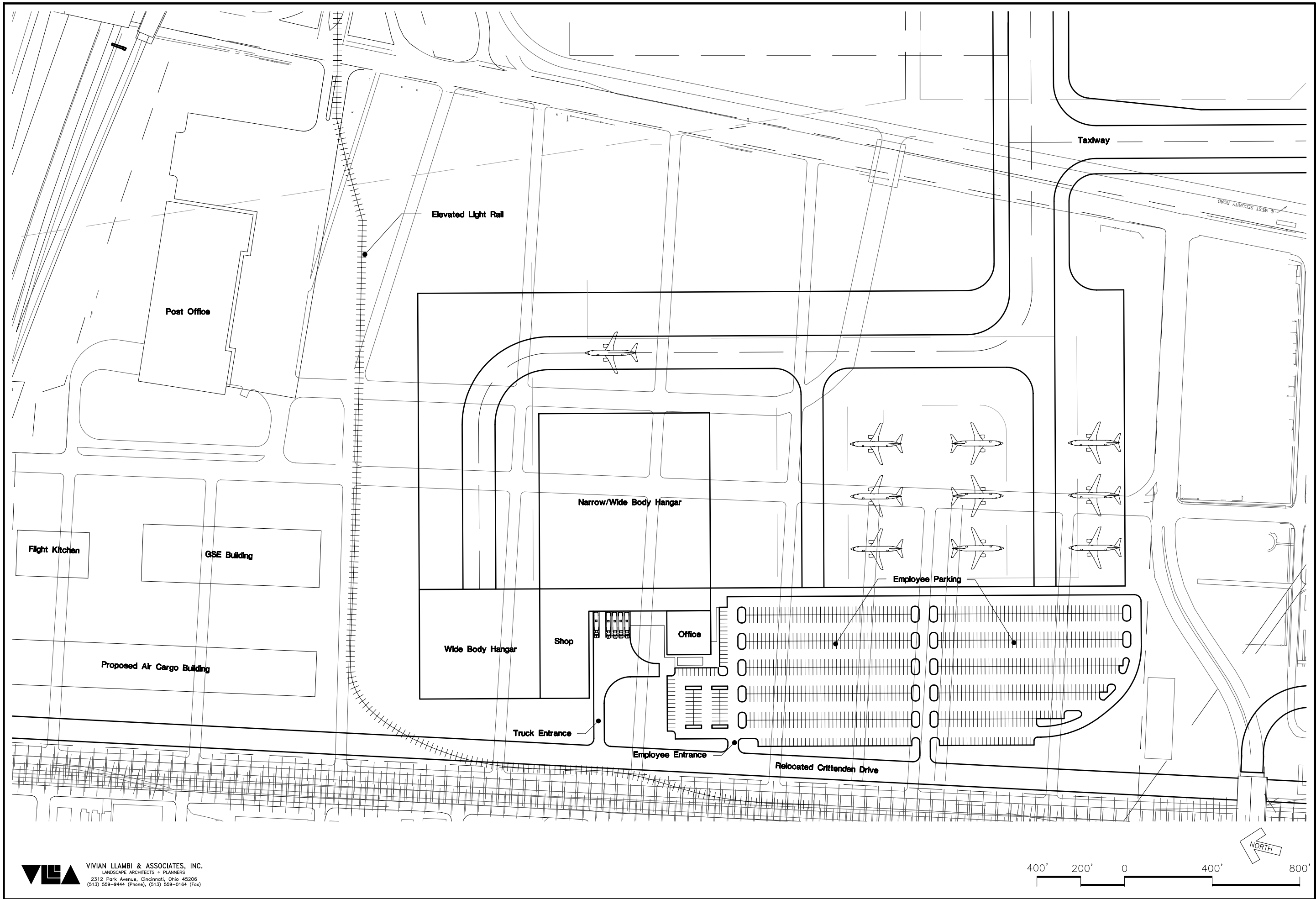
This sheet contains technical information regarding elevations, latitude and longitude coordinates, and other key runway data. Also included are general airport information, wind roses and associated tables, and navigational aids.

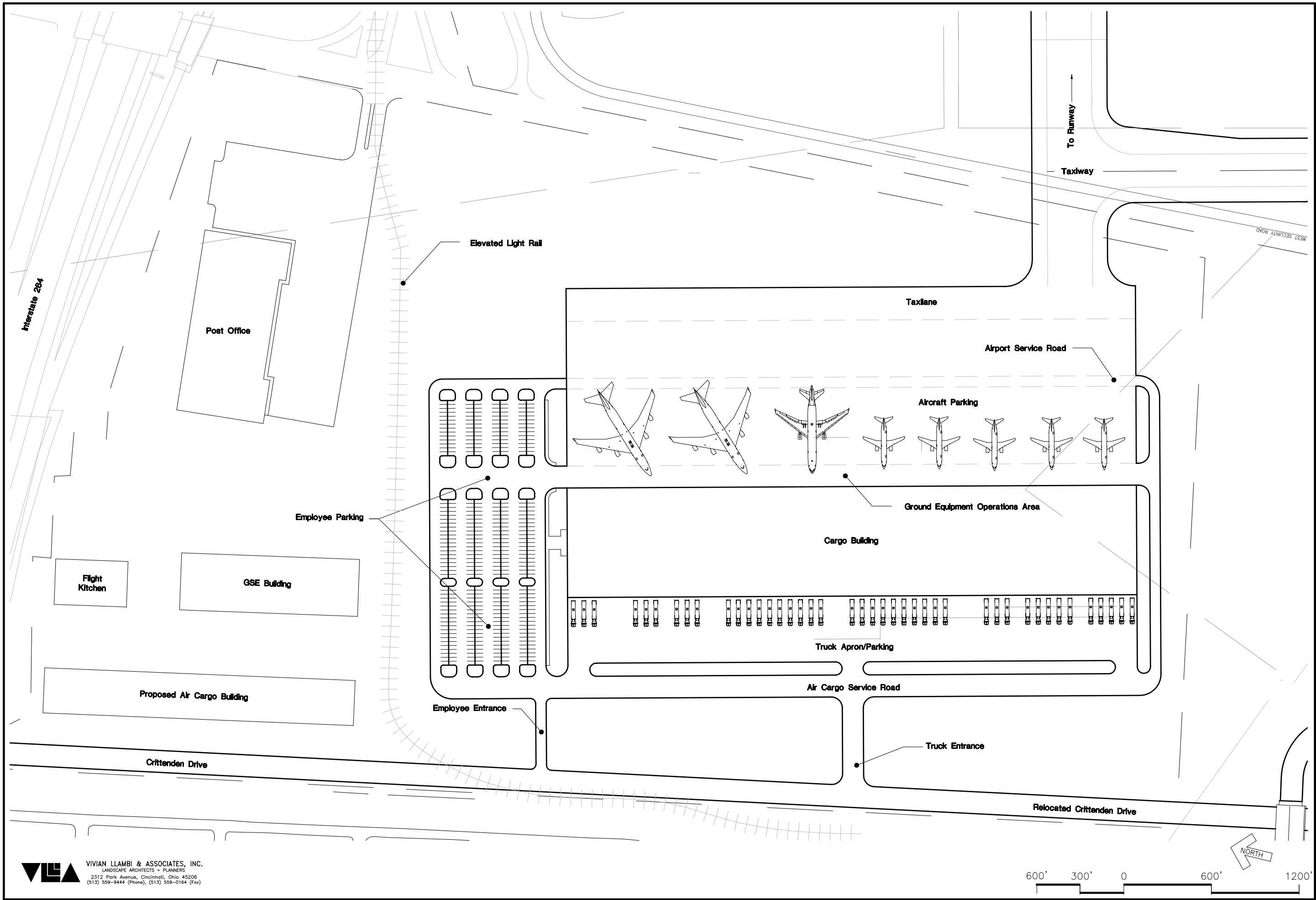
8.4 Future Terminal Area Plan

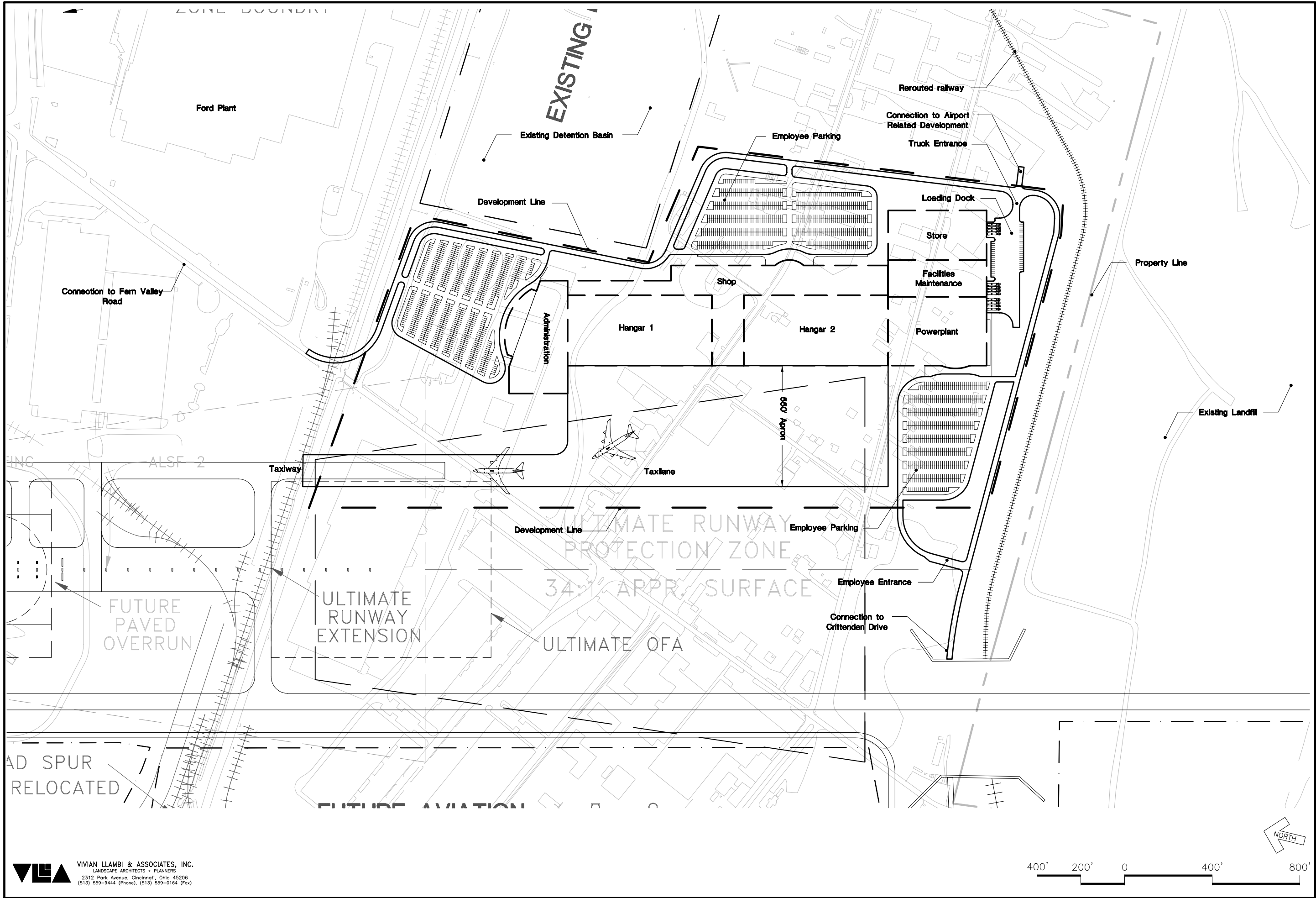
These plans provide an enlarged view of the facilities proposed in the passenger terminal area, including terminal and concourse expansion, parking garage expansion, and roadway improvements. A building data table is provided to assist in identifying the use and location of existing and proposed buildings.

8.5 Northwest Development Area Plan

Similar to the Terminal Area Plan, the Northwest Development Area Plan provides additional detail for the area near Crittenden Drive and I-264, the Watterson Expressway. The proposed relocation of the cargo, GSE maintenance, and flight kitchen facilities to this area is depicted along with the relocation of Crittenden Drive. In addition to the technical requirements of the ALP, two alternative site development plans were developed for the Northwest Development Area for the Airport to use in marketing to potential tenants. **Exhibit 8.5-1** depicts an aircraft maintenance complex consisting of a 150,000 square foot hangar, a 70,000 square foot hangar, approximately 9 apron parking positions, and related office and employee parking. **Exhibit 8.5-2** presents an alternate development plan for cargo facilities that includes a 325,000 square foot cargo building with eight to ten aircraft parking positions on the east and truck parking on the west. **Exhibit 8.5-3** presents a concept plan for the Knopp-







Melton area south of the Airport. This concept represents a heavy maintenance complex including hangars, repair shops and office space.

8.6 *Airspace Plan*

This plan is based on Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace. Federal criteria have been established to protect an airport's airspace and approaches to each runway. This plan will assist in determining if construction in the vicinity of the Airport will penetrate future imaginary surfaces.

8.7 *Approach Plans*

The approach plan sheets provide plan and profile views of the six runway ends for the inner portions of the approaches. Obstructions are identified along with the corresponding obstruction elevation and imaginary surface elevation.

8.8 *On-Airport Land Use Plan*

This sheet depicts development areas within the future Airport property line. This plan was developed to provide guidance to locating aviation-related development in a logical and efficient way. South and west of the airfield, general land uses are depicted as market conditions will dictate the actual uses of these properties.

The following land use categories are depicted:

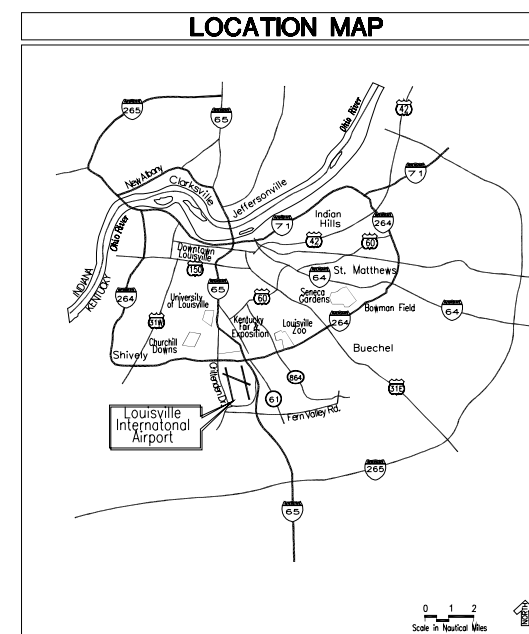
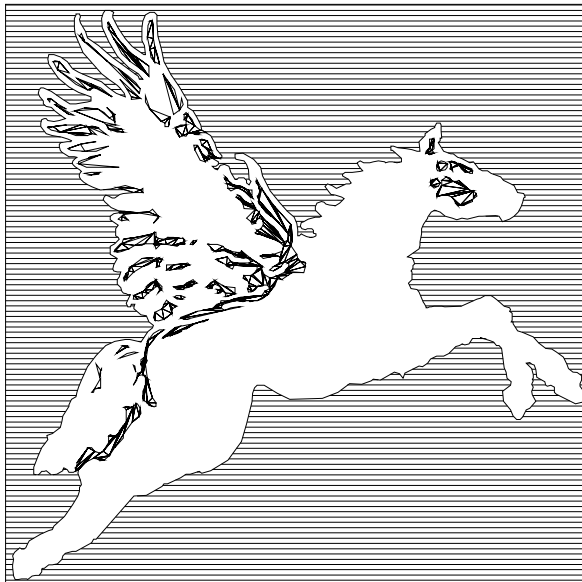
- *Airport Terminal Area*
- *United Parcel Service (UPS) Property*
- *Air Traffic Control Tower*

- *KY Air National Guard, FBO, and Corporate General Aviation*
- *Northwest Development Area*
 - *USPS*
 - *Rental Cars*
- *Residential Relocation Areas*
 - *Preston Highway*
 - *Edgewood*
 - *Minors Lane*
 - *Ashton Adair*
- *Future Airport Maintenance/Admin Campus*
- *Future Airport Related/Compatible Development*
- *Future Intermodal Transfer Center*
- *Future Aircraft Maintenance*

8.9 Airport Photograph

This sheet presents an aerial photograph of the Airport for reference purposes.

Airport Master Plan



Louisville & Jefferson County Regional Airport Authority
Louisville, Kentucky

May, 2004

FAA DISCLAIMER:

THE PREPARATION OF THIS DOCUMENT WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS 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 APPROPRIATE PUBLIC LAWS.

THE FAA'S APPROVAL OF THIS AIRPORT LAYOUT PLAN (ALP) REPRESENTS ACCEPTANCE OF THE GENERAL LOCATION OF FUTURE FACILITIES DEPICTED. DURING THE PRELIMINARY DESIGN PHASE, THE AIRPORT OWNER SHALL SUBMIT, FOR FAA APPROVAL: FINAL LOCATIONS, HEIGHTS, AND EXTERIOR FINISH OF ALL STRUCTURES. THE FAA'S CONCERNS ARE OBSTRUCTIONS, IMPACT ON ELECTRIC FACILITIES, AND ADVERSE IMPACT ON CONTROLLER VIEW OF AIRCRAFT APPROACHES AND GROUND MOVEMENT AREAS WHICH COULD ADVERSELY AFFECT THE SAFETY, EFFICIENCY, OR UTILITY OF THE AIRPORT.

ALL PROPOSED CONSTRUCTION ON AIRPORT PROPERTY SHALL BE SUBMITTED TO THE FAA FOR REVIEW AND APPROVAL AT THE EARLIEST DATE. RUNWAY PROTECTION ZONES AND CRITICAL AREAS OF FAA FACILITIES ARE SHOWN TO INDICATE AREAS WHICH MUST REMAIN FREE FROM FUTURE DEVELOPMENT. HOWEVER, THESE STERILE AREAS ARE NOT ALL ENCOMPASSING, AND FUTURE STRUCTURES OUTSIDE OF THESE STERILE AREAS MAY STILL ADVERSELY IMPACT THE PERFORMANCE OF THE ASSOCIATED FACILITIES.

LOUISVILLE INTERNATIONAL
AIRPORT AT STANDIFORD FIELD

CHARLES T. MILLER - EXECUTIVE DIRECTOR

DATE _____














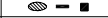
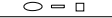





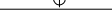
FEDERAL AVIATION ADMINISTRATION

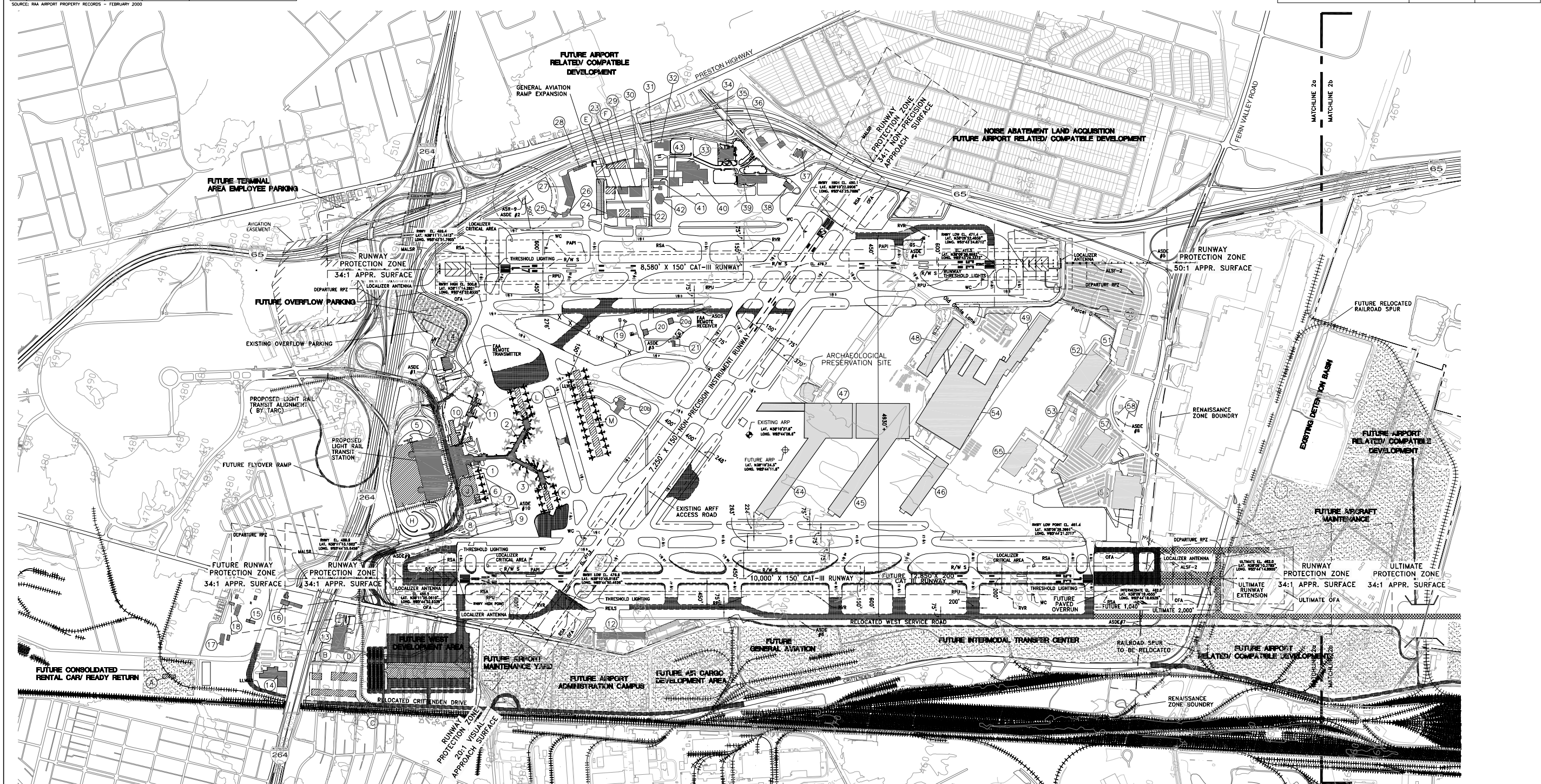
APPROVED _____ DATE _____

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DRAWING INDEX	
NO.	Drawing Name
--	Title Sheet
1 of 12	Airport Layout Plan
2 of 12	Airport Layout Plan
3 of 12	Airport Data Summary
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6 of 12	Airspace Plan
7 of 12	Approach Plan 17L-35R
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10 of 12	On-Airport Land Use Plan
11 of 12	On-Airport Land Use Plan
12 of 12	Airport Photograph

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DRAWING LEGEND		
ITEM	EXISTING	FUTURE
GROUND CONTOUR		
AIRPORT PROPERTY LINE		
MAJOR ROADS		
BUILDINGS		
AIRFIELD PAVEMENT		
SECURITY FENCE		
NAVAIDS		
LIGHTING		
BEACON		
AIRPORT REFERENCE POINT		
SURFACE DRAINAGE		
RENAISSANCE ZONE BOUNDARY		



- NOTES:
1. FUTURE STRUCTURES WILL CONFORM TO FAA NAVJAG CRITICAL AREA, FAR PART 77 AND TERPS OBSTRUCTION CRITERIA, AND ACT LINE OF SIGHT CRITERIA.
 2. AIRPORT DESIGN STANDARDS BASED ON FAA CLASS V AIRCRAFT.
 3. THE DEPICTED AIRPORT LAYOUT PLAN IS BASED ON GS TOPOGRAPHY DATA AND OTHER SOURCES AVAILABLE BEFORE THE DESIGN, OR CONSTRUCTION PROJECTS ARE UNDERTAKEN. THE EXACT LOCATION OF EXISTING FACILITIES SHOULD BE FIELD CHECKED AND VERIFIED.
 4. THE TANKWAYS ARE 75' DIAMETER. OTHERS NOTED, EXIST TANKWAY WIDTH MAY VARY DEPENDING ON LOCATION AND DESIGN.
 5. INDICATED ELEVATION OF ROADS WHICH TRAVEL THE RPZ INCLUDE 15' FOR NON-INTERSTATE ROADS AND 17' FOR INTERSTATE HIGHWAYS.
 6. ANY PROPOSED CONSTRUCTION OF AN AIRPORT SHOULD BE SUBMITTED TO THE FAA FOR REVIEW AND APPROVAL AT THE EARLIEST DATE. RUNWAY PROTECTION ZONES AND CRITICAL AREAS OF APPROVAL SHOWN TO INDICATE AREAS WHICH MUST REMAIN FREE FROM FUTURE DEVELOPMENT. THESE ARE NOT CRITICAL AREAS, NOT ALL ENCOMPASSING, AND FUTURE STRUCTURES OUTSIDE OF THESE STERILE AREAS MAY STILL ADVERSELY IMPACT THE PERFORMANCE OF THE ASSOCIATED FACILITIES.
- SEE DRAWING 2 OF 12 FOR AIRPORT AND RUNWAY DATA.

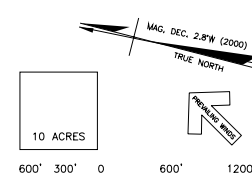
1. THE PREPARATION OF THIS DOCUMENT WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT. THE CONTENTS OF THIS DOCUMENT ARE NOT NECESSARILY THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS REPORT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE U.S. DEPARTMENT OF TRANSPORTATION TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN, NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.
2. THE FAA'S APPROVAL OF THIS AIRPORT LAYOUT PLAN (ALP) REPRESENTS ACCEPTANCE OF THE AIRPORT LAYOUT PLAN FOR THE PURPOSES OF THE AIRPORT DEVELOPMENT, DURING THE PRELIMINARY DESIGN PHASE, OF THE AIRPORT. OWNER SHALL SUBMIT, FOR FAA APPROVAL, FINAL LOCATIONS, HEIGHTS, AND OBSTRUCTIONS, IMPACT ON ELECTRONIC FACILITIES, AND ADVERSE IMPACT ON CONTROLLER VIEW OF AIRCRAFT APPROACHES AND GROUND MOVEMENT AREAS WHICH COULD ADVERSELY AFFECT THE SAFETY, EFFICIENCY, OR UTILITY OF THE AIRPORT.

CONSTRUCTION NOTICE REQUIREMENT

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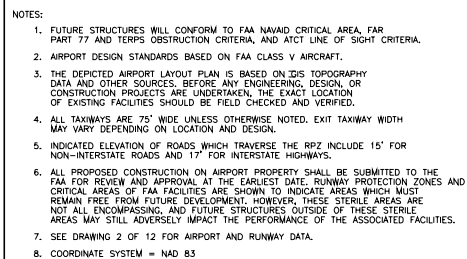
LOUISVILLE INTERNATIONAL AIRPORT	
CHARLES T. MILLER - EXECUTIVE DIRECTOR	DATE _____
FEDERAL AVIATION ADMINISTRATION	
APPROVED _____	DATE _____

June 2004	SRR	Latitude/ Longitude
May 2004	SRR	FAA REVISIONS
DATE	BY	REVISIONS



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SOURCE: RAA AIRPORT PROPERTY RECORDS - FEBRUARY 2001



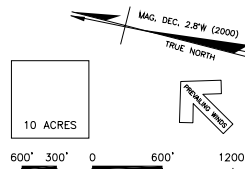
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June 2004	SRR	Latitude/ Longitude
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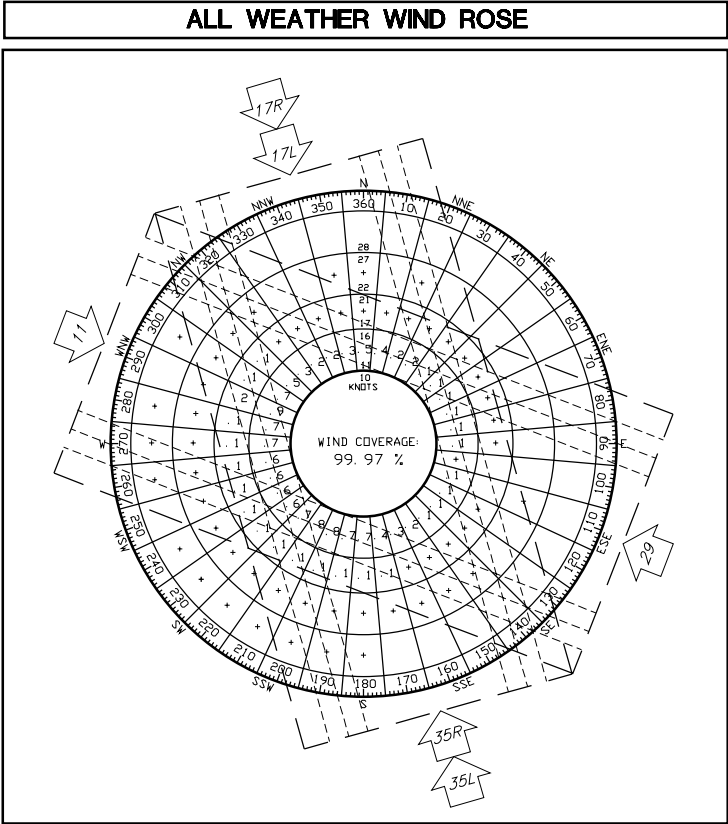
AIRPORT ELEVATION 500 MSL

Airport Layout Plan


Louisville International Airport
Louisville, Kentucky

DRAWN: mjh CHECKED: SRR FILE: louisv\mp\.\Lou01.dwg DATE: June, 2004

PB PB AVIATION, INC.
312 ELM STREET, CINCINNATI, OHIO 45202



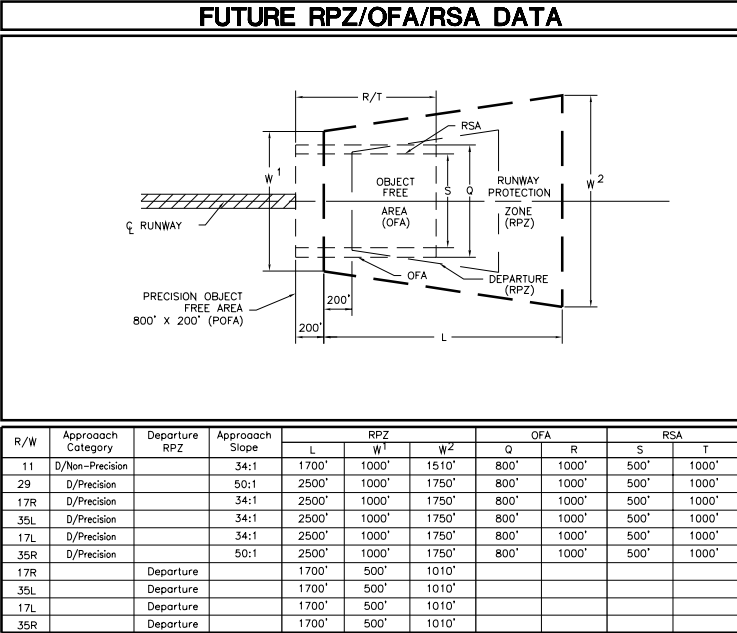
WIND DATA SUMMARY				
ALL WEATHER WIND ROSE - WIND COVERAGE				
RUNWAY	10 KNOTS	13 KNOTS	16 KNOTS	20 KNOTS
17L/35R	91.59%	96.24%	98.36%	99.77%
17R/35L	91.60%	96.24%	98.36%	99.77%
11/29	90.32%	95.38%	98.20%	99.73%
COMBINED RUNWAYS	96.76%	99.12%	99.30%	99.97%

Source: National Climatic Data Center
Federal Building, Asheville, NC
Weather Station No.: 93821
Station Location: Standiford Field, Louisville, KY

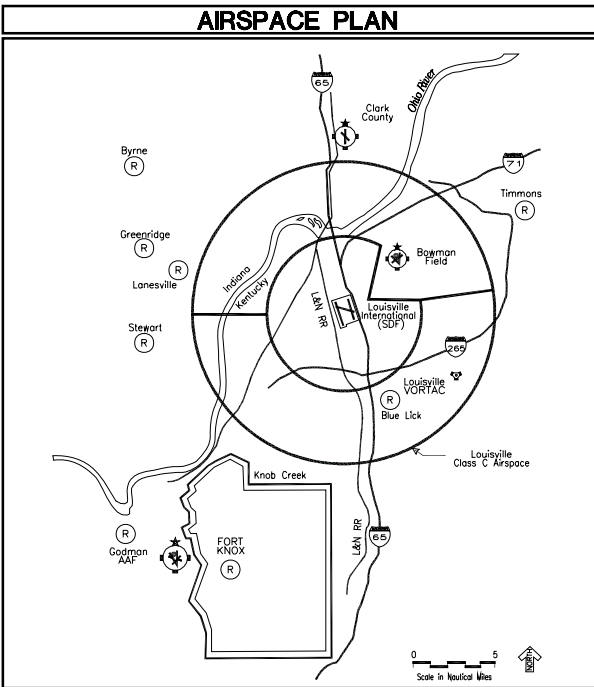
Data Period: May 1989 to April 1999

Wind Observation Recorded 24 Hours a Day

Total Annual Observations: 87,358



MODIFICATIONS TO FAA AIRPORT DESIGN STANDARDS										
DEVIATION DESCRIPTION			EFFECTED DESIGN STANDARD			PROPOSED DISPOSITION				
1. Runway 11 Extended Object Free Area (OFA) and Runway Safety Area (RSA) 600' x 800'			Precision Runway OFA & RSA 1000' x 800'			Utilize existing FAA waiver				
2. Runway 29 has a fence in OFA & RSA			Precision Runway OFA & RSA 1000' x 800'			Utilize existing FAA waiver				
3. Runway 35R has a fence in OFA			Precision Runway OFA 1000' x 800'			Utilize existing FAA waiver				



AIRPORT DATA		
ITEM	EXISTING	FUTURE
Airport Elevation (MSL)	500	500
Airport Reference Point (ARP)	N 38°10'27.8"	N 38°10'24.3"
Magnetic Declination year 2000	W 85°44'09.6"	W 85°44'11.6"
Mean Max. Temp. Hottest Month	81.1°F	81.1°F
Service Role	Air Carrier/Air Cargo	Air Carrier/Air Cargo
Terminal NAVAIDS	ILS/VOR/NDB/GPS	ILS/VOR/NDB/GPS
Combined Wind Coverage (A/W) (10 Kts)	99.97%	99.97%
Distance & Direction from Downtown Louisville	4 miles S	4 miles S
Land Owned in Fee (Acres)	1,200	2,200
Aviation Easement (Acres)	35L = 27.8 acres 17L = 27.6 acres	35L = 27.8 acres 17L = 27.6 acres
Owner	Regional Airport Authority of Louisville & Jefferson County	Regional Airport Authority of Louisville & Jefferson County
Helipad	Center Airfield	Center Airfield
Aircraft Reference Code	D-V (B-747)	D-V (B-747)

(-) No Anticipated Change

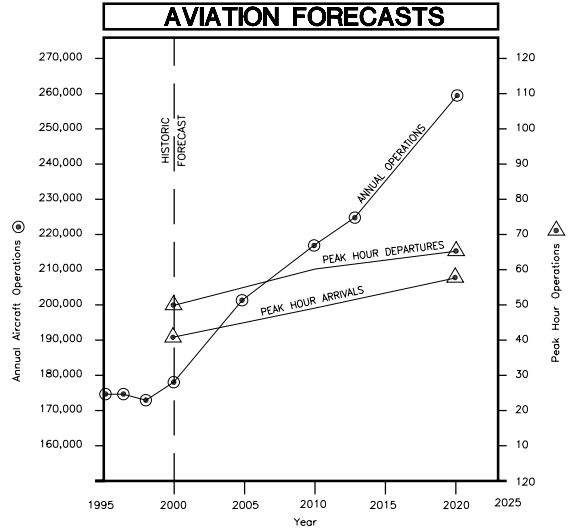
RUNWAY DATA						
ITEM	11 - 29		17R - 35L		17L - 35R	
	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE
RUNWAY LENGTH	7,250'	-	10,000'	12,850'	8,580'	-
RUNWAY WIDTH	150'	-	150'	200'	150'	-
OBSTRUCTION CLEARANCE SLOPE	29 = 34:1 11 = 20:1	-	17R = 34:1 35L = 34:1	17R = 34:1 35L = 34:1	17L = 34:1 35R = 50:1	-
EFFECTIVE GRADIENT (%)	0.027%	-	0.240%	0.240%	0.350%	-
RUNWAY END ELEVATION (MSL)	11 = 476.6 29 = 480.1	-	17R = 485.5 35L = 461.4	17R = 489.9 35L = 462	17L = 500.8 35R = 471.4	-
AZIMUTH (TRUE)	11-111°06'55" 29-291°07'47"	-	17R-165°23'53" 35L-345°24'13"	-	17L-164°54'37" 35R-344°54'54"	-
RUNWAY END COORDINATES NORTH AMERICA DATUM (1983)	11-N 38°10'48.8183" W 85°44'50.4626"	-	17R-N 38°11'05.0610" W 85°44'52.9339"	17R-N 38°11'13.1862" W 85°44'55.6459"	17L-N 38°11'14.2821" W 85°43'52.8385"	-
	29-N 38°10'22.9906" W 85°43'25.7686"	-	35L-N 38°09'29.3991" W 85°44'21.3717"	35L-N 38°09'10.2785" W 85°44'14.9900"	35R-N 38°09'52.4039" W 85°43'24.8712"	-
DECLARED DISTANCE	TAKE OFF RUN AVAILABLE (TORA)			17R=11,890' 35L=11,890'	17L=8,580' 35R=8,579'	
	TAKE OFF DISTANCE AVAILABLE (TODA)			17R=12,432' 35L=12,165'	17L=8,579' 35R=8,579'	
	ACCELERATED STOP DISTANCE AVAILABLE (ASDA)			17R=11,432' 35L=11,165'	17L=8,129' 35R=8,250'	
	LANDING DISTANCE AVAILABLE (LDA)			17R=10,582' 35L=10,125'	17L=7,800' 35R=7,800'	
AIRPORT REFERENCE CODE	D-V (B-747)	-	D-V (B-747)	-	D-V (B-747)	-
RUNWAY LIGHTING	HIRL, REIL	-	HIRL, CL, TDZ	HIRL, CL, TDZ	HIRL, CL, TDZ	-
RUNWAY MARKING	NON-PRECISION	-	PRECISION	PRECISION	PRECISION	-
APPROACH CATEGORY (FAR PART 77)	11= VISUAL(20:1) 29= PIR(50:1)	-	17R= PIR(34:1) 35L= PIR(34:1)	17R= PIR(34:1) 35L= PIR(34:1)	17L= PIR(34:1) 35R= PIR(50:1)	-
RUNWAY SURFACE COMPOSITION	CONCRETE (WC)	-	CONC/GROOVED	CONC/GROOVED	CONC/GROOVED	-
PAVEMENT STRENGTH (*)	SINGLE	75,000	-	75,000	75,000	-
	DUAL	170,000	-	207,000	207,000	-
	DUAL TANDEM	360,000	-	360,000	360,000	-
	DOUBLE DUAL TANDEM	850,000	-	850,000	850,000	-
NAVIGATION AIDS	11 = - 29 = LOC, NDB, VOR	-	17R=GS, LOC, RVR 35L=GS, LOC,	17R=GS, LOC, RVR 35L=GS, LOC,	17L=GS, LOC, RVR 35R=GS, LOC, RVR	-
VISUAL NAVIGATION AIDS	11= REIL 29= MALSR	-	17R= MALSR, PAPI 35L= ALSF-2, PAPI	17R= MALSR, PAPI 35L= ALSF-2, PAPI	17L= MALSR, PAPI 35R= ALSF-2, PAPI	-
APPROACH MINIMUMS	29= LOC 980-500 NDB 1120-1 1/2 GPS 1000-600	-	17R=ILS CAT I GPS 1320-2 1/4 35L=ILS CAT III GPS 1000-1 3/4	-	17L=ILS CAT I GPS 1320-2 1/4 35R=ILS CAT III GPS 1000-600	-

(—) No Anticipated Change

(*) FOR DETAILED PAVEMENT INFORMATION REFER TO THE LOUISVILLE INTERNATIONAL AIRPORT PAVEMENT MANAGEMENT PROGRAM REPORT (PAVEMENT CONSULTANTS, INC. 2001)

CONSTRUCTION REQUIREMENTS:

TO PROTECT OPERATIONAL SAFETY AND
FUTURE DEVELOPMENT, ALL PROPOSED
CONSTRUCTION ON THE AIRPORT MUST
BE COORDINATED BY THE AIRPORT OWNER
WITH THE FAA'S DISTRICT OFFICE PRIOR TO
CONSTRUCTION, FAA'S REVIEW TAKES
APPROXIMATELY SIXTY (60) DAYS.



REVISIONS	
DATE	BY
June 2004	SRR
May 2004	SRR

AIRPORT ELEVATION 500 MSL

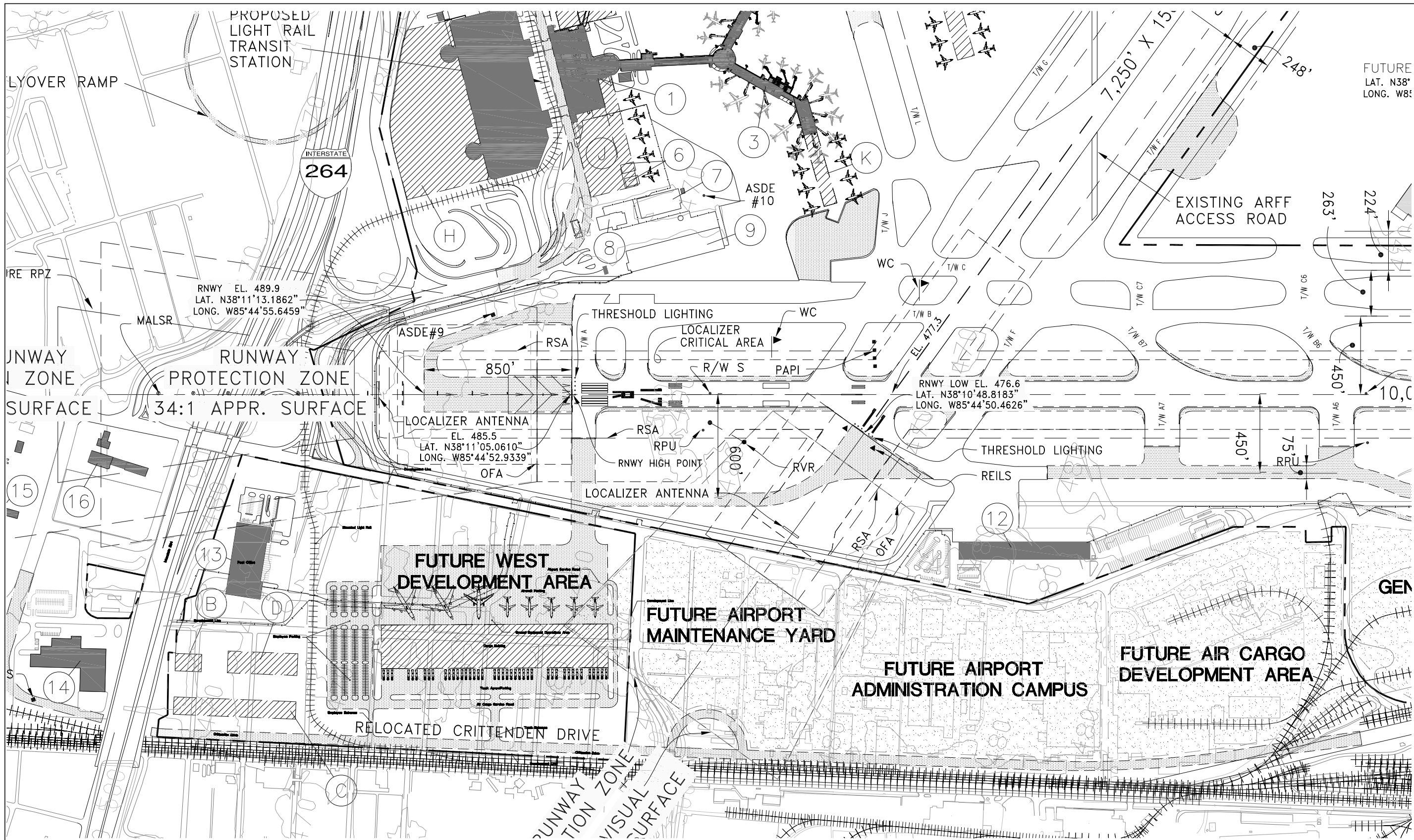
**Airport
Data Summary**

**Louisville International Airport
Louisville, Kentucky**

Drawn: mjh, Checked: SRR, File: louisv\mjh\louisv.dwg, Date: June, 2004

PB AVIATION, INC.
312 ELM STREET, CINCINNATI, OHIO 45202

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of
12



EXISTING FACILITY LEGEND					FUTURE FACILITY LEGEND				
FACILITY No.	FACILITY DESCRIPTION	BUILDING AREA (S.F.)	TOP ELEVATION (ESTIMATE)(MSL)	REMARKS	FACILITY No.	FACILITY DESCRIPTION	BUILDING AREA (S.F.)	TOP ELEVATION (ESTIMATE)(MSL)	REMARKS
1	LANDSIDE AIR CARRIER TERMINAL	185,485	520	172,000 SF OF LEASABLE SPACE	43	HYUNG CONCRETE CONTROL HANGAR (510)	23,800	520	---
2	AIRSIDE CONCOURSE A	79,894	510	11 AIRCRAFT GATES, 86,101 SF/LEASABLE SPACE	44	UPS CARGO WING 3	376,000	510	---
3	AIRSIDE CONCOURSE B	79,894	510	9 AIRCRAFT GATES, 86,101 SF/LEASABLE SPACE	45	UPS CARGO WING 2	376,000	510	---
4	TSA OFFICES	22,000	---	---	47	UPS CARGO WING 1	250,000	510	---
5	PARKING STRUCTURE	1,600,000	520	1,442 GRADE LEVEL SPACES (4 LEVEL GARAGE)	48	UPS CARGO SORTING WING	200,000	510	---
6	RAC FUEL STORAGE/CAR WASH	1,000	500	20,000 GALS	49	UPS CARGO SORTING WING	180,000	510	---
7	USE SERVICES	30,000	505	AA, AV SR, DELTA, FEDEX, SW, USA - 11 BAYS	50	UPS CARGO SORTING FACILITY	935,000	530	---
8	CATERING KITCHEN	13,600	505	---	51	UPS SATELLITE BUILDING	37,500	510	---
9	AIR CARGO BUILDING	74,100	500	DELTA, MURPHY, SW, SURF, TIME (23 BAYS)	52	UPS MAINTENANCE HANGAR	50,000	500	---
10	HOTEL (PROPOSED)	110,000	530	TR-1-251 RMS, TR-1-256 RMS, ---	53	UPS MAINTENANCE HANGAR	227,500	555	---
11	U.S. CUSTOMS GATES (PROPOSED)	---	---	OPERATIONAL FEBRUARY 16, 2000	54	UPS CARGO SORTING FACILITY	30,000	490	---
12	FEDERAL EXPRESS SORTING BLDG.	82,500	510	---	55	UPS CARGO SORTING FACILITY	1,100,000	510	---
13	U.S.P.S. & AIR CARGO BLDG.	90,000	520	---	56	UPS PERSONNEL TRAINING	190,000	490	---
14	RAA MAINTENANCE FACILITY	76,500	500	---	57	UPS WAREHOUSE	220,000	500	---
15	NATIONAL REMOTE SERVICE CENTER	8,500	495	---	58	UPS WAREHOUSE	112,500	500	---
16	BUDGET REMOTE SERVICE CENTER	20,000	495	---	59	UPS WAREHOUSE	15,000	740	---
17	AVIS RENT-A-CAR SERVICE CENTER	12,500	495	TR-8-500 RMS (5 STORES)	---	---	---	---	---
18	HERTZ REMOTE SERVICE CENTER	14,000	495	---	---	---	---	---	---
19	RAA REMOTE SERVICE CENTER	1,000	500	CONVERSION OF OLD ARFF STATION	---	---	---	---	---
20	RAA STORAGE	---	---	---	---	---	---	---	---
21	METAL MAINT MAGAZINE STORAGE	---	488	---	---	---	---	---	---
22	RAA REMOTE SERVICE CENTER	---	488	---	---	---	---	---	---
23	RAA REMOTE SERVICE CENTER	---	488	---	---	---	---	---	---
24	RAA REMOTE SERVICE CENTER	---	488	---	---	---	---	---	---
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40	RAA REMOTE SERVICE CENTER	---	488	---	---	---	---	---	---
41	RAA REMOTE SERVICE CENTER	---	488	---	---	---	---	---	---
42	RAA REMOTE SERVICE CENTER	---	488	---	---	---	---	---	---

200' 100' 0 200' 400'

MAJ. DEC. 2-8W (2000)

TRUE NORTH

AIRPORT ELEVATION 500 MSL

West Development Area Plan

5 of 12

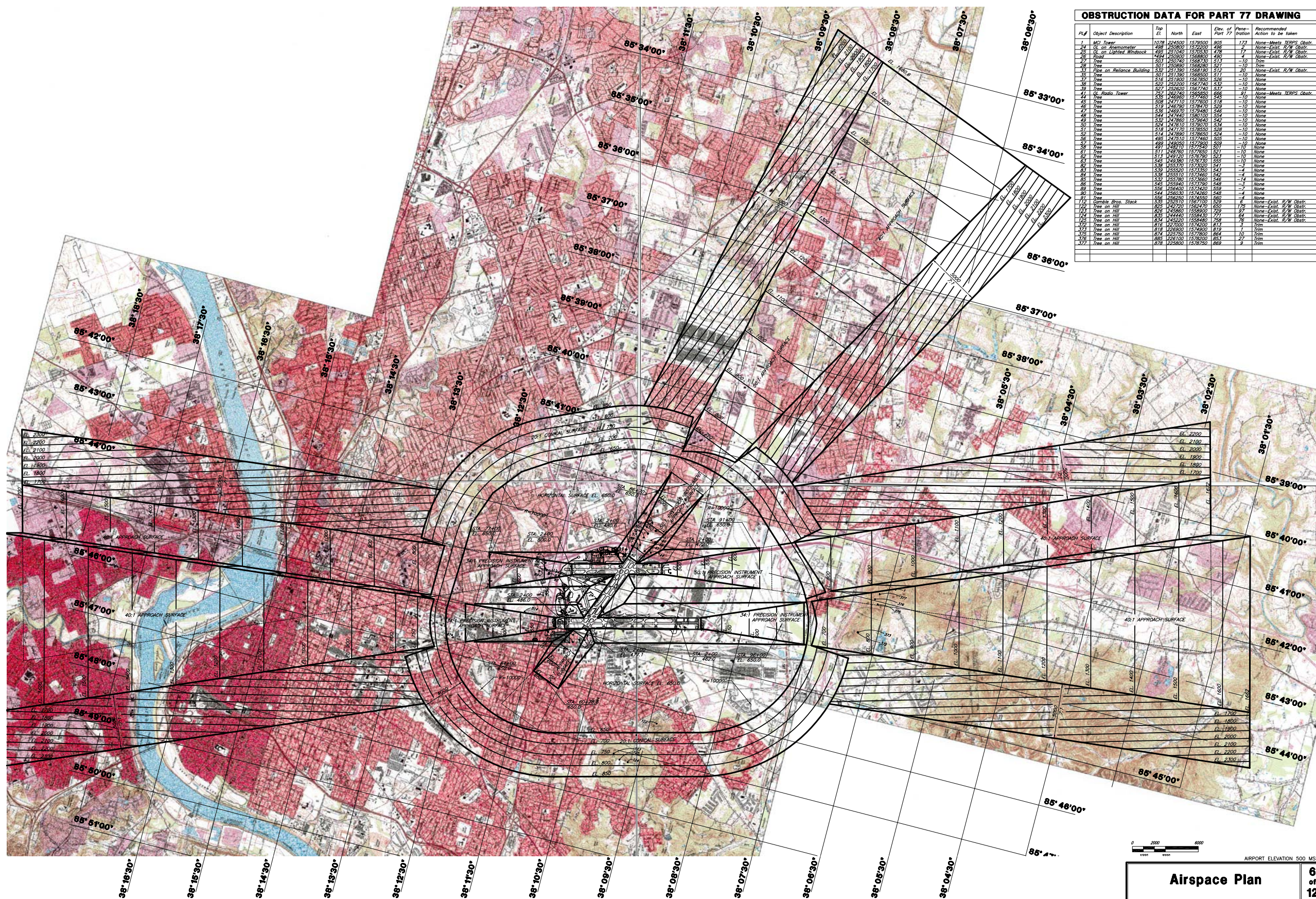
Louisville International Airport
Louisville, Kentucky

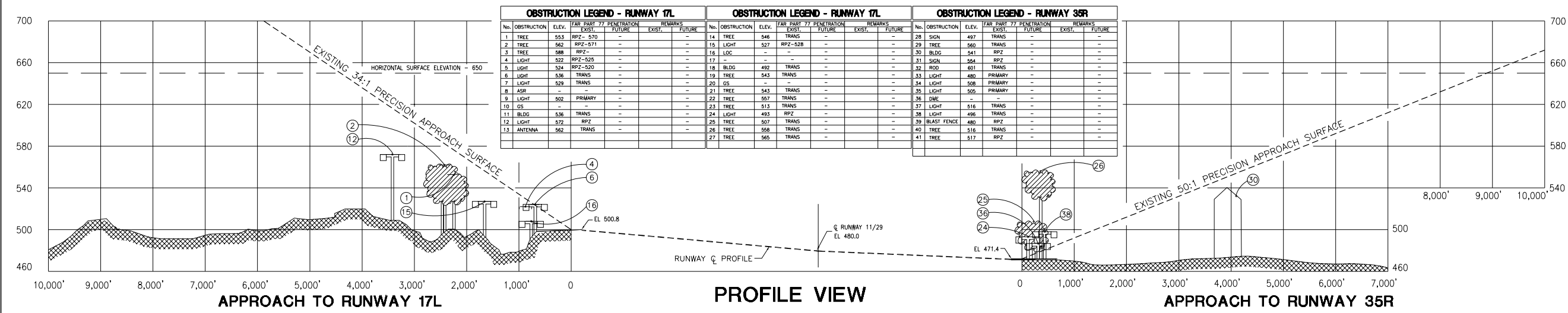
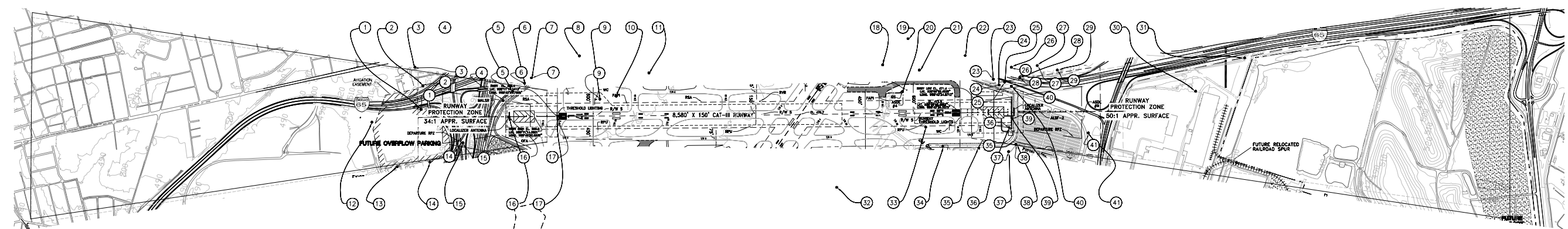
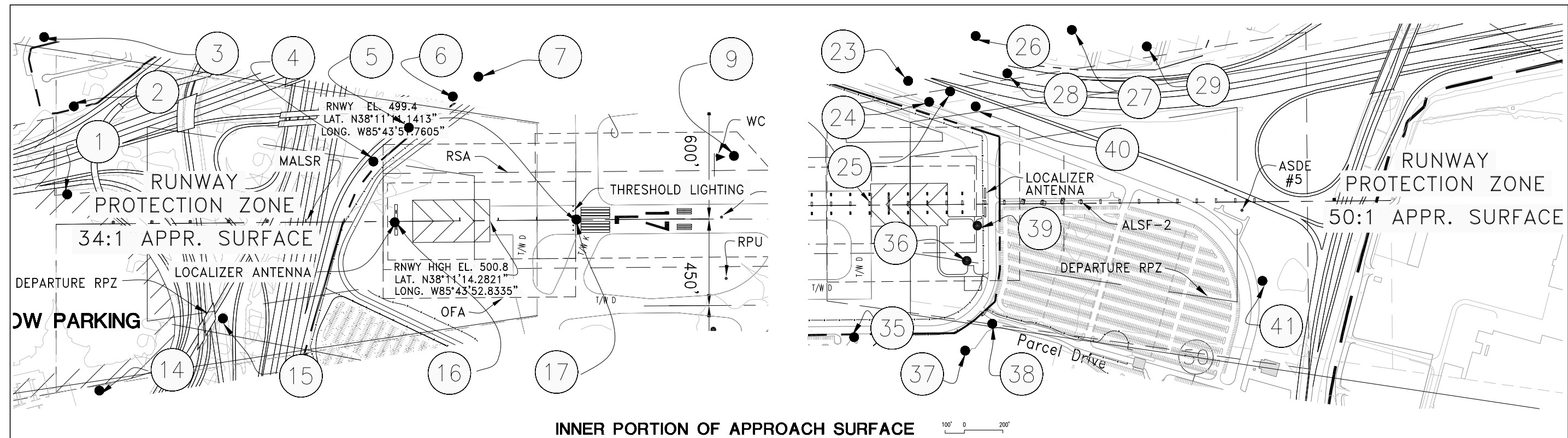
DRAWN: M.H. CHECKED: SRR FILE: louisv\mp\louisv01.dwg DATE: June, 2004

June 2004 SRR Latitude/ Longitude
May 2004 SRR FAA REVISIONS

DATE BY REVISIONS

FB AVIATION, INC.
312 ELM STREET, CINCINNATI, OHIO 45202

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OBSTRUCTION LEGEND - RUNWAY 17L						OBSTRUCTION LEGEND - RUNWAY 17L						OBSTRUCTION LEGEND - RUNWAY 35R					
No.	OBSTRUCTION	ELEV.	FAR PART 77 PENETRATION	REMARKS		No.	OBSTRUCTION	ELEV.	FAR PART 77 PENETRATION	REMARKS		No.	OBSTRUCTION	ELEV.	FAR PART 77 PENETRATION	REMARKS	
1	TREE	553	RPZ-570	-	-	14	TREE	546	TRANS	-	-	28	SIGN	497	TRANS	-	-
2	TREE	562	RPZ-571	-	-	15	LIGHT	527	RPZ-528	-	-	29	TREE	560	TRANS	-	-
3	TREE	588	RPZ-	-	-	16	LOC	-	-	-	-	30	BLDG	541	RPZ	-	-
4	LIGHT	522	RPZ-525	-	-	17	-	-	-	-	-	31	SIGN	564	RPZ	-	-
5	LIGHT	524	RPZ-520	-	-	18	BLDG	492	TRANS	-	-	32	ROAD	601	TRANS	-	-
6	LIGHT	536	TRANS	-	-	19	TREE	543	TRANS	-	-	33	LIGHT	480	PRIMARY	-	-
7	LIGHT	529	TRANS	-	-	20	GS	-	-	-	-	34	LIGHT	508	PRIMARY	-	-
8	ASH	-	-	-	-	21	TREE	543	TRANS	-	-	35	LIGHT	505	PRIMARY	-	-
9	LIGHT	502	PRIMARY	-	-	22	TREE	557	TRANS	-	-	36	LINE	-	-	-	-
10	GS	-	-	-	-	23	TREE	513	TRANS	-	-	37	LIGHT	516	TRANS	-	-
11	BLDG	536	TRANS	-	-	24	LIGHT	493	RPZ	-	-	38	LIGHT	496	TRANS	-	-
12	LIGHT	572	RPZ	-	-	25	TREE	507	TRANS	-	-	39	BLAST FENCE	480	RPZ	-	-
13	ANTENNA	562	TRANS	-	-	26	TREE	558	TRANS	-	-	40	TREE	516	TRANS	-	-
						27	TREE	565	TRANS	-	-	41	TREE	517	RPZ	-	-

20' 0 40' VERTICAL SCALE		400' 0 800' HORIZONTAL SCALE	
DATE	BY	REVISIONS	
June 2004	SRR	Latitude and Longitude	
May 2004	SRR	FAA REVISIONS	

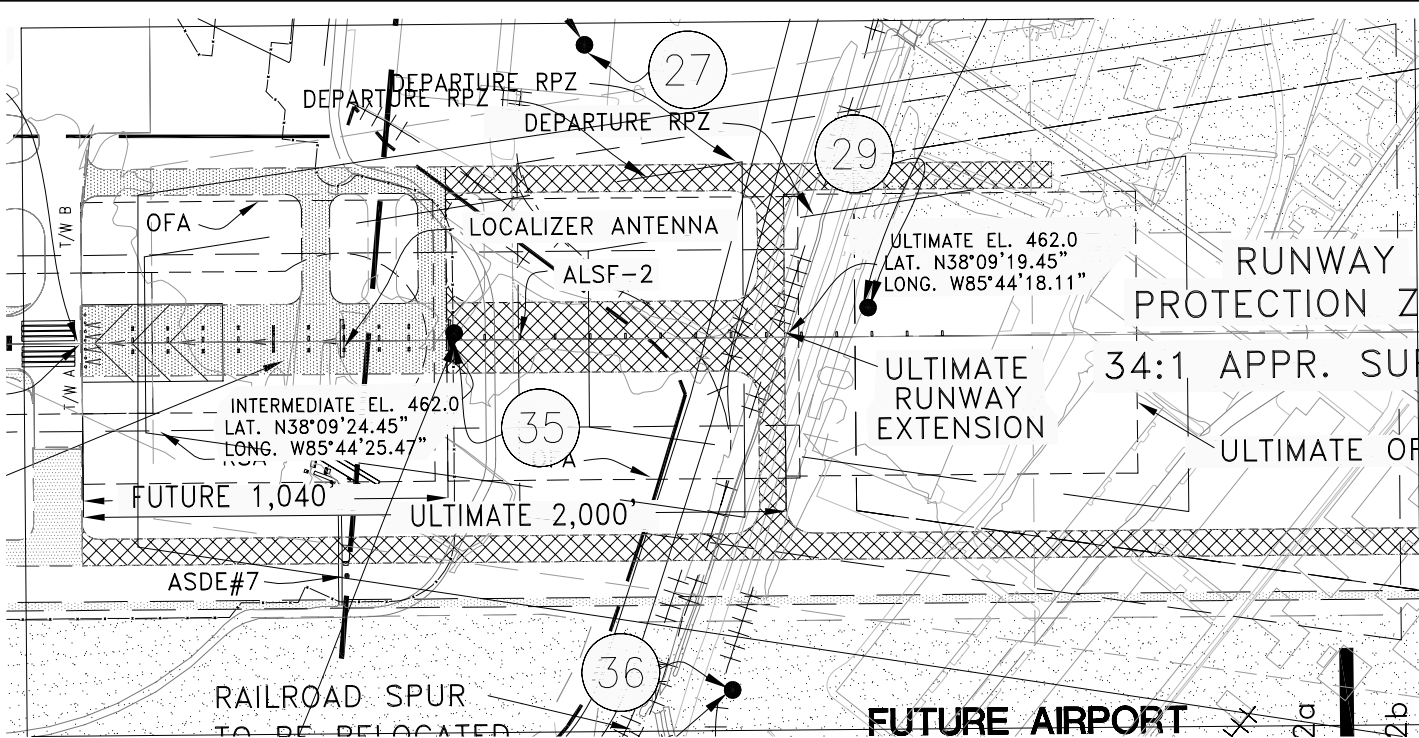
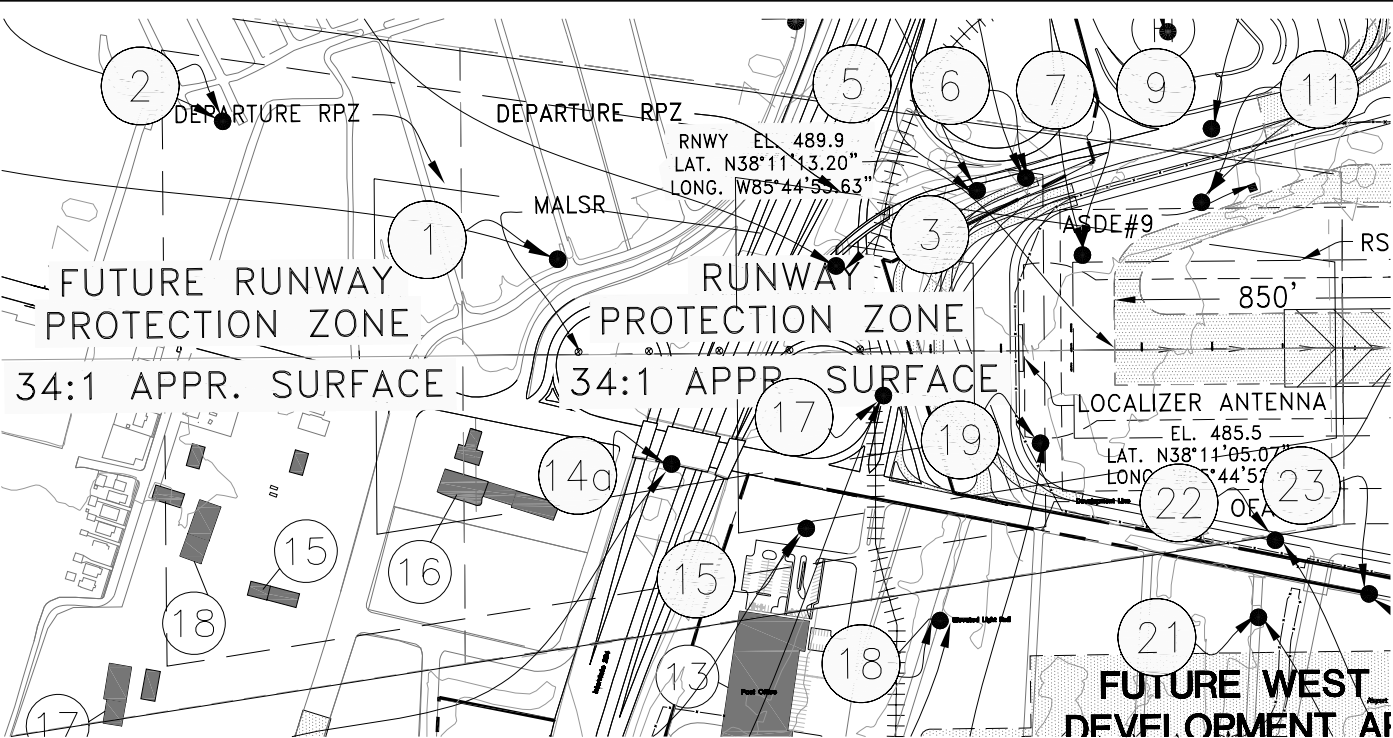
Approach Plans 17L-35R

Louisville International Airport Louisville, Kentucky

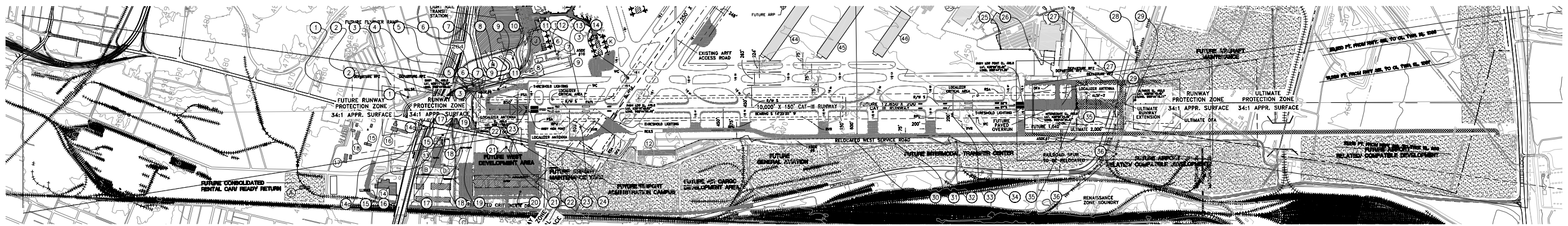
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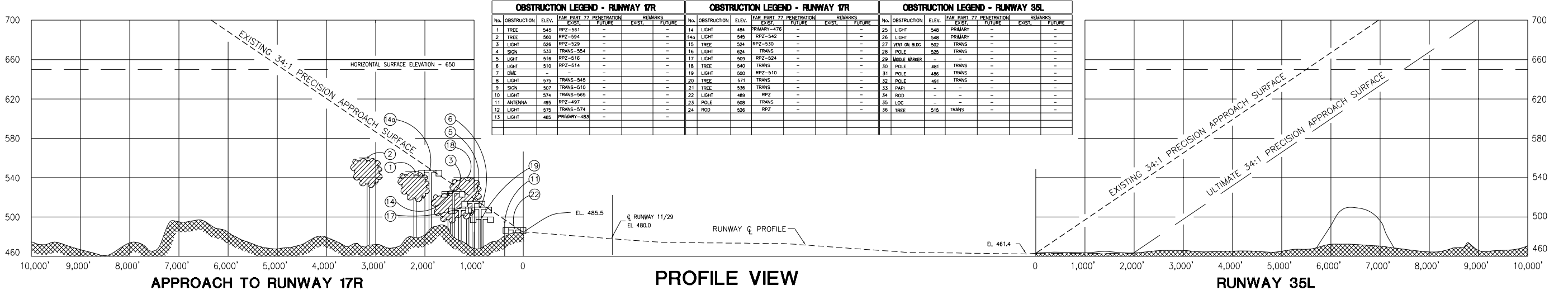
7 of 12



INNER PORTION OF APPROACH SURFACE



PLAN VIEW 17R/35L



PROFILE VIEW

20' 0 40' VERTICAL SCALE
400' 0 800' HORIZONTAL SCALE

DATE	BY	REVISIONS
June 2004	SRR	Latitude and Longitude
May 2004	SRR	FAA REVISIONS

Approach Plans 17R-35L

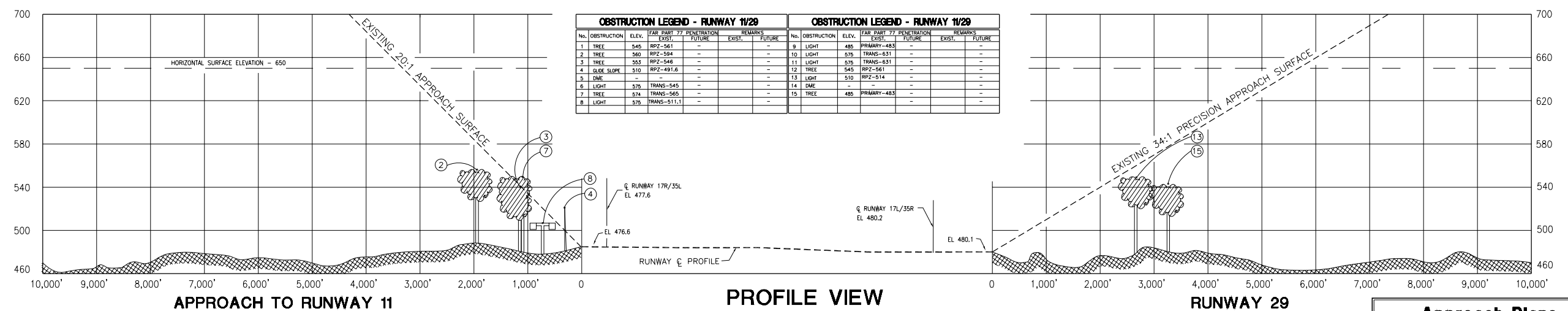
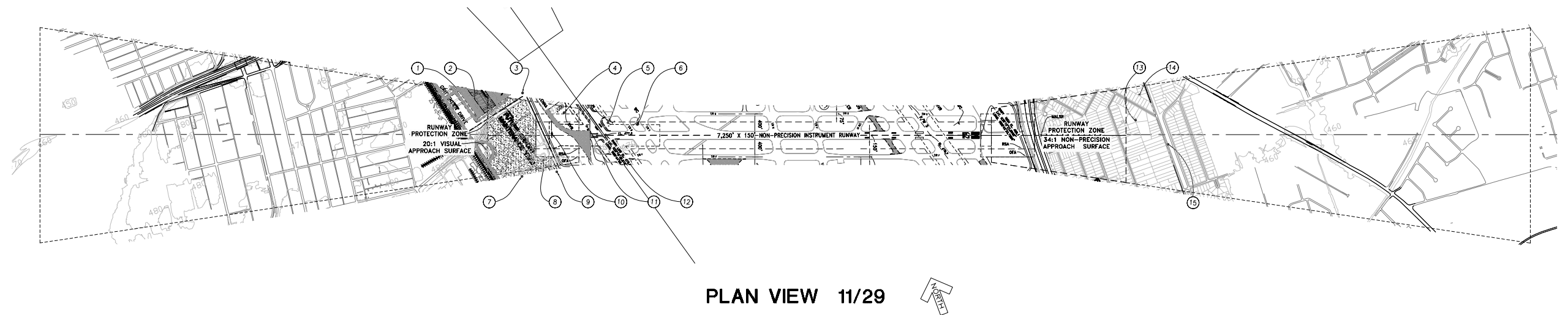
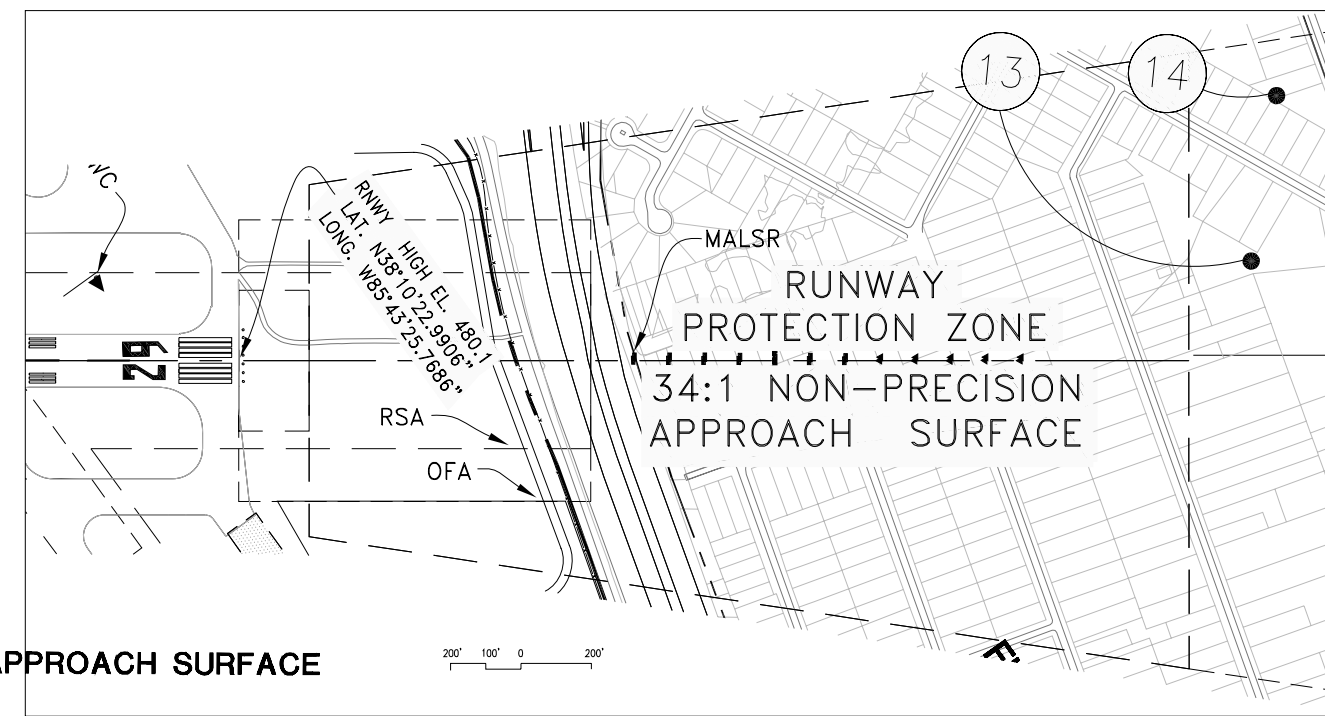
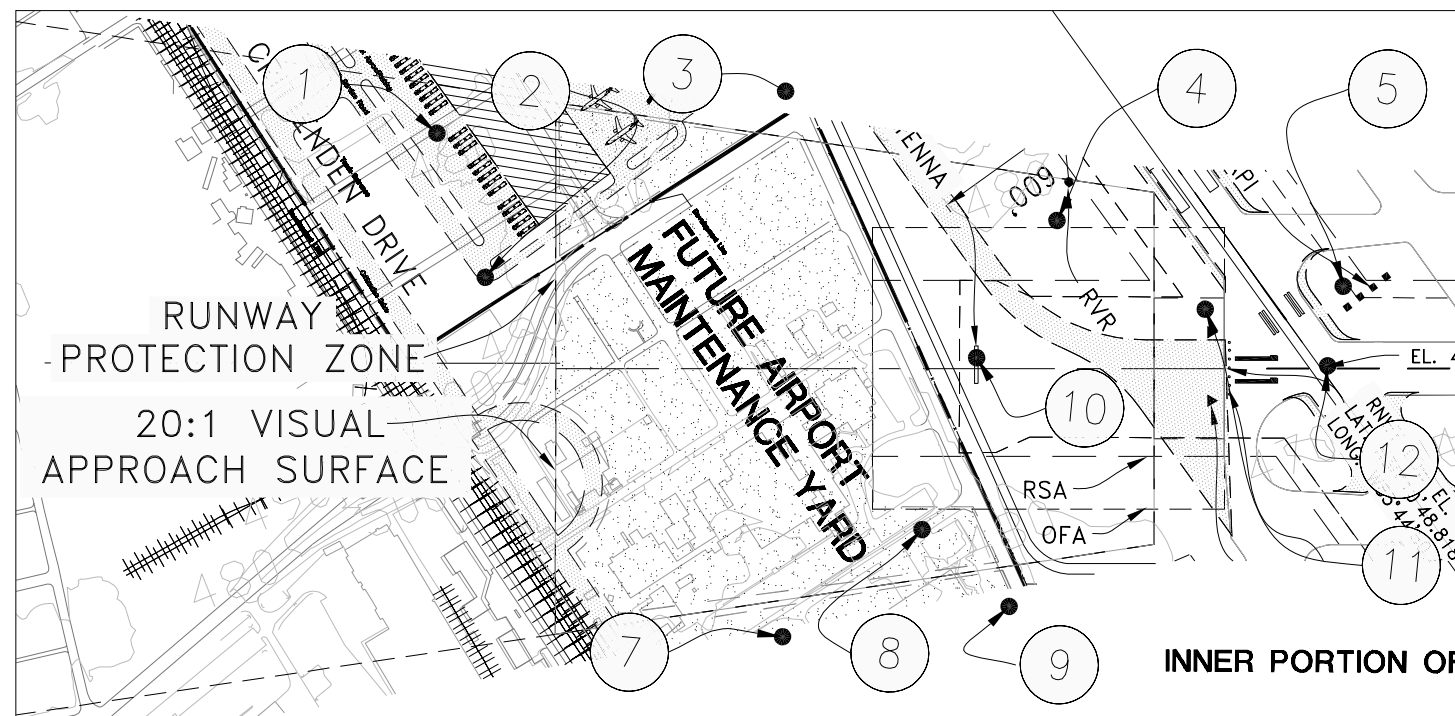
Louisville International Airport
Louisville, Kentucky

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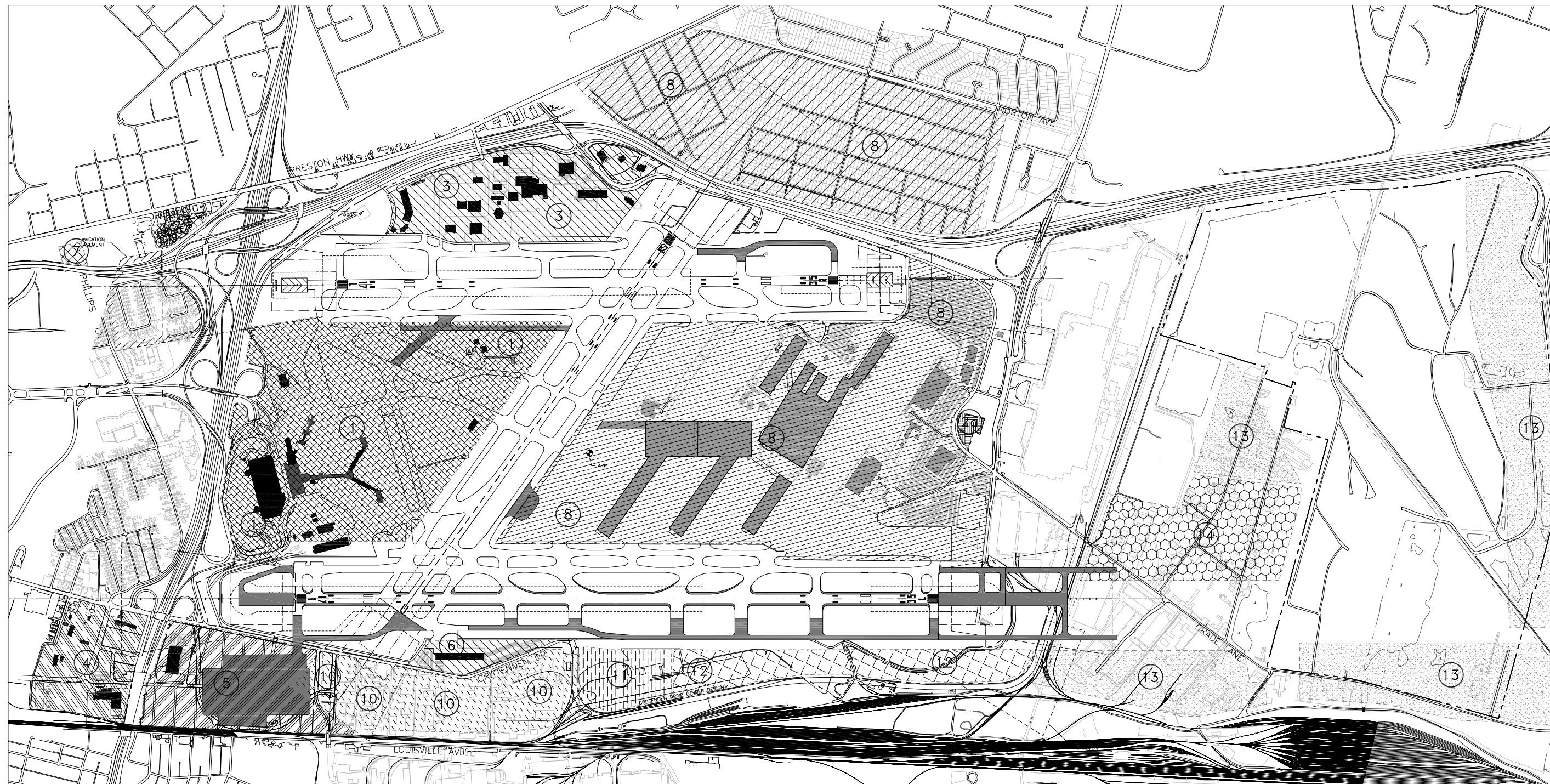
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AIRPORT ELEVATION 500 MSL
















8 of 12



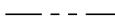


OBSTRUCTION LEGEND - RUNWAY 11/29					OBSTRUCTION LEGEND - RUNWAY 11/29				
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2	TREE	560	RPZ-564	-	10	LIGHT	575	TRANS-631	-
3	TREE	553	RPZ-546	-	11	LIGHT	575	TRANS-631	-
4	GLIDE SLOPE	510	RPZ-591.6	-	12	TREE	545	RPZ-561	-
5	DME	-	-	-	13	LIGHT	510	RPZ-514	-
6	LIGHT	575	TRANS-545	-	14	DME	-	-	-
7	TREE	574	TRANS-565	-	15	TREE	485	PRIMARY-485	-
8	LIGHT	575	TRANS-511.1	-					



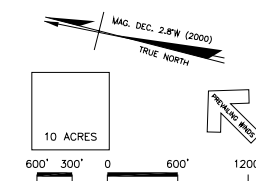
LEGEND

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|--|--|--|
|  1 - AIRPORT TERMINAL AREA |  5 - NORTHWEST DEVELOPMENT AREA (SOUTH) COMMERCIAL/INDUSTRIAL
USPS AIRMAIL FACILITY AND
COMMERCIAL AIRCRAFT SERVICES |  9 - FUTURE AIRPORT RELATED/ COMPATIBLE DEVELOPMENT
(EXISTING RESIDENTIAL LAND ACQUISITION AREA) |
|  2 - UNITED PARCEL SERVICE (UPS)
PROPERTY - INDUSTRIAL |  6 - WEST AIRFIELD DEVELOPMENT AREA
COMMERCIAL/INDUSTRIAL
FEDERAL EXPRESS FACILITY |  10 - FUTURE AIRPORT MAINTENANCE /
AIR CARGO DEVELOPMENT /
AIRPORT ADMINISTRATIVE CAMPUS |
|  2a - ATCT SITE
PERPETUAL LEASED PROPERTY |  7 - PRESTON HIGHWAY VOLUNTARY
RESIDENTIAL RELOCATION AREA
COMMERCIAL - FAR PART 150
FUTURE TERMINAL AREA PARKING |  11 - FUTURE GENERAL AVIATION AREA |
|  3 - KYANG, FBO, CORPORATE HANGARS |  8 - EDGEWOOD VOLUNTARY RESIDENTIAL
RELOCATION AREA. COMMERCIAL/INDUSTRIAL
AIRPORT COMPATIBLE DEVELOPMENT |  12 - INTERMODAL TRANSFER CENTER DEVELOPMENT |
|  4 - NORTHWEST DEVELOPMENT AREA (NORTH)
RENTAL CARS AND RAA MAINTENANCE FACILITY | |  13 - FUTURE AIRPORT RELATED/COMPATIBLE DEVELOPMENT
(EXISTING COMMERCIAL/INDUSTRIAL LAND USES) |
| | |  14 - FUTURE AIRCRAFT MAINTENANCE |

LEGEND

-  AIRPORT BOUNDARY
 FUTURE RUNWAY/TAXIWAY
 RUNWAY/TAXIWAY CENTERLINE








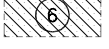







THIS LAND USE PLAN DEPICTS LAND USES ASSOCIATED WITH EXISTING AND FUTURE AIRPORT PROPERTY. PLEASE REFER TO THE LOUISVILLE INTERNATIONAL AIRPORT FAR PART 150 NOISE COMPATIBILITY STUDY FOR OFF-AIRPORT LAND USE DETAILS AS WELL AS FUTURE NOISE CONTOURS.



On Airport Landuse Plan		10 of 12
Louisville International Airport Louisville, Kentucky		
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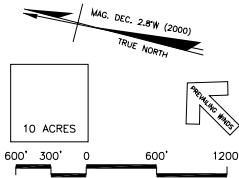
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|---|---|---|
|  - AIRPORT TERMINAL AREA |  - NORTHWEST DEVELOPMENT AREA (SOUTH) COMMERCIAL/INDUSTRIAL |  - FUTURE AIRPORT RELATED/ COMPATIBLE DEVELOPMENT (EXISTING RESIDENTIAL LAND ACQUISITION AREA) |
|  - UNITED PARCEL SERVICE (UPS) PROPERTY - INDUSTRIAL |  - WEST AIRFIELD DEVELOPMENT AREA COMMERCIAL/INDUSTRIAL |  - FUTURE AIRPORT MAINTENANCE / AIR CARGO DEVELOPMENT / AIRPORT ADMINISTRATIVE CAMPUS |
|  - ATCT SITE PERPETUAL LEASED PROPERTY |  - PRESTON HIGHWAY VOLUNTARY RESIDENTIAL RELOCATION AREA COMMERCIAL - FAR PART 150 FUTURE TERMINAL AREA PARKING |  - FUTURE GENERAL AVIATION AREA |
|  - KYANG, FBO, CORPORATE HANGARS |  - EDGEWOOD VOLUNTARY RESIDENTIAL RELOCATION AREA, COMMERCIAL/INDUSTRIAL |  - INTERMODAL TRANSFER CENTER DEVELOPMENT |
|  - NORTHWEST DEVELOPMENT AREA (NORTH) RENTAL CARS AND RAA MAINTENANCE FACILITY |  - FUTURE AIRPORT RELATED/COMPATIBLE DEVELOPMENT (EXISTING COMMERCIAL/INDUSTRIAL LAND USES) |  - FUTURE AIRCRAFT MAINTENANCE |
| | | |

LEGEND

- AIRPORT BOUNDARY
FUTURE RUNWAY/TAXIWAY
RUNWAY/TAXIWAY CENTERLINE

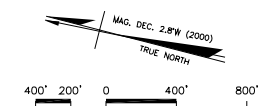
THIS LAND USE PLAN DEPICTS LAND USES ASSOCIATED WITH EXISTING AND FUTURE AIRPORT PROPERTY. PLEASE REFER TO THE LOUISVILLE INTERNATIONAL AIRPORT FAR PART 150 NOISE COMPATIBILITY STUDY FOR OFF-AIRPORT LAND USE DETAILS AS WELL AS FUTURE NOISE CONTOURS.



On Airport Landuse Plan		11 of 12
 Louisville International Airport Louisville, Kentucky		
<small>DRAWN: mjh CHECKED: SRR FILE: louisv\mjh\lou11.dwg DATE: May, 2003</small>		
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10 ACRES



Airport Photograph		12 of 12
 Louisville International Airport Louisville, Kentucky		
DRAWN: mjh CHECKED: SRR FILE: louisv\mp\Low12.dwg DATE: May, 2003		
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9.0 CAPITAL IMPROVEMENT PROGRAM

This Chapter presents the Capital Improvement Program (CIP) for the implementation of the preferred alternative. The phasing plan and cost estimates, based on a planning level of detail, are presented to illustrate the timing and relative magnitude of the CIP. It is important to note that the CIP presented includes those development projects that were specifically identified in the Master Plan Update. The elements of the plan that are conceptual in nature (i.e. long-term land uses south of the Airport) do not have sufficient definition to provide a cost estimates and thus were not included in the CIP.

Table 9.1-1 presents the list of Master Plan projects by year with estimated capital cost. **Exhibit 9.1-1** depicts the project locations on the Airport with the numbers corresponding to the project list in Table 9.1-1. In practice, capital projects will be undertaken when demand warrants, rather than in strict accordance with the phasing presented in this Chapter. Furthermore, the actual financing of capital expenditures will be a function of RAA analysis and policy at the time of implementation.

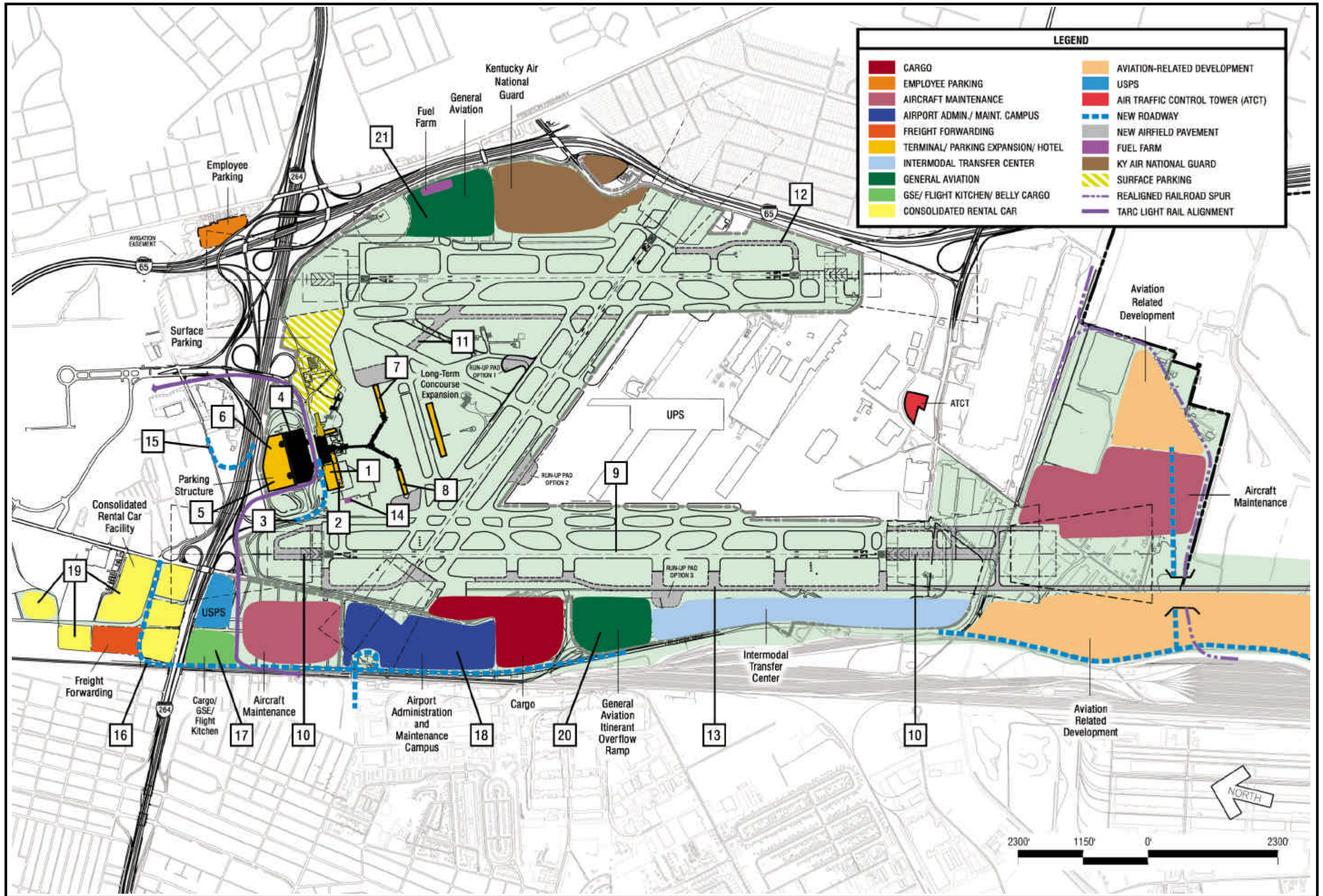
9.1 Phase I: 2003-2006

10. *Runway 17R/35L Paved Overruns* – In order to provide additional takeoff length for long-haul cargo flights increased safety, and noise benefits, this project consists of constructing paved overruns of 850 feet to the north and 1,040 feet to the south of Runway 17R/35L. This cost estimate does not include the ultimate extension to Runway 35L, an additional 850 foot extension.

12. *Taxiway E Extension* – This taxiway would provide a full-length taxiway on the east side Runway 17L/35R. It would allow general aviation and KY Air National Guard aircraft to taxi directly to Runway 35R without crossing the runway to taxi on the opposite full-length taxiway.

Table 9.1-1 Louisville International Airport CAPITAL IMPROVEMENT PLAN																					
	PROJECT	Total Cost	RAA Fiscal Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Landside Terminal Expansion Phase 1	\$ 58,148,000							\$ 8,722,200	\$ 14,537,000	\$ 17,444,400	\$ 17,444,400									
2	Landside Terminal Expansion Phase 2	\$ 87,223,000																\$ 65,417,250	\$ 21,805,750		
3	Terminal and Access Roads, Curbsides	\$ 33,505,000							\$ 5,025,750	\$ 8,376,250	\$ 10,051,500	\$ 10,051,500									
4	Expansion of Existing Parking Structure (2 levels)	\$ 41,209,000									\$ 6,181,350	\$ 35,027,650									
5	New Parking Structure (Phase 1)	\$ 50,517,000														\$ 25,258,500	\$ 25,258,500				
6	New Parking Structure (Phase 2)	\$ 50,517,000																		\$ 25,258,500	\$ 25,258,500
7	Concourse A Expansion	\$ 37,124,000							\$ 5,568,600	\$ 9,281,000	\$ 11,137,200	\$ 11,137,200									
8	Concourse B Expansion	\$ 73,794,000													\$ 36,897,000	\$ 36,897,000					
9	Widening of Runway 17R/35L	\$ 22,527,000																		\$ 11,263,500	\$ 11,263,500
10	Runway 17R/35L Paved Overruns	\$ 18,000,000			\$ 1,800,000	\$ 8,100,000	\$ 8,100,000														
11	Taxiway R and D4 Extension	\$ 22,358,000							\$ 10,612,000							\$ 11,746,000					
12	Taxiway E Extension	\$ 8,100,000				\$ 8,100,000															
13	Taxiway A	\$ 28,756,000					\$ 6,075,000						\$ 9,720,000				\$ 12,961,000				
14	Fuel Stand	\$ 4,250,000						\$ 4,250,000													
15	KFEC Exit Ramp	\$ 25,364,000											\$ 25,364,000								
16	Relocation of Crittenden Dr.	\$ 10,334,000											\$ 6,200,400	\$ 4,133,600							
17	Cargo/GSE/Flight Kitchen Complex	\$ 24,606,000						\$ 2,460,600	\$ 4,921,200	\$ 4,921,200										\$ 12,303,000	
18	Airport Administration/ Maintenance Campus	\$ 18,081,000											\$ 4,520,250	\$ 4,520,250			\$ 4,520,250	\$ 4,520,250			
19	RAC Ready/Return	\$ 5,916,000					\$ 887,400	\$ 5,028,600													
20	General Aviation Itinerant Overflow Ramp	\$ 43,934,000				\$ 10,983,500						\$ 21,967,000									\$ 10,983,500
21	General Aviation Hangar	\$ 5,894,000									\$ 2,947,000								\$ 2,947,000		
	Total By Year	\$ 670,157,000		\$ -	\$ 1,800,000	\$ 27,183,500	\$ 15,062,400	\$ 11,739,200	\$ 34,849,750	\$ 37,115,450	\$ 47,761,450	\$ 95,627,750	\$ 45,804,650	\$ 8,653,850	\$ 36,897,000	\$ 73,901,500	\$ 42,739,750	\$ 69,937,500	\$ 24,752,750	\$ 48,825,000	\$ 47,505,500

Source: PB Aviation



13. *Taxiway A* – Taxiway A would be constructed on an as needed basis to serve west side development. The first phase would be between Runway 11 and Runway 17R to serve the existing FedEx cargo ramp and future development of the Northwest property.

19. *Consolidated Rental Car Ready/Return* – Site preparation and construction of a rental car terminal (12,000 square feet) containing rental car counters for the various agencies and related lobby space. Approximately 800 parking spaces would be used for rental car pickup and drop-off.

20. *General Aviation Itinerant Overflow Ramp* – Three phases of ramp expansion for general aviation itinerant parking and special uses such as horse transport.

9.2 Phase II: 2007-2011

1. *Landside Terminal Expansion (Phase 1)* – Phase 1 terminal expansion includes the extension of the landside building to provide additional ticketing lobby and counter space on the second level and baggage claim expansion on the first level. The extension would be approximately 200 feet in length.

3. *Terminal and Access Roads, Curbsides* – Extension of the 2-level roadway to coincide with the terminal expansion and modifications to the exit roadway to provide access improvements to the development area east of the terminal. Because of the construction impacts it was envisioned that the full curbside extension would be done as a single project rather than with each phase of the terminal expansion.

4. *Expansion of Existing Parking Structure (2 levels)* – This project includes construction of 2 additional levels to the existing parking structure and

pedestrian bridges to connect the added levels to the terminal. This expansion will provide approximately 2,100 parking spaces adjacent to the terminal.

7. Concourse A Expansion – This project includes terminal and apron construction for Concourse A to provide 7 gates along with holdroom and concessions space on the concourse level and airline support space on the apron level.

11. Taxiway R and D4 Extension – The first phase of this project would be the construction of an extension of the high-speed taxiway exit (D4) directly to the terminal area. This taxiway extension would provide a dual parallel taxiway and replace the existing Taxiway R.

14. Fuel Stand – Construct a pipeline connection from the UPS fuel farm to a fuel stand in the terminal area where aircraft refueling trucks will stage and receive fuel from the pipeline.

17. Cargo/GSE/Flight Kitchen Complex – Site preparation and construction of an air cargo building (70,000 square feet), flight kitchen (15,000 square feet), and GSE maintenance building (50,000 square feet) along with parking and truck loading docks. A secure tug road would serve this complex and the USPS facility.

20. General Aviation Itinerant Overflow Ramp – The second phase of ramp expansion on the west side of the airfield for general aviation itinerant parking and special uses such as horse transport.

21. General Aviation Hangars – Construction of corporate GA hangars of similar size and type as the existing hangars. The timing would ultimately depend on demand for these facilities.

9.3 Phase III: 2012-2020

2. *Landside Terminal Expansion (Phase 2)* – This project is the full build-out of the landside building (approximately 250 additional feet in length) as well as construction of a 5-gate concourse along the south side of the expanded landside terminal.

5. *New Parking Structure (Phase 1)* – The next phase of parking expansion includes approximately 3,000 spaces in a new structure over the existing surface lot.

6. *New Parking Structure (Phase 2)* – Addition of approximately 3,000 spaces to the Phase 1 parking structure.

8. *Concourse B Expansion* – An extension similar to Concourse A extension that would provide 5 additional gates and corresponding holdroom, concessions, and airline support space.

9. *Widening of Runway 17R/35L* – At the point where the Airbus A380 becomes the critical aircraft at the Airport, Runway 17R/35L is to be widened to 200 feet. This project includes symmetrical widening and relocation of necessary runway lighting.

11. *Taxiway R and D4 Extension* – The second phase of this project consists of a taxiway extension that would provide a dual parallel taxiway system for Runway 17L/35R and replace the existing Taxiway P.

13. *Taxiway A* – The remainder of Taxiway A would be constructed on an as needed basis to serve west side development.

15. *KFEC Exit Ramp* – Construction of a flyover ramp from Phillips Lane to Eastbound Watterson Expressway for traffic exiting the KFEC complex. This will reduce non-airport traffic from the terminal roadway.

16. *Relocation of Crittenden Drive* – Construction of approximately 8,300 linear feet of four-lane road adjacent to the railroad line from the existing Crittenden Drive extending northward, under the Watterson Expressway and reconnecting with existing Crittenden Drive north of the Watterson Interchange. This project also includes the connector ramp and bridge over the railroad to Woodlawn Avenue.

17. *Cargo/GSE/Flight Kitchen Complex* – Site preparation and construction of an air cargo building (70,000 square feet), flight kitchen (15,000 square feet), and GSE maintenance building (50,000 square feet) along with parking and truck loading docks. A secure tug road would serve this complex and the USPS facility.

18. *Airport Administration/ Maintenance Campus* – Site preparation and construction of Airport Administration buildings, storage warehouse, relocation of the airport maintenance building and maintenance yard.

20. *General Aviation Itinerant Overflow Ramp* – The third and final phase of ramp expansion for general aviation itinerant parking and special uses.

21. *General Aviation Hangars* – Construction of corporate GA hangars of similar size and type as the existing hangars. The timing of these facilities would ultimately depend on market demand.

* * * * *

The phasing of the improvements described above was based on implementation to meet demand described in *Chapter 3.0, Activity Projections*. It must be emphasized that the actual timing and financing of Airport improvements will be based upon actual activity, as well as the Airport's particular financial circumstances, at the time of implementation.

APPENDIX A – TERMINAL REQUIREMENT ASSUMPTIONS

TABLE A-1 Louisville International Airport PASSENGER TERMINAL FACILITIES FORECAST INPUT ASSUMPTIONS						
Planning Years				Unit	Terminal Facilities Program Variables	Louisville Assumption Sources
2000	2005	2010	2020			
3.8164	4.4194	4.9884	6.6322	Pax	= Million Annual Passengers	Airport Activity Report, September 1999, Table 48, Assumes MAP is double the annual enplanements
1006	1143	1269	1621	Pax	= Peak hour number of originating domestic passengers	Projected from Airport Activity Report, September 1999, Table 28 and Table 48
75	89	102	152	Pax	= Peak Hour number of originating international passengers	Based on B727-100 aircraft currently used at 80% load factor and increased at the same yearly rate as total enplanements, all origin.
1090	1239	1375	1757	Pax	= Peak hour number of enplaning domestic passengers	Airport Activity Report, September 1999, Table 48
75	89	102	152	Pax	= Peak hour number of enplaning international passengers	Based on B727-100 aircraft currently used at 80% load factor and increased at the same yearly rate as total enplanements, all origin.
855	972	1079	1378	Pax	= Peak hour number of terminating domestic passengers	Airport Activity Report, September 1999, Table 48, assumes percentage of terminating/deplaning equals percentage of originating
75	89	102	152	Pax	= Peak hour number of terminating international passengers	Based on B727-100 aircraft currently used at 80% load factor and increased at the same yearly rate as total enplanements, all origin.
84	96	106	136	Pax	= Peak hour number of domestic to domestic transfer passengers	Projected from Airport Activity Report, September 1999, Table 28 and Table 48
0	0	0	0	Pax	= Peak hour number of international to international transfer passengers	Based on B727-100 aircraft currently used at 80% load factor and increased at the same yearly rate as total enplanements, all origin
0	0	0	0	Pax	= Peak hour number of domestic to international transfer passengers	Based on B727-100 aircraft currently used at 80% load factor and increased at the same yearly rate as total enplanements, all origin.
0	0	0	0	Pax	= Peak hour number of international to domestic transfer passengers	Based on B727-100 aircraft currently used at 80% load factor and increased at the same yearly rate as total enplanements, all origin.
927	1053	1169	1493	Pax	= Peak hour number of deplaning domestic passengers	Airport Activity Report, September 1999, Table 48
75	89	102	152	Pax	= Peak hour number of deplaning international passengers	Based on B727-100 aircraft currently used at 80% load factor and increased at the same yearly rate as total enplanements, all origin.
1.35	1.35	1.35	1.35	Visitors	= Number of visitors per originating domestic passenger	E-mail from Steve Ryan dated 14 February 2000 forwarding e-mail from Rande Swann dated 14 February 2000
1.35	1.35	1.35	1.35	Visitors	= Number of visitors per originating international passenger	E-mail from Steve Ryan dated 14 February 2000 forwarding e-mail from Rande Swann dated 14 February 2000
1.35	1.35	1.35	1.35	Visitors	= Number of visitors per terminating domestic passenger	E-mail from Steve Ryan dated 14 February 2000 forwarding e-mail from Rande Swann dated 14 February 2000
1.35	1.35	1.35	1.35	Visitors	= Number of visitors per terminating international passenger	E-mail from Steve Ryan dated 14 February 2000 forwarding e-mail from Rande Swann dated 14 February 2000
11.6	11.6	11.6	11.6	%	= Percentage of domestic originating passengers utilizing curbside-check-in	Customer Satisfaction Survey Jan - Dec 1999 Question D9
90	90	90	90	L.F.	= Average exposure length per FIS baggage claim device	Assumption Based on Past Experience
2	2	2	2	No.	= Number of curbside desks per input conveyor	Assumption Based on Past Experience
3	3	3	3	Min.	= Processing rate of passengers at curbside check-in	Assumption Based on Past Experience
180	180	180	180	S.F.	= Area per curbside check-in module	Assumption Based on Past Experience
2.35	2.35	2.35	2.35	Min.	= Processing rate of domestic passenger at check-in	Assumption Based on Past Experience
72.2	72.2	72.2	72.2	%	= Percentage of domestic passengers using check-in desks	Customer Satisfaction Survey Jan - Dec 1999 Question D9
100	100	100	100	%	= Percentage of domestic check-in desks manned during the peak hour	Assumption Based on Past Experience
3.55	3.55	3.55	3.55	L.F.	= Average length of check-in counter and baggage well	Assumption Based on Past Experience
5.00	5.00	5.00	5.00	%	= Percentage of domestic passengers using carts in the check-in queue	Assumption Based on Past Experience

<p align="center">TABLE A-1 (continued) Louisville International Airport PASSENGER TERMINAL FACILITIES FORECAST INPUT ASSUMPTIONS</p>						
Planning Years				Unit	Terminal Facilities Program Variables	Louisville Assumption Sources
2000	2005	2010	2020			
17.5	17.5	17.5	17.5	S.F.	= Average area per passenger with cart in the check-in queue	Assumption Based on Past Experience
15	15	15	15	S.F.	= Average area per passenger without cart in the check-in queue	IATA Level of Service C
0.0	10.00	10.00	15.00	%	= Percentage of passengers and visitors utilizing the light rail station	Assumption Based on Past Experience
60	60	60	60	%	= Percentage of visitors in domestic check-in queue	Assumption Based on Past Experience
198	198	198	198	S.F.	= Area of oversized baggage check-in	Assumption Based on Past Experience
3.55	3.55	3.55	3.55	L.F.	= Length of ticket sales counter	Assumption Based on Past Experience
1.5	1.5	1.5	1.5	No.	= Average number of pieces of baggage per passenger	E-mail from Steve Ryan dated 14 February 2000 forwarding e-mail from Rande Swann dated 14 February 2000
0.25	0.25	0.25	0.25	Min.	= Processing time per person at security	Assumption Based on Past Experience
50	50	50	50	%	= Percentage of originating passenger visitors traveling to airside	Assumption Based on Past Experience
50	50	50	50	%	= Percentage of terminating passenger visitors traveling to airside	Assumption Based on Past Experience
325	325	325	325	S.F.	= Area of primary screening per unit	Assumption Based on Past Experience
276	276	276	276	S.F.	= Area of secondary screening per unit	Assumption Based on Past Experience
77	77	77	77	%	= Percentage of domestic terminating peak during airport peak	Assumption Based on Past Experience
12	12	12	12	L.F.	= Distance between security units	Assumption Based on Past Experience
2.6	2.6	2.6	2.6	L.F.	= Average distance between persons in the security queue	Assumption Based on Past Experience
145	145	145	145	L.F.	= Average exposure length of each landside baggage claim device	Average of the existing baggage claim devices
83.8	83.8	83.8	83.8	%	= Percentage of domestic terminating passengers using baggage claim	Customer Satisfaction Survey Jan - Dec 1999 Question A2
725	725	725	725	S.F.	= Area of each baggage claim device	Average of the existing baggage claim devices
31.8	31.8	31.8	31.8	%	= Percentage of baggage claim passengers using baggage carts	Customer Satisfaction Survey Jan - Dec 1999 Question A6
21.53	21.53	21.53	21.53	S.F.	= Area per passenger with cart	Assumption Based on Past Experience
17.00	17.00	17.00	17.00	S.F.	= Area per passenger without cart	IATA Level of Service "C"
8.50	8.50	8.50	8.50	Min.	= Average occupancy time per person in domestic baggage claim	Customer Satisfaction Survey Jan - Dec 1999 Question A3
20	20	20	20	S.F.	= Area per waiting and seated person	IATA Level of Service "C"
50	50	50	50	S.F.	= Area per bathroom module	Assumption Based on Past Experience
1	0	0	0	No.	= Number of 1-25 seat aircraft domestic gates	Based on projections in Table 1-1 that are based on Airport Activity Report, September 1999, Tables 30 and 35
2	1	1	1	No.	= Number of 26-49 seat aircraft domestic gates	Based on projections in Table 1-1 that are based on Airport Activity Report, September 1999, Tables 30 and 35
3	5	7	9	No.	= Number of 50-79 seat aircraft domestic gates	Based on projections in Table 1-1 that are based on Airport Activity Report, September 1999, Tables 30 and 35
0	0	0	0	No.	= Number of 80-100 seat aircraft domestic gates	Based on projections in Table 1-1 that are based on Airport Activity Report, September 1999, Tables 30 and 35
14	14	15	18	No.	= Number of 101-200 seat aircraft domestic gates	Based on projections in Table 1-1 that are based on Airport Activity Report, September 1999, Tables 30 and 35
0	0	0	0	No.	= Number of 201-300 seat aircraft domestic gates	Based on projections in Table 1-1 that are based on Airport Activity Report, September 1999, Tables 30 and 35
0	0	0	0	No.	= Number of 301-560 seat aircraft domestic gates	Based on projections in Table 1-1 that are based on Airport Activity Report, September 1999, Tables 30 and 35
18.3	18.3	18.3	18.3	%	= Percent of peak hour domestic terminating passengers using rental cars	Customer Satisfaction Survey Jan - Dec 1999 Question A8
1.12	1.12	1.12	1.12	Min.	= Processing time at the rental car counter	Customer Satisfaction Survey Jan - Dec 1999 Question A10H

TABLE A-1 (continued) Louisville International Airport PASSENGER TERMINAL FACILITIES FORECAST INPUT ASSUMPTIONS						
Planning Years				Unit	Terminal Facilities Program Variables	Louisville Assumption Sources
2000	2005	2010	2020			
5	5	5	5	L.F.	= Length of average rental car counter	Taken from the floor plans
80	80	80	80	%	= Percentage of pax for whom seats are provided in the domestic departure lounge	Assumption Based on Past Experience
11	11	11	11	S.F.	= Space per seated person in the departure lounges	IATA Level of Service "C"
8	8	8	8	S.F.	= Space per standing person in the departure lounges	Assumption Based on Past Experience
0.25	0.25	0.25	0.25	Min.	= Processing time per passenger at the domestic departure gate	Assumption Based on Past Experience
0.875	0.875	0.875	0.875	L.F.	= Length of Baggage Claim belt per bag	Custom Conveyor
50	50	50	50	S.F.	= Space per gate check-in desk	Assumption Based on Past Experience
15	15	15	15	S.F.	= Space per person at gate check-in queue	IATA Level of Service "C"
82	82	82	82	L.F.	= Largest wingspan and clearance of 1-25 seat aircraft	Assumption Based on Aircraft Manuals and FAA Advisory Circulars
123	123	123	123	L.F.	= Largest wingspan and clearance of 26-49 seat aircraft	Assumption Based on Aircraft Manuals and FAA Advisory Circulars
131	131	131	131	L.F.	= Largest wingspan and clearance of 50-79 seat aircraft	Assumption Based on Aircraft Manuals and FAA Advisory Circulars
139	139	139	139	L.F.	= Largest wingspan and clearance of 80-100 seat aircraft	Assumption Based on Aircraft Manuals and FAA Advisory Circulars
206	206	206	206	L.F.	= Largest wingspan and clearance of 101-200 seat aircraft	Assumption Based on Aircraft Manuals and FAA Advisory Circulars
240	240	240	240	L.F.	= Largest wingspan and clearance of 201-300 seat aircraft	Assumption Based on Aircraft Manuals and FAA Advisory Circulars
280	280	280	280	L.F.	= Largest wingspan and clearance of 301-560 seat aircraft	Assumption Based on Aircraft Manuals and FAA Advisory Circulars
15	15	15	15	L.F.	= Average width of the concourse corridor	Taken from Drawing of Existing Facility
10	10	10	10	L.F.	= Depth of enclosed operations area per gate	Assumption Based on Past Experience
6	6	6	6	L.F.	= Depth of unenclosed operations area per gate	Assumption Based on Past Experience
30	30	30	30	L.F.	= Average depth of airline ticketing offices	Taken from Drawing of Existing Facility
100	100	100	100	%	= Percentage of international passengers using check-in	Assumption Based on Past Experience
20	20	20	20	%	= Percentage of international passengers using carts in the check-in queue	Assumption Based on Past Experience
60	60	60	60	%	= Percentage of visitors in the international check-in queue	Assumption Based on Past Experience
100	100	100	100	%	= Percentage of international desks manned during the peak hour	Assumption Based on Past Experience
3.55	3.55	3.55	3.55	L.F.	= Average length of international check-in desk and bag well	Assumption Based on Past Experience
4.5	4.5	4.5	4.5	Min.	= Average processing rate of an international passenger at check-in	Assumption Based on Past Experience
100	100	100	100	%	= Percentage of originating international visitors traveling to airside	Assumption Based on Past Experience
100	100	100	100	%	= Percentage of terminating international visitors traveling to airside	Assumption Based on Past Experience
0.05	0.05	0.05	0.05	%	= Percentage of international terminating peak to airport peak	Assumption Based on Past Experience
30	30	30	30	Min.	= Average dwell time per international visitor in the meeter/greeter lounge	Assumption Based on Past Experience
1	1	1	1	Min.	= Average dwell time per international passenger in the meeter/greeter hall	Assumption Based on Past Experience
100	100	100	100	%	= Percentage of international terminating passengers using baggage claim	Assumption Based on Past Experience

TABLE A-1 (continued) Louisville International Airport PASSENGER TERMINAL FACILITIES FORECAST INPUT ASSUMPTIONS						
Planning Years				Unit	Terminal Facilities Program Variables	Louisville Assumption Sources
2000	2005	2010	2020			
20	20	20	20	S.F.	= Space required per person while circulating	IATA Level of Service "C"
8.5	8.5	8.5	8.5	Min.	= Average occupancy time per international passenger in baggage claim	Customer Satisfaction Survey Jan - Dec 1999 Question A3
20	20	20	20	%	= Percentage of international passengers using baggage carts	Assumption Based on Past Experience
0	0	0	0	No.	= Number of 1-25 seat aircraft international gates	Based on B727-100 aircraft currently used at 80% load factor and increased at the yearly rate as total enplanements
0	0	0	0	No.	= Number of 26-49 seat aircraft international gates	Based on B727-100 aircraft currently used at 80% load factor and increased at the yearly rate as total enplanements
0	0	0	0	No.	= Number of 50-79 seat aircraft international gates	Based on B727-100 aircraft currently used at 80% load factor and increased at the yearly rate as total enplanements
1	1	1	2	No.	= Number of 80-100 seat aircraft international gates	Based on B727-100 aircraft currently used at 80% load factor and increased at the yearly rate as total enplanements
0	0	0	0	No.	= Number of 101-200 seat aircraft international gates	Based on B727-100 aircraft currently used at 80% load factor and increased at the yearly rate as total enplanements
0	0	0	0	No.	= Number of 201-300 seat aircraft international gates	Based on B727-100 aircraft currently used at 80% load factor and increased at the yearly rate as total enplanements
0	0	0	0	No.	= Number of 301-560 seat aircraft international gates	Based on B727-100 aircraft currently used at 80% load factor and increased at the yearly rate as total enplanements
0.1	0.1	0.1	0.1	Min.	= Processing rate for terminating passengers at int. baggage re-check	Assumption Based on Past Experience
0.5	0.5	0.5	0.5	Min.	= Processing rate per transfer passenger at int. baggage re-check	Assumption Based on Past Experience
3.55	3.55	3.55	3.55	L.F.	= Length of international baggage recheck counter	Assumption Based on Past Experience
5.0	5.0	5.0	5.0	%	= Peak hour percentage of international passengers using rental cars	Assumption Based on Past Experience
90	90	90	90	%	= Percentage of pax for whom seats are provided in the international departure lounge	Assumption Based on Past Experience
1.5	1.5	1.5	1.5	Min.	= Processing time per passenger at the international check-in gate	Assumption Based on Past Experience
10	10	10	10	L.F.	= Average width of the sterile corridor	Assumption Based on Past Experience
5.0	5.0	5.0	5.0	%	= Percentage of international passengers using the gate check-in	Assumption Based on Past Experience
0	0	0	0	Min.	= Average dwell time per in-transit passenger in the in-transit lounge	Assumed that all International Passengers are O & D
1.2	1.2	1.2	1.2	Min.	= Average processing time per passenger at Immigration	Assumption Based on Past Experience
10	10	10	10	L.F.	= Distance between Immigration booths	Assumption Based on Past Experience
500	500	500	500	S.F.	= Area of FIS baggage claim devices	Assumption Based on Past Experience
20	20	20	20	%	= Percentage of passengers in FIS using baggage carts	Assumption Based on Past Experience
20	20	20	20	Min.	= Average dwell time per passenger in FIS baggage claim	Assumption Based on Past Experience
10	10	10	10	%	= Percentage of FIS passengers searched by Customs	Assumption Based on Past Experience
19.0	19.0	19.0	19.0	%	= Percentage of terminating passengers using the Information Booth	Customer Satisfaction Survey Jan - Dec 1999 Question A12
2	2	2	2	Min.	= Average processing time at the Information Booth	Assumption Based on Past Experience
5	5	5	5	Min.	= Processing time per passenger at Customs	Assumption Based on Past Experience

APPENDIX B – ALTERNATIVE AIRPORT SITE DESCRIPTIONS

APPENDIX B - ALTERNATIVE AIRPORT SITE DESCRIPTIONS

The potential for relocating Louisville International Airport from its current site to a new location was investigated as part of this Master Plan Update Study. The results of this investigation are presented in Chapter 6.0 and conclude that the current airport location is the most prudent choice for commercial aviation in the Greater Louisville region.

This appendix contains a description of the sites that were identified for analysis. Three of the sites are in Kentucky and three of the sites are in Indiana. The descriptions of the six sites are provided in the following order:

- *Plum Creek*
- *Long Run*
- *Utica*
- *Jericho*
- *Pleasant Run*
- *Union*

Each description examines six key aspects: location, geography, proximity to air trade area, surrounding obstructions, manmade features, and environmental features.

1.0 PLUM CREEK

1.1 Location

The Plum Creek site is located to the east of Louisville. It is surrounded by the communities of Fisherville (18.8 miles from Louisville) in Jefferson County, Simpsonville (25.2 miles from Louisville), Shelbyville (32.5 miles) and Finchville (32 miles) all located in Shelby County. Plum Creek can be accessed by a number of major and minor roads. Interstate 64 (I-64), a major roadway passes to the north,

while minor roads such as Taylor Wood Road, Clark Station Road and SR 1399 meander through the site. **Exhibit B-1** depicts the site's location.

1.2 Geography

The physical characteristics of Plum Creek are favorable. It has an elevation ranging from 700 feet to 850 feet Mean Sea Level (MSL). It is interspersed with streams, lakes and ponds. The vegetation is grassland with pockets of forest.

Bullskin Creek flows along the east of Plum Creek and eventually joins with Clear Creek to Brashears Creek. Other smaller creeks are located in and around Plum Creek, creating a terrain intertwined with streams.

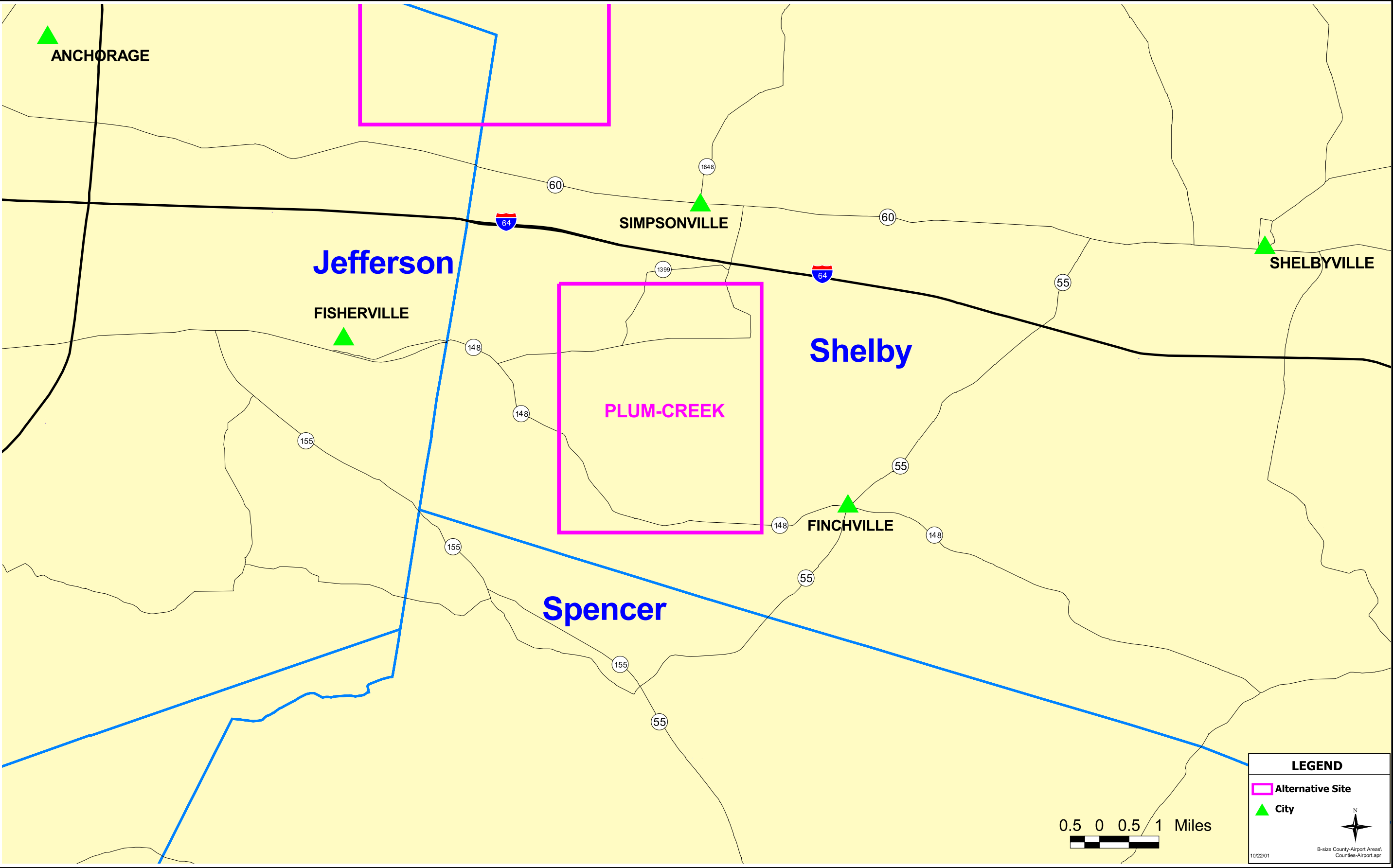
1.3 Proximity to Air Trade Area

Plum Creek is located approximately 25 miles from the Central Business District (CBD) of downtown Louisville. As such, it is somewhat removed from any densely populated centers.

Despite Plum Creek's limitation of not having an immediate large primary air trade market, it is appropriately situated between two primary air trade markets of Louisville and Lexington.

1.4 Surrounding Obstructions

Topographical obstructions are not likely to be a problem at this site. The elevation of the site ranges between 700 feet to 850 feet MSL. However, the overall terrain has an average elevation of 750 feet MSL, with the lowest elevation located along the creeks. The highest elevation of Plum Creek is 850 feet MSL.



The most significant obstructions are the telephone towers located northwest of Plum Creek and four private-use airports. The towers follow a path alongside I-64. The airports noted on the Kentucky Aeronautical Chart 1998-1999, are located to the north of Plum Creek and are five to 10 miles away. One of the airports (PVT) Willow Island 740-25 is located in the southern section of Plum Creek. The other restricted airports located to the north of Plum Creek are (PVT) Timmons 690-22, (PVT) Snodgrass 760-17 and (PVT) Shelby 840-27.

1.5 *Manmade Features*

Plum Creek is predominantly a green field site. Several houses are located along the secondary arterials (Clark Station Road, Taylor Woods Road and SR 1399). These houses would need to be acquired in order to obtain sufficient space for the Airport development. Further Airport expansion at Plum Creek is also possible and will require road relocations.

A number of utilities are located in and surrounding Plum Creek. These utilities include rail, telephone, electricity, and underground pipelines. These utilities appear to be adequate to serve a major airport.

1.6 *Environmental Features*

The site's natural habitat contains many waterways such as Bullskin Creek, Clear Creek, Brashears Creek, Gust Creek (in the eastern section), Plum Creek (in the southwest section of Plum Creek) and small lakes and ponds. The natural forms of these environs promote the habitation of unique animals and plants and would be impacted by site development.

2.0 LONG RUN

2.1 Location

The area of Long Run straddles the borders of Jefferson and Shelby Counties. It is located southeast of Floydburgh, Crestwood, and Pee Wee Valley and east of Anchorage and Berrytown. Long Run engulfs the Long Run (Park) and Flat Rock Community. It can be accessed via SR 1531 (Eastwood and Fisherville Road), SR 362 and SR 1408. **Exhibit B-2** depicts the site's location.

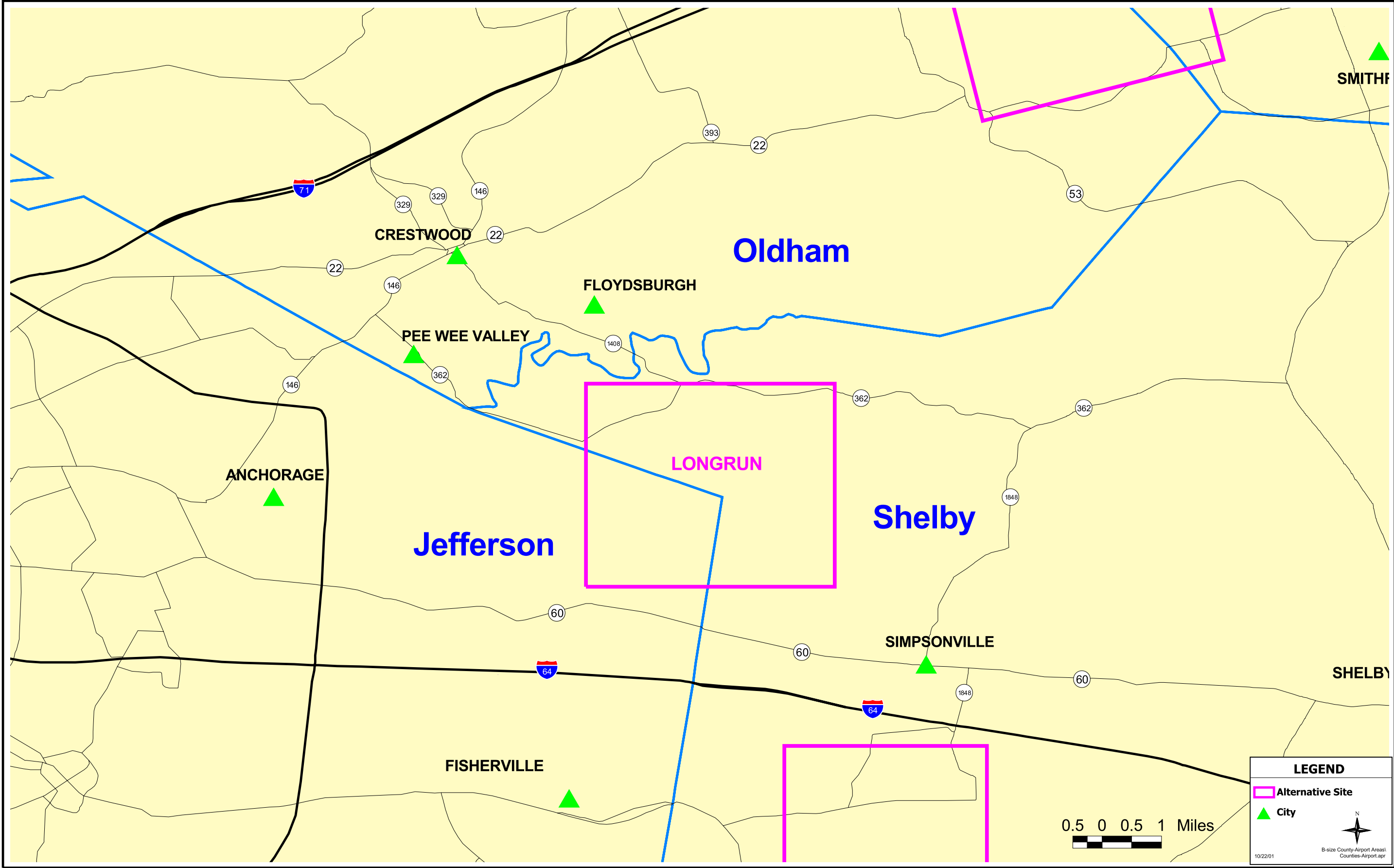
2.2 Geography

The physical characteristics of Long Run are less favorable than Plum Creek. Long Run's elevation ranges from 654 feet MSL to 800 feet MSL. Having a 150 feet difference, its relief is rugged, with many streams running down from its hills.

Three streams meander through Long Run. Tater Run, Long Run and other unnamed streams flow from east to west into Long Run and Long Run Park Lake. Long Run is separated from its surrounding communities by the Floyds Fork Creek.

2.3 Proximity to Air Trade Area

Long Run is approximately 20 miles from the Central Business District (CBD) of downtown Louisville. It is much closer to the primary air trade market of Louisville than Plum Creek or Jericho. Access to Long Run is efficient because it is in close proximity to I-64. Long Run's location is attractive to Louisville's air trade market and Lexington's air trade area.



2.4 *Airspace Constraints*

A number of private-use airports and towers situate the Long Run area. Two airports (PVT) Timmons 690-22 and (PVT) Snodgras 760-17 are located to the immediate south of Long Run and three telecommunication towers are located on Long Run's western section. The elevations of these towers range from 1,409 feet MSL to 1,019 feet MSL according to the Kentucky Aeronautical Chart 1998-1999. The towers and private-use airports are conflicts that could be mitigated if a commercial service airport were constructed at this location.

2.5 *Manmade Features*

Most of Long Run is used as a park and golf course. There are quite a number of utilities located in and surrounding Long Run. Some of these utilities include road, telephone services, electricity and underground pipelines. No railroads were identified in the vicinity of Long Run.

2.6 *Environmental Features*

Long Run's natural habitat encourages free flowing watercourses. The presence of many waterways such as Floyds Fork, Tater Run, Long Run and the Long Run Park Lake have shaped the landscape of Long Run. The natural features of the site and the public recreational activities are important concerns that would need to be addressed in any environmental studies required for Airport development.

3.0 UTICA

3.1 Location

Utica is located in Indiana. **Exhibit B-3** depicts the site's location. Utica was formerly the U.S. Military Reservation, Indiana Army Ammunitions Plant. It is bordered by the Ohio River to the east, SR 62/SR 3 (Charlestown Road) to the west and the City of Jeffersonville to the south. A connector to I-265 is under construction and will improve access to this site.

Availability of space for future airport expansion at Utica is possible in the southern and northern sections of the site. In the north, the available space is intermixed with higher elevations and several creeks, i.e., Fourteen Mile Creek, Nealy Lind Run and Little Buttle. In the south, land must be acquired from landowners in order to expand.

3.2 Geography

The physical characteristics of Utica are favorable for development. It has an elevation ranging from 505 feet MSL in the south to 550 feet MSL to the north. There are very few natural lakes or ponds on the site, but a number of creeks traverse the northern portion. These creeks are Fourteen Mile Creek, Battle Creek, Silver Creek, Nealy Lind Run and Little Buttle.

Cliff ranges protrude on the northern and eastern edge of the site. The cliff's plateau is approximately 630 feet MSL and quickly decreases to an elevation of 450 feet MSL towards the Ohio River. The land mass is mixed with manmade structures, grassland vegetation and forested areas covering the creeks and cliff ranges. The Kentucky Aeronautical Chart 1998-99 notes the location of a mine/quarry in the northern region of this site.

3.3 Proximity to Air Trade Area

Utica is about 15 miles from downtown Louisville, and therefore very close to the Louisville air trade market. Although it is farther away from the Lexington air trade area than the Jericho, Plum Creek and Long Run sites, it is uniquely situated on the periphery of a densely populated center.

3.4 Airspace Constraints

Utica has two significant airspace issues. One conflict is the presence of Clark County Airport located to the northwest. The second issue is the cliff range that projects on its northern to eastern edges. The overall terrain has an average elevation of 530 feet MSL. The low-lying areas are located in the southern section and the higher elevation is located along the cliff/hill range. The Kentucky Aeronautical Chart 1998-99 notes that the cliff heights along Utica's northern and eastern sections range around 765 feet MSL to 859 feet MSL.

3.5 Manmade Features

Utica is a closed military installation and contains old structures and equipment. Hazardous substances may exist on the site and must be taken into consideration if Utica is to be redeveloped.

Being in close proximity to Jeffersonville and Louisville, all of the necessary utilities are present to serve Utica's airport needs. Electricity, telephone, underground pipelines and sewage disposal systems are available on the western side of the site. Roads and railroads extend to the north and south on the western edge of Utica.

At the time of this analysis, nine (9) bridge construction alternatives were being examined for crossing the Ohio River. Of the nine alternatives, six are in the

vicinity of Utica, while the other three alternatives are positioned in the vicinity of downtown Louisville.

3.6 Environmental Features

The development of an airport at Utica would have little impact on natural habitat. Because this site was formerly used for military operations, hazardous waste may be present.

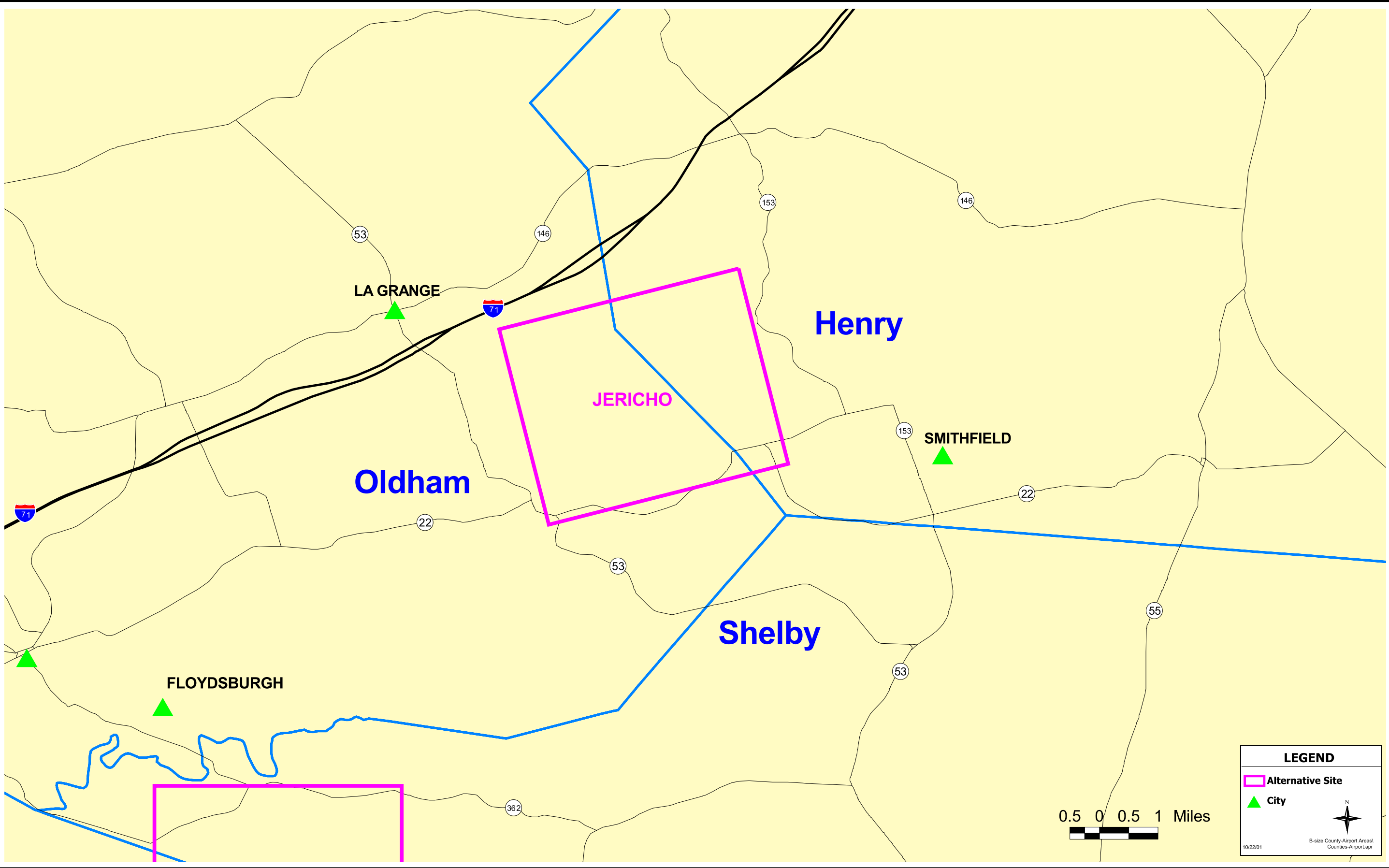
4.0 JERICO

4.1 Location

The Jericho site is located on the jurisdictional boundaries of two counties, Oldham County and Henry County. It is bordered by the communities of Smithfield in the east and La Grange in the northwest. There are no nearby residential communities to its north or south. The location of the site is depicted in **Exhibit B-4**.

I-71 is a short distance from the site. Other minor roads such as SR 1861, SR 153, Mt. Olive Road, Blakemore Road, Ratcliff Road and SR 712 wind throughout the site connecting the locales of Tarascon, Jericho and Liro.

Jericho has fairly limited space for expansion. If expansion were to take place, it would be northerly, approaching Lake Jericho. Expansion to the east or west would impact the nearby communities of Smithfield and La Grange. Jericho is also constrained to the west because of the presence of Crystal Lake.



4.2 Geography

The topography of Jericho is less than favorable for development. Although its elevation ranges between 800 feet MSL and 850 feet MSL it is extremely rugged topography with no uniform pattern.

Numerous waterways and a few manmade dams are located throughout the site. The vegetation is grassland with pockets of forested areas. From the north flows the Little Kentucky River and Jackson Creek, while from the east flows the Crystal Fork. Dams are located on all three waterways. Other creeks that flow throughout Jericho are Floyds Fork, North Fork, and the Jericho Fork.

4.3 Proximity to Air Trade Area

Jericho is located approximately 26 miles from downtown Louisville and is appropriately positioned to attract the populace in the air trade area of Louisville. Although I-71 is nearby, direct access to Jericho would need to be improved to accommodate the increased traffic that would occur with airport development. It is possible that minor roads on the site could connect Jericho to I-71.

4.4 Airspace Constraints

Few obstructions affect the airspace at this site. A few telephone towers are located to the east. These towers range from 970 feet MSL to 1210 feet MSL. The Kentucky Aeronautical Chart 1998-99 recorded no airspace constraints or hazards other than the communication towers and an outdoor theater that is located to the north of Jericho.

4.5 *Manmade Features*

Jericho is predominantly a green field area, but extensive site preparation would be necessary because of its rugged terrain. The roads SR 1861, SR 153, Mt. Olive Road, Blakemore Road, Ratcliff Road and SR 712 would need to be reconfigured to create a more efficient space and to retain access to the site, as well as to maintain access to surrounding locales.

Houses located along the secondary roadways (SR 1861, SR 153, Mt. Olive Road, Blakemore Road, Ratcliff Road and SR 712) would need to be acquired in order to obtain sufficient space for airport development.

A number of utilities are available in and the around Jericho site. There are gas storage facilities, sewage facilities, a railway, telephone services, electricity, and underground pipelines.

4.6 *Environmental Features*

Jericho has many waterways that can be impacted by the development of an airport. Most of the waterways that meander through Jericho have their origin in Jericho's elevated terrain. The natural habitat that is formed by the waterways would be affected if development occurs. Some of the waterways with sources flowing from Jericho's high terrain are Floyds Fork, Jericho Fork and tributaries that run into the Little Kentucky River.

5.0 PLEASANT RUN

5.1 Location

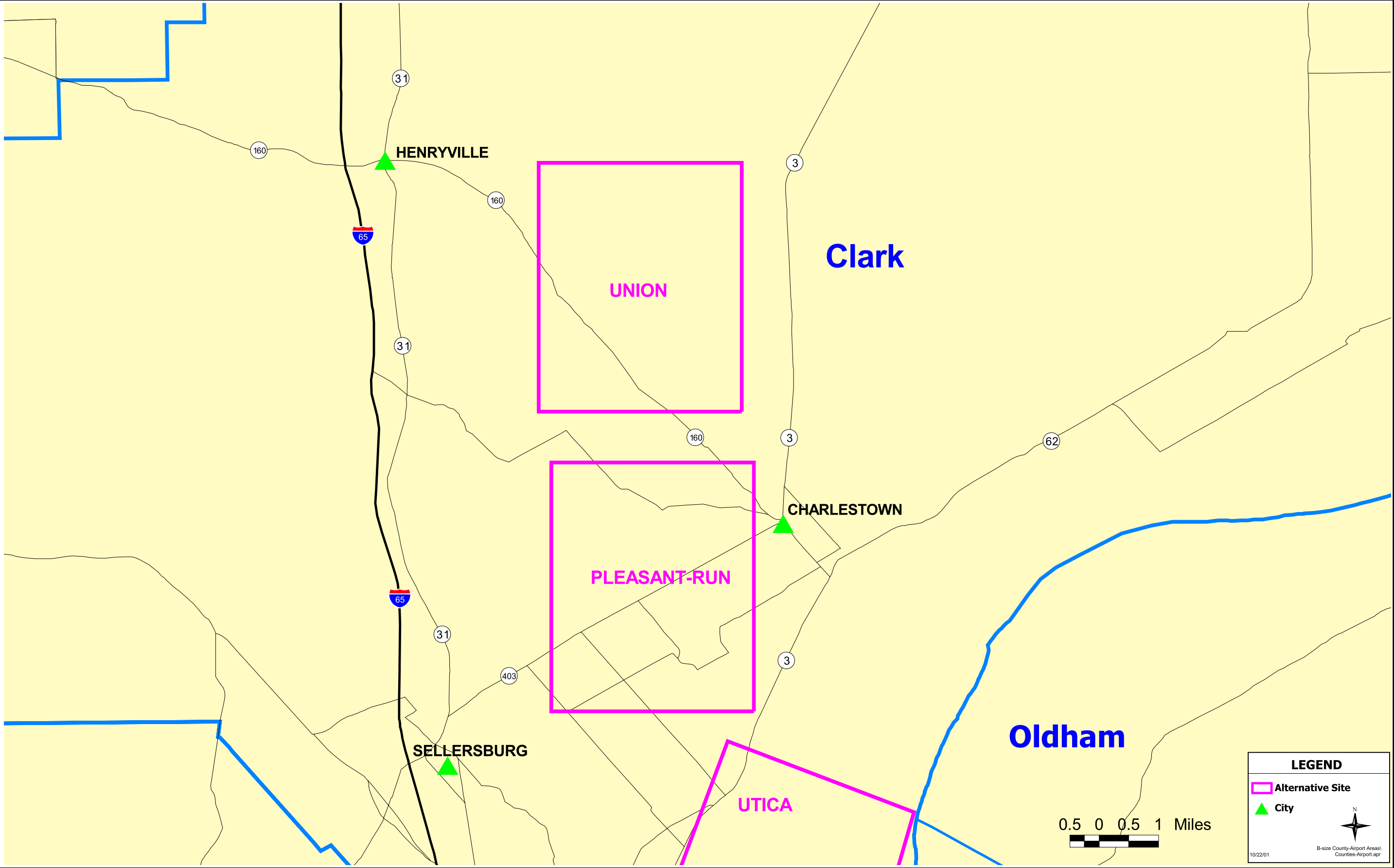
Pleasant Run is located in Indiana, southwest of the city of Charlestown, and is situated between Silver Creek and Patrol Road. To the east are the U.S. Military Reservation, Indiana Army Ammunitions Plant and the Ohio River. To the west are Silver Creek and the community of Sellersburgh. Pleasant Run Creek flows through the site.

Pleasant Run is approximately six miles from I-65, approximately 10 miles from I-265 and 17 miles from downtown Louisville. Jenke and Bethany Roads, along with SR 403, all pass through the Pleasant Run site. **Exhibit B-5** depicts the location of the site.

Pleasant Run has limited space for future expansion. The most likely opportunity for further expansion is to the northeast toward Charlestown. If expansion were to take place to the east, the existing rail and road network would need to be diverted. The presence of Silver Creek would make expansion to the west difficult.

5.2 Geography

The topography of Pleasant Run is favorable for airport development. Its elevation ranges from 480 feet MSL to 550 feet MSL, thereby being relatively flat and undulating. In the midst of Pleasant Run flows the single main creek, Pleasant Run Creek, from which smaller tributaries flow. Grassland and pockets of forested areas are found along Pleasant Run Creek.



5.3 Proximity to Air Trade Area

The Pleasant Run site has an advantage in its potential to absorb not only the air trade area of Louisville but that of the Southern Indiana region as well. It is only six miles from I-65 and only 17 miles away from downtown Louisville.

5.4 Airspace Constraints

Similar to the Utica site, the proximity of Pleasant Run to the Clark County Airport may pose an airspace conflict, depending on airfield configuration. Tall towers are located to the north and northwest, which range in height of 712 feet MSL to 1298 feet MSL and may also need to be addressed if an airport layout is planned for this site.

5.5 Manmade Features

Pleasant Run has a grid road network, which would need to be reconfigured to accommodate Airport development. The houses are located along this grid network would need to be acquired in order to obtain sufficient space for airport development.

Many utilities are available in the areas surrounding Pleasant Run. There are sewage treatment facilities, a railroad, telecommunication services, electricity and underground pipelines.

5.6 Environmental Features

Pleasant Run has one main waterway, Pleasant Run Creek. Its environment is marginal, not unique. The natural environment has already been disturbed by the roadway network that exists on the site.

6.0 UNION

6.1 Location

The Union site is just north of the Pleasant Run site. There are no nearby communities except that of Charlestown, which is located several miles to the southeast. Steep slopes limit access from the east; however, access from the west is possible via Hansberry Road, Treloar Road and Memphis Road. Similar to Pleasant Run, Union is six or seven miles from I-65. Exhibit B-5 depicts the location of the Union site.

Union has space for future expansion to the north and northeast. Future expansion would entail some road relocation and grading.

6.2 Geography

The topography of the Union site is favorable for development and its elevation ranges from 490 feet MSL to 530 feet MSL. There are a few tributaries, namely Sugar Run, Carr Feyton and Branch, which drain Union by way of Sinking Fork. The vegetation is grassland with few forested areas.

6.3 Proximity to Air Trade Area

Union is the third Indiana site and like its neighboring sites, Pleasant Run and Utica, has an advantage in absorbing not only the air trade area of Louisville but that of southern Indiana.

6.4 *Airspace Constraints*

Union's airspace is less subject to impacts by activities at Clark County Airport than the other two Indiana sites.

6.5 *Manmade Features*

A grid road network transverses the site and relocations would be necessary to accommodate Airport development. Houses located along this grid network would need to be acquired for airport development.

Utilities available to the site include sewage facilities, a railroad, telephone services, electricity and underground pipelines.

6.6 *Environmental Features*

Union has a few ponds, but for the most part, it is well drained. There are no striking environmentally sensitive features. The natural environment has already been disturbed by the roadway network that exists on the site.

APPENDIX C – ENVIRONMENTAL AGENCY CORRESPONDENCE



United States Department of the Interior

FISH AND WILDLIFE SERVICE

446 Neal Street
Cookeville, TN 38501

November 1, 2002

Mr. Sheldon Daisley
Consultant
PB Aviation, Incorporated
312 Elm Street, Suite 2500
Cincinnati, Ohio 45202

Dear Mr. Daisley:

Thank you for the information which you provided regarding the Master Plan Update for the Louisville International Airport. You requested our agency's input regarding the potential impacts of the proposed 20-year facilities plan on environmental resources. Our comments and recommendations are provided below.

Although a preferred development plan has been selected from among four preliminary alternatives, our agency was unaware that the subject planning effort was underway. It would appear that development options have already been proposed and tentatively selected based on technical and financial factors, without the benefit of environmental resource information that would help ensure formulation of environmentally sensitive alternatives.

We note that the preferred plan includes expansive areas adjacent to Outer Loop Road that are designated as "airport related development," "future passenger terminal," and "remote parking." These areas include several hundred acres of existing wetlands, including both natural forested wetlands and managed wetlands created as Clean Water Act permit mitigation for existing developments in the area. Included are created and preserved mitigation wetlands for Waste Management of Kentucky, United Parcel Service, and Enterprise Industrial Park. Water detention basins that provide compensation for lost flood storage capacity also exist within these proposed development boundaries. These sites are protected by deed restrictions and/or conservation easements that preclude any impacts to their intended functions. We find it disturbing that the presence of these resources appears to have not been taken into consideration prior to this relatively late stage of planning. The presence of both natural and mitigation wetlands and flood storage compensation units with their regulatory and legally binding long-term protection provisions is common knowledge. There are also additional flood compensation and stream restoration efforts proposed and designed by the Corps of Engineers and Metropolitan Sewer District for these areas. The subject proposed airport developments could encounter serious regulatory, legal, and financial obstacles if pursued as proposed. We strongly suggest that the Corps of Engineers and Metropolitan

Sewer District be contacted for specific information regarding protected wetlands and mitigation tracts within the subject Master Plan boundary. Both agencies have funded resource surveys for this area, and published comprehensive resource information.

In response to your specific question regarding the presence of threatened or endangered species within the planning area, we note that the following listed species may occur:

Indiana bat	<i>Myotis sodalis</i>
Gray bat	<i>Myotis grisescens</i>
Short's goldenrod	<i>Solidago shortii</i>
Running buffalo clover	<i>Trifolium stoloniferum</i>

Considerable effort has been expended over the past 20 years by Federal, State, and local agencies to maintain the wetland and flood storage capacity baselines in Jefferson County; particularly in the Pond Creek watershed. We strongly suggest that wetlands and flood storage weigh heavily in any decisions related to expansion of the Louisville Airport and related developments. Future development throughout the County could be jeopardized if it is demonstrated in this situation that wetland and flood storage mitigation tracts will not be protected.

We appreciate the opportunity to provide comments on the subject long-range proposal. If you have questions regarding our comments and recommendations, please contact Bob Bay of my staff at (931) 528-6481, ext. 220.

Sincerely,



Lee A. Barclay, Ph.D.
Field Supervisor

xc: Mr. Eric Somerville, EPA, Atlanta, GA
Mr. Jim Townsend, COE, Louisville, KY
Mr. Wayne Davis, KDFWR, Frankfort, KY
Mr. John Dovak, KDOW, Frankfort, KY

United States Department of Agriculture



Chrysler Bldg., Suite 100-A
4233 Bardstown Road
Louisville, KY 40218-3280

Telephone: (502) 499-1900
FAX: (502) 499-1748

October 17, 2002

Sheldon Daisley
PB Aviation, Inc.
312 Elm Street, Suite 2500
Cincinnati, OH 45202

Dear Mr. Daisley:

We received your request for comments regarding prime and unique farmland on the area encompassed under the Louisville International Airport Master Plan. After reviewing the plans and the exhibits illustrating the airport property, we found that the area does not contain either prime or unique farmland.

Please let this letter serve as our agency comments regarding your request. If we can be of further assistance, please feel free to call on us.

Sincerely,

Kurt D. Mason, CPESC
District Conservationist



Education, Arts and Humanities Cabinet

KENTUCKY HERITAGE COUNCIL

The State Historic Preservation Office

Paul E. Patton
Governor
Marlene M. Helm
Cabinet Secretary

David L. Morgan
Executive Director and
SHPO

November 1, 2002

Mr. Sheldon Daisley
Consultant
P B Aviation, Inc.
312 Elm Street, Suite 2500
Cincinnati, Ohio 45202

Dear Mr. Daisley:

Thank you for your letter dated September 6, 2001 (received October 2, 2002) concerning the Louisville International Airport's Master Plan Update in Louisville, Jefferson County, Kentucky. After reviewing the brief summary of proposed activities and the attached map, I determined that we do not have sufficient information to assess potential effects to historic structures and archaeological sites listed in or eligible for listing in the National Register of Historic Places. Please provide us with the complete Master Plan Update for the Louisville International Airport. We look forward to reviewing the Master Plan.

Should you have any questions, feel free to contact Charles Hockensmith of my staff at (502) 564-7005.

Sincerely,

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059
FAX: (502) 315-6677
<http://www.lrl.usace.army.mil>

November 24, 2002

Operations Division
Regulatory Branch (South)
ID No. 200201263-asb

Mr. Sheldon Daisley
PB Aviation, Inc.
312 Elm Street, Suite 2500
Cincinnati, Ohio 45202

Dear Mr. Daisley:

This is in response to your September 6, 2002 letter requesting comments on the recommended Master Plan Update for the Louisville International Airport (SDF) in Louisville, Jefferson County, Kentucky. Following a review of the Master Plan, it appears as though the proposed expansion and development activities would impact "waters of the United States," including wetlands. Additionally, some areas marked as "airport related development" near Minors Lane and Outer Loop, and as "future passenger terminal" and "remote parking" north of Outer Loop are situated within the boundaries of existing wetland mitigation sites that are protected from development by permanent conservation and restrictive easements.

The Corps of Engineers exercises regulatory authority under Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344). The data you furnished indicates an authorization under one or both of these sections of law would likely be required before you begin the work. However, the information given is insufficient for us to be certain of the need for a permit on this particular proposal. We will need additional detail on the project's design, scope, construction methods and purpose in order to determine whether a permit is required.

We have found it is usually in the applicant's best interest to submit that data in a formal permit application. Should an individual permit be required, we can then begin processing your request immediately. Enclosed is a packet which contains the information and forms needed to apply for a DA permit. Currently, the processing time for non-controversial applications requiring individual review takes approximately 120 days. Please allow sufficient time in your pre-construction schedule for the processing of a DA permit application.

To assist you in the permitting process, we would be happy to meet with you or your representatives prior to the submittal of your application. If we can be of any further assistance, please contact us by writing to the above address, ATTN: CELRL-OP-FS, or by calling me at (502) 315-6691.

Sincerely,

A handwritten signature in cursive script that reads "Amy S. Babey".

Amy S. Babey
Project Manager
Regulatory Branch

Enclosure