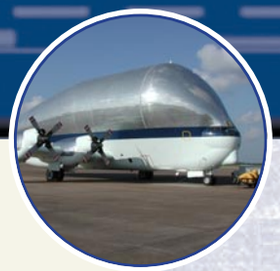



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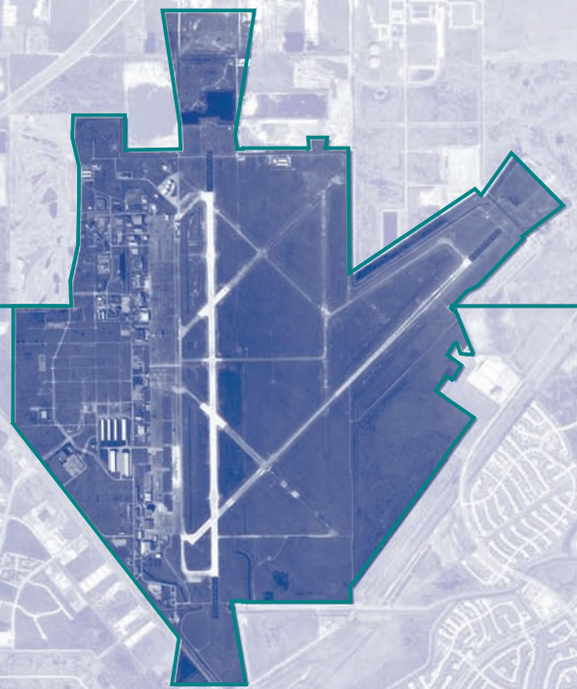

Comprehensive Plan

Master Plan
Ellington Field

Prepared for

Houston Airport System
Houston, Texas

May 2004

HOUSTON AIRPORT SYSTEM

LEIGH FISHER ASSOCIATES
Consultants to Airport Management

Comprehensive Plan

Master Plan
Ellington Field

Prepared for

Houston Airport System
Houston, Texas

May 2004

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PREFACE

In February 2004, Continental Express announced that it would cease operations at Ellington Field (the Airport) in September 2004. This announcement was made following the completion of technical analyses during final document preparation. Thus, this *Comprehensive Plan* reflects continued commercial air carrier service through the end of the planning period (2021). The withdrawal of Continental Express is expected to have the following impacts on the Master Plan findings and recommendations:

- **Aviation Activity Forecasts.** The withdrawal of Continental Express' service means that future operations levels will be slightly lower (approximately 3.5%) than forecast at the end of the planning period. Furthermore, since the Houston Airport System (HAS) Policy Plan identifies the Airport as a General Aviation (GA) facility, it is unlikely that a different commercial service operator will initiate new service. If Continental Express elects to re-start service at some future date, it is likely that they would provide service at, or near, their current activity level.

- **Facility Requirements—Airfield.** Airfield facility requirements are based on estimates of peak hour aircraft activity. Since the assumed Continental Express schedule is, at most, one arrival and departure during an hour, removal of commercial air carrier service will have no material effect on airfield facility requirements.

- **Facility Requirements—Commercial Air Carrier.** Commercial air carrier facility requirements are based on Continental Express' existing facilities. The withdrawal of commercial air carrier service removes these requirements in the future.

- **Facility Development Strategies and Airport Development Plan.** The recommended development plan for the GA area assumes the continued presence of the existing Continental Express terminal building, aircraft parking area, and need for public parking. When Continental Express vacates the terminal building and parking area, HAS will have increased flexibility in organizing the ramp at the north end of the GA area.

- **Financial Analysis and Implementation Plan.** The estimates of future revenues assume continued revenue from commercial air carrier service for landing fees and ground leases through the planning period. Without Continental Express service, these revenues will be lower than forecast in the Master Plan. The vacation of the Continental Express facilities may allow the Airport to accommodate additional GA growth without requiring facility upgrades (utility extensions, new public parking lots) that may be required at other locations.

As shown in Chapter 7, "Financial Analysis and Implementation Plan," the Master Plan projects the Airport to "break even" (revenue generated on-Airport will offset operating expenses) by 2021, assuming realization of the high growth scenario. Without Continental Express revenue, the break-even date will occur later, beyond the end of the planning period. To counteract this delay, HAS will have to aggressively market the aviation and nonaviation developable property to exceed the high growth scenario assumptions.

In addition to the loss of Continental Express revenue at the Airport, HAS's annual Airport Improvement Program grant (a portion of which is awarded for commercial service at Ellington Field) will be reduced by $1,000,000.

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Chapter 1

INTRODUCTION

This Comprehensive Plan Report presents the findings and conclusions of the Comprehensive Plan for Ellington Field (Ellington or the Airport). This report documents recommendations for implementation by the Houston Airport System (HAS) and City of Houston. Background information and detailed analyses are provided in the companion document: *Master Plan Technical Report*. This chapter is divided into the following sections:

- Key Planning Issues
- Airport Role
- Planning Goals and Objectives
- Document Organization

1.1 KEY PLANNING ISSUES

The *Houston Airport System Policy Plan** (the *HAS Policy Plan*) identified development priorities for Ellington that would encourage revenue-generating development, accommodate moderate growth in general aviation (GA) aircraft operations, and be consistent with the Airport's roles in the HAS. These policies were based on the following key planning issues identified in the *HAS Policy Plan*:

- Increased aviation activity at Ellington would likely entail (airspace) capacity trade-offs with William P. Hobby Airport (Hobby).
- Substantially increased aviation activity at the Airport could interfere with important military and National Aeronautics and Space Administration (NASA) activities.
- Ellington has a substantial amount of land in excess of its immediate requirements.
- The operating costs of Ellington are subsidized by the other HAS airports.

In addition to these system-wide concerns, a number of Airport-specific planning issues have been identified as follows:

- The runway protection zone (RPZ) at the approach end of Runway 4 as noted on the current Airport Layout Plan (ALP) does not conform to

**Houston Airport System Policy Plan*, October 2002, Leigh Fisher Associates.

Federal Aviation Administration (FAA) airport design and encompasses several buildings occupied by NASA.

- Because HAS controls only about 50% of the ramp area, accommodating substantial growth in GA development may require providing taxiway access to new areas.

- The recent departure of the United Parcel Service (UPS) flight activity and future departure of all UPS activity will decrease revenues to the Airport.

- The Burlington Northern Santa Fe (BNSF) Railroad has announced plans to construct a rail line adjacent to the Airport serving the Bayport Complex.

1.2 AIRPORT ROLE

As noted in the *HAS Policy Plan*, Ellington plays three primary roles in the HAS:

1. Military and NASA support
2. GA reliever
3. Limited passenger service

Ellington is the home for three military operations, the Texas Air National Guard (TxANG), United States Army National Guard (ANG), and the United States Coast Guard (USCG). Ellington is also home to selected NASA training facilities; NASA and the TxANG own property within the Airport boundary. Almost all military and NASA activity in the Houston metropolitan area operates from Ellington. These activities represent important elements of national defense and space exploration. Ellington is frequently the airport of choice for Air Force 1 and other aircraft carrying high-profile dignitaries and public officials. The *HAS Policy Plan* identifies support for these activities as a major priority.

Ellington also hosts a variety of GA activities, including personal and recreational flying, flight training, and corporate operations. In 2000 and 2001, Ellington accommodated about 10% of all Houston-area GA demand and 22% of GA demand at the three HAS airports. About 10% of this activity is corporate GA, while the remaining 90% is recreational and flight training.

Continental Express provides limited commercial passenger service between Ellington and George Bush Intercontinental Airport/Houston (Intercontinental). In 2001, Ellington Field accommodated less than 0.2% of HAS commercial passenger activity.

1.3 PLANNING GOALS AND OBJECTIVES

Development of planning recommendations for Ellington has been guided by the HAS Mission Statement, which is to provide an airport environment that is "safe, friendly, and efficient." This mission statement leads to the following planning goals:

"...safe..." — Addresses issues related to meeting or enhancing aviation safety and security requirements. Specific planning goals for the Airport addressed safety areas and runway protection zones, runway incursion potential, and mixing of dissimilar aircraft types.

"...friendly..." — Addresses convenience and level of service to airport users. Specific planning goals for the Airport addressed the provision of convenient passenger and general aviation facilities, as well as convenient access for all Airport users.

"...efficient..." — Addresses the best use of HAS resources. Specific planning goals for the Airport could address minimization of capital costs and enhancement of revenue potential.

Accordingly, the objectives of this Comprehensive Plan are to address regional and local planning issues in accordance with the HAS policies described above. Specific planning objectives are listed below.

- Determine the amount and type of aviation activity to be accommodated at Ellington over the 20-year planning period consistent with the Airport's roles of supporting military and NASA operations.

- Develop facility plans that accommodate forecast aviation activity consistent with HAS policies for providing safe, friendly, and efficient aviation facilities.

- Encourage on-Airport development that:
  – Is compatible with existing and future airfield operations
  – Is compatible with nearby communities
  – Supports the image and goals of adjacent communities

- Integrate planning efforts of local/regional agencies and organizations and cooperate on projects of mutual interest.

- Prepare facility development plans that allow Ellington to become financially self-sufficient.

1.4 DOCUMENT ORGANIZATION

The remainder of this Comprehensive Plan Report is organized into chapters that represent the major tasks undertaken to develop the recommendations of the Comprehensive Plan for Ellington Field:

Chapter 2—Existing Airport Conditions
Chapter 3—Aviation Activity Forecasts
Chapter 4—Demand/Capacity Analyses
Chapter 5—Facility Development Strategies
Chapter 6—Airport Development Plan
Chapter 7—Financial Analysis and Implementation Plan
Chapter 8—Environmental Overview

Chapter 2

EXISTING AIRPORT CONDITIONS

Ellington Field occupies approximately 2,300 acres at an elevation of 34 feet above mean sea level (MSL). The site includes two parallel runways, one cross-wind runway, approximately 94 acres of general aviation area, and 258 acres controlled by the three on-Airport military units and NASA. Additionally, there are approximately 200,000 square feet of aircraft storage hangars, and about 60,000 square feet of office space (aviation- and nonaviation-related).

Figure 2-1 illustrates land uses within the Airport boundary and identifies key airfield facilities. All airport development is concentrated west of the runways. General aviation land uses are located in the middle of the developed area, flanked by military land uses to the north and NASA to the south. Open space not part of the airfield area accounts for approximately 30% of the total airport property.

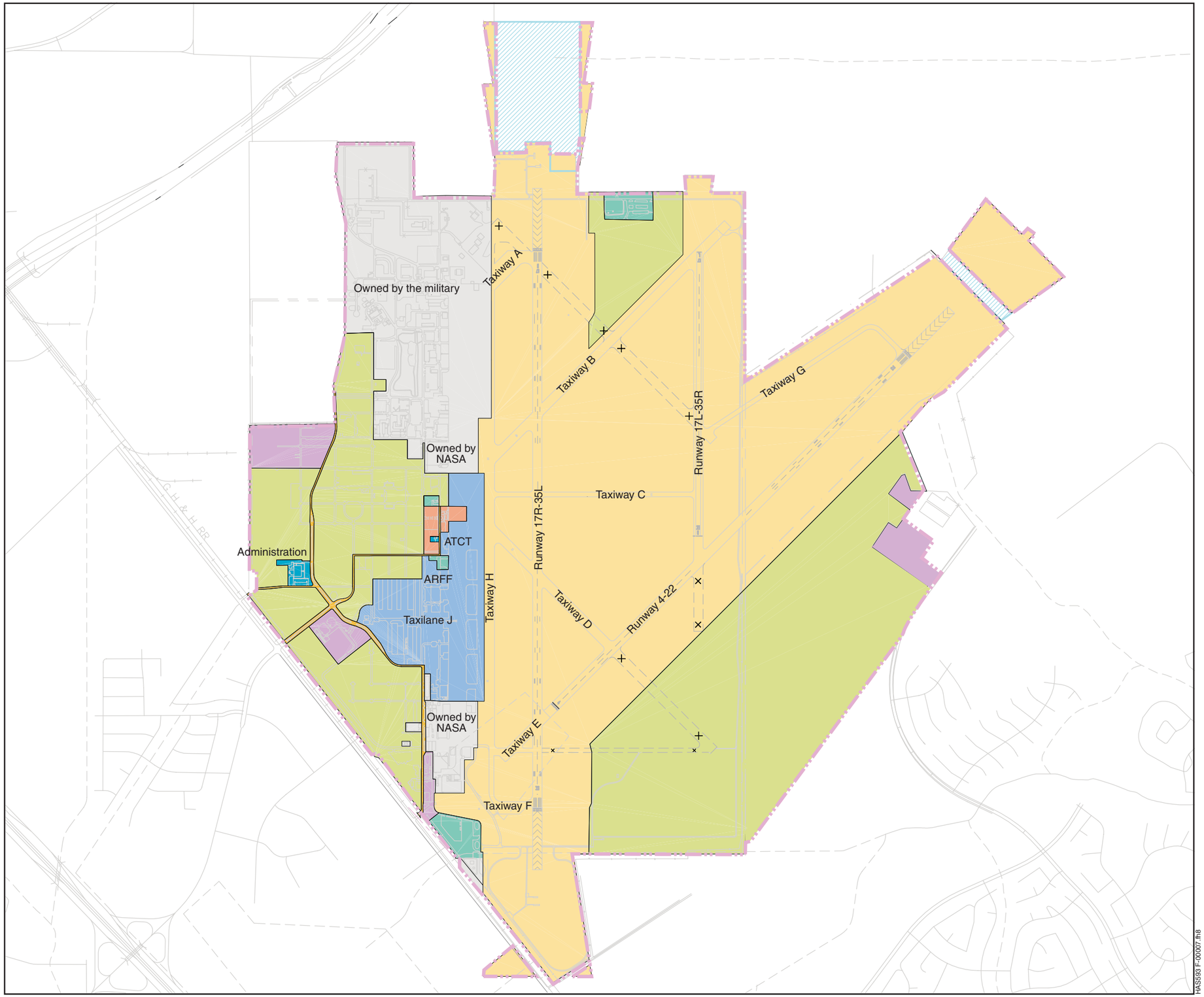
2.1 REGIONAL SETTING

As illustrated on Figure 2-2, Ellington is located within the City of Houston, approximately 20 miles southeast of downtown Houston. The Airport is bordered on the southeast by Clear Lake City and is within 1 mile of the south edge of the City of Pasadena. Ellington is approximately 10 miles from Galveston Bay and 30 miles from the Gulf of Mexico.

The area surrounding and most directly affected by the presence and operation of the Airport is referred to as the Airport environs. These environs are generally bounded on the north by Genoa-Red Bluff Road and Beltway 8, on the west by Interstate 45, on the east by Space Center Boulevard, and on the south by Clear Lake Boulevard, as shown on Figure 2-3.

Off-Airport land uses include generalized land uses and sensitive land uses, such as churches, schools, hospitals, and public parks. The area to the southeast of Ellington, Clear Lake City, is a collection of sensitive land uses, including single-family residential, public parks, schools, and churches. Sylvan Rodriguez Park is located approximately 0.5 mile south of the Airport. Land uses north and west of Ellington are less dense than in Clear Lake City and are a mixture of single- and multi-family residential, commercial, industrial, institutional, and undeveloped. Areas east and southwest of Ellington are predominately undeveloped. Immediately east of Ellington is property owned by Boeing.

Up to three new roadways or roadway extensions are planned in the vicinity of Ellington, as well as multiple widening projects. The roadways most likely to impact Ellington are the planned connection between Space Center Boulevard and State Highway 3 and the planned connection between Ellington and Beltway 8.



LEGEND

- Access (12 acres)
- Airfield (1,174 acres)
- Support (19 acres)
- Commercial (35 acres)
- Government (4 acres)
- General aviation (94 acres)
- Special use (Military and NASA) (258 acres)
- Terminal (7 acres)
- Vacant/Other (671 acres)
- Aviation easement
- X — Closed runway or taxiway
- Airport boundary
- ARFF — Airport Rescue and Fire Fighting
- ATCT — Airport Traffic Control Tower

N

800 0 800 1,600

Graphic Scale in Feet

HAS593 F-00007.fh8

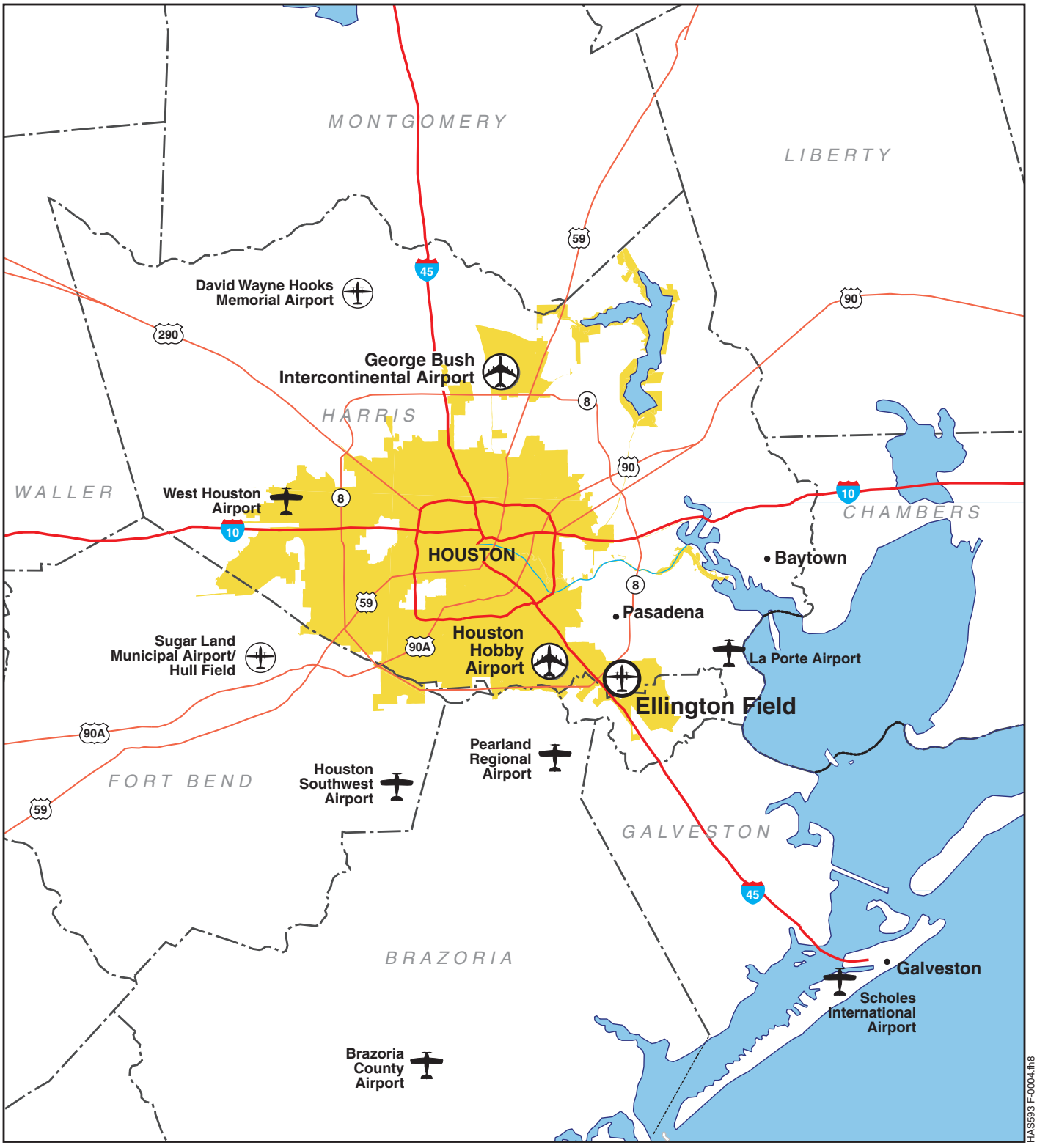
Figure 2-1

AIRPORT LAND USES AND KEY FACILITIES

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES



LEGEND

- Major air carrier airport
- Towered general aviation airport
- Non-towered general aviation airport
- Houston city limits

Source: Leigh Fisher Associates, March 2003.

N

6 0 6 12

Graphic Scale in Miles

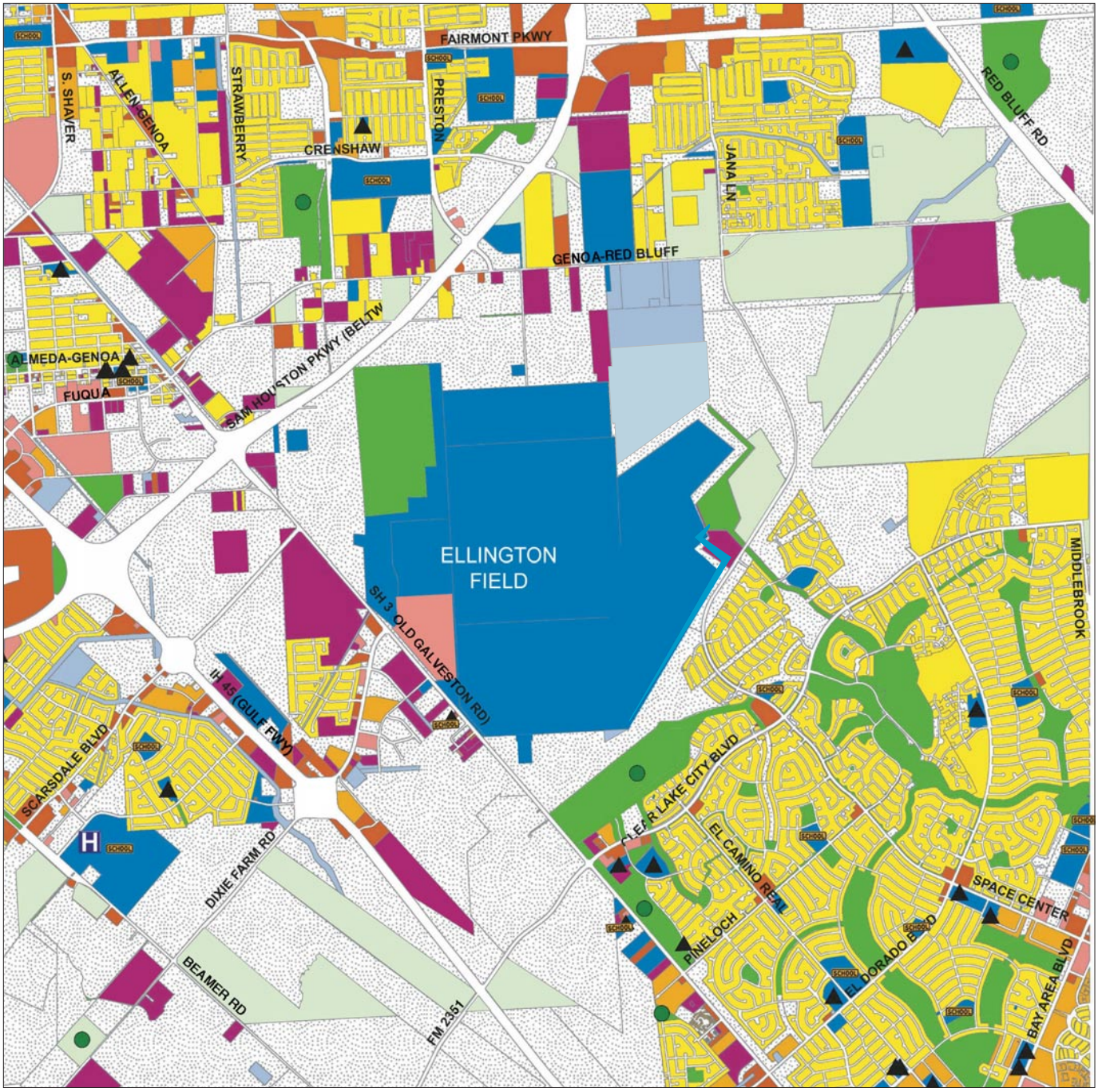
Figure 2-2

ELLINGTON FIELD LOCATION

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES



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LEGEND

- Single Family Residential
- Multi-Family Residential
- Commercial
- Office
- Industrial
- Public & Institutional
- Transport & Utilities
- Parks & Open Space
- Undeveloped
- Agricultural Production
- Churches
- Hospital
- Public Parks
- Schools

N

0.6 0 0.6 1.2

Graphic Scale in Miles

Source: City of Houston; Knudson & Associates

Figure 2-3

AIRPORT ENVIRONS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES

2.2 AIRFIELD AND AIRSPACE FACILITIES

This section includes a description of the components of Ellington's airfield as well as details concerning airspace facilities and air traffic control issues.

2.2.1 Airfield Facilities

Ellington's airfield facilities can accommodate aircraft with wingspans of up to 171 feet and approach speeds of up to 165 knots. Information regarding the characteristics and condition of airfield facilities at the Airport, including runways, taxiways, and service roads, is summarized in the following paragraphs.

As shown on Figure 2-1, Ellington has two parallel runways (separated by 2,600 feet, centerline to centerline) and one cross-wind runway. Runway 17R-35L is 9,001 feet long and 150 feet wide. Runway 17L-35R, is 4,609 feet long, 75 feet wide, and is not Federal Aviation Regulations (FAR) Part 139 certified for commercial air carrier use. The crosswind runway, Runway 4-22, is 8,001 feet long and 150 feet wide. In addition, Ellington has two runways that have been decommissioned.

The strength of the runway pavements is sufficient to accommodate the aircraft using them (i.e., the strength of 17L-35R is sufficient for the smaller general aviation and helicopter traffic and the strength of 17R-35L and 4-22 is sufficient for the larger, heavier aircraft).

As shown on Figure 2-1, the three runways are served by eight taxiways and one taxilane. The taxiways provide aircraft access between the runways and the aircraft parking areas and the taxilane provides access to the existing HAS-owned aircraft storage facilities. Taxiway H, an apron-front taxiway parallel to 17R-35L, is the only full-length parallel taxiway. The other taxiways provide access to and from 17L-35R and 4-22.

The existing service roads on the Airport are located on the airside and are used primarily for access to navigational aid equipment, airfield and grounds maintenance, and the perimeter fencing to maintain security. There are approximately 67,000 linear feet of all-weather service roads (12.7 miles) in the airfield area. In addition, there are approximately 3 miles of service roads marked along the east and west edges of the apron to provide identified paths for vehicles traveling on the apron.

The majority of the service roads that follow the perimeter of the Airport are in good condition with limited pavement cracking and wear. The roads that access the navigational aides and some less-traveled interior roads are more deteriorated and are in fair-to-poor condition. A new interior service road was completed in 2002 east and parallel to Runway 17R-35L, extending from the existing north perimeter service road to the existing service road near the threshold of Runway 35L.

2.2.2 Airspace Facilities and Air Traffic Control

Procedures and conditions pertinent to aircraft operations at Ellington are discussed in the following paragraphs. Figure 2-4 shows the locations of facilities and imaginary surfaces relevant to aircraft operations.

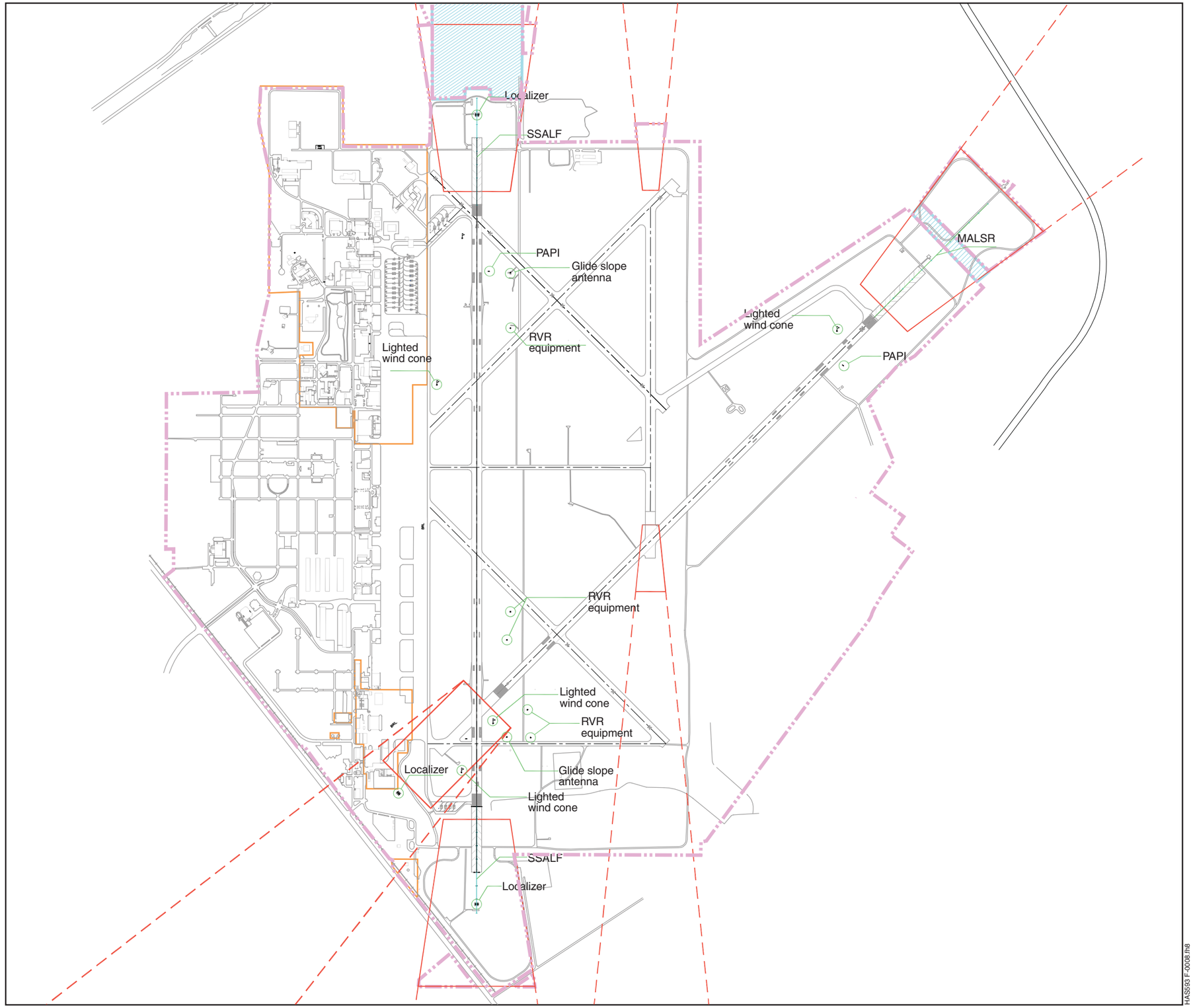
Imaginary Surfaces and Obstructions. The airspace and land in the Airport environs consist of imaginary or obstacle limitation surfaces. Approach surfaces are sloped trapezoidal areas centered about the extended runway centerline. Penetration of an approach surface by a manmade object, object of natural growth, or terrain, is considered an obstruction to air navigation. Approach surfaces vary depending on the types of navigational aids that are available at an airport. No obstructions are listed on Ellington's existing Airport Layout Plan (ALP), although interviews with Airport tenants revealed concern over the height of piles of materials located north of the Airport.

The primary purpose of a runway protection zone (RPZ), a trapezoidal area centered about the extended runway centerline, is to enhance the protection of people and property on the ground in the event an aircraft lands or crashes beyond the runway end. RPZ dimensions vary with the type of aircraft and approach visibility minimums associated with that runway end. As shown on Figure 2-4, not all land underlying the existing RPZs is within the Airport boundary. Beneath the approach to Runway 35L, a limited amount of area is owned by other agencies for road and rail rights-of-way. Under the approach to Runway 17R, HAS owns aviation easements for the existing and future RPZs, but owns less than half of the land. HAS owns all the land beneath the RPZ for the approach to Runway 22, except for a ditch running perpendicular to the runway. HAS owns an avigation easement over the ditch.

Under the approach for Runway 4, NASA owns the land and structures within the RPZ. FAA Advisory Circular (AC) 150/5300-15, *Use of Value Engineering for Engineering and Design of Airport Grant Projects*, recommends that RPZs be clear of incompatible objects and activities and that airports own sufficient property interest in an RPZ to control the land use. The FAA has determined that NASA property and structures within the RPZ is an acceptable condition since the structures do no penetrate the FAR Part 77 surface.

Air Traffic Control Procedures. The existing terminal airspace structure and air traffic control (ATC) procedures at Ellington are reviewed and potential constraints that affect airport capacity are identified in the following paragraphs.

The Houston Terminal Radar Approach Control (Houston TRACON) sequences instrument flight rules (IFR) aircraft to Ellington, and then transfers arriving aircraft to Ellington Field Airport Traffic Control Tower (Ellington Tower) at the final



LEGEND

- Airport boundary
- Aviation easement
- Runway protection zone (RPZ)
- Approach surface
- Special use (Military and NASA) areas
- Runway 4 RPZ, revised location

MALSR	Medium-intensity approach lighting system with runway alignment indicator lights
PAPI	Precision approach path indicator
RVR	Runway visual range
SSALF	Simplified short approach lighting system with sequenced flashing lights

N

750 0 750 1,500

Graphic Scale in Feet

HAS593 F-0008.fh8

Figure 2-4

NAVIGATION AND VISUAL AIDS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES

approach fix or 7 miles from the Airport, whichever is farther. Ellington Tower controls the movement of aircraft in the vicinity of Ellington, within the Class D Airspace.

The Class D airspace for Ellington is defined as the area within a 5-statute-mile-radius and from the ground up to 2,000 feet MSL (1,968 feet above airport elevation). Ellington's Class D airspace visual flight rules (VFR) entry points for general aviation aircraft are Downtown La Porte (6 miles north east), Kemah Bridge (8 miles south east), and Clover Field (8 miles south west) at 1,000 feet MSL. VFR entry points for jet aircraft (NASA, United States Air National Guard) are Bay Port (6 miles east) and the Power Plant (6 miles south east) at 1,600 feet MSL.

IFR aircraft operations at Ellington are integrated with William P. Hobby Airport (Hobby) and George Bush Intercontinental Airport/Houston (Intercontinental) traffic by the Houston TRACON on an individual basis on the routes shown on Figures 2-5 (southflow) and 2-6 (northflow).

Approximately 85% of all aircraft operations at Ellington use Runways 17R, 17L, and 22 (south flow) and approximately 15% use Runways 35L, 35R, and 4 (north flow). The vast majority of aircraft operations occur on the longer Runways 17R-35L and 4-22, with Runway 17L-35R primarily accommodating general aviation touch-and-go training activity.

During visual meteorological conditions (VMC), aircraft operating under VFR operate on a right traffic pattern for Runways 4, 35L, 35R and a left traffic pattern for Runways 17R, 17L, and 22. The pattern altitude is 1,100 feet MSL for turboprop aircraft and 1,600 feet MSL for turbojet aircraft. The airport traffic pattern altitude for small general aviation aircraft and helicopters is 600 feet.

At present, Ellington Tower is a non-radar military facility. Because Ellington Tower is not an FAA facility, Houston TRACON cannot assume that an IFR aircraft has landed without positive communication from Ellington Tower. Consequently, Houston TRACON may not allow an aircraft to initiate an approach to the Airport and cross the Final Approach Fix (FAF) until Ellington Tower telephones Houston TRACON to confirm that the previous aircraft has landed. As the FAF is about 6 miles from the runway, this requirement imposes a minimum 6-mile separation between successive approaches. Collectively, these conditions impose a limit on the IFR acceptance rate at the Airport. When Ellington Tower becomes an FAA contract tower, coordination between facilities will be entirely within the FAA. At that time, Houston TRACON controllers believe that the radar coverage from Ellington's airport surveillance radar (ASR) will be sufficient to allow separation between approaches to be brought down to about 3 miles.

LEGEND

- Ellington Arrivals
- Ellington Departures
- Hobby Arrivals
- Hobby Departures

N

1.5 0 1.5 3

Graphic Scale in Nautical Miles

Figure 2-5

ELLINGTON/HOBBY INTERACTIONS
ELLINGTON SOUTH FLOW

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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LEGEND

- Ellington Arrivals
- Ellington Departures
- Hobby Arrivals
- Hobby Departures

N

1.5 0 1.5 3

Graphic Scale in Nautical Miles

Figure 2-6

ELLINGTON/HOBBY INTERACTIONS
ELLINGTON NORTH FLOW

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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Interactions with William P. Hobby Airport. The airport traffic areas for Hobby and Ellington overlap and are divided by the control zone boundary midway between the two airports. The jurisdiction and altitudes of the overlapping airspace areas between Hobby and Ellington depend on the runways in use and are specified in the letters of agreement between the two ATC facilities. Specifically, depending on runway use, the Houston TRACON delegates different portions of the Ellington airport traffic area to the Hobby Tower Radar Approach Control (Hobby TRACAB).

Ellington traffic patterns are on the east side of the airport (away from Hobby). Because the allocation of airspace between Ellington and Hobby is well defined by runway use for VFR operations, few direct airspace interactions occur and little communication is necessary between the respective control towers.

Navigational and Landing Aids. Existing navigational and landing aids at Ellington are summarized in Table 2-1. The Category I ILSs on Runways 17R, 35L, and 22 allow precision instrument approaches by providing pilots with an electronic glide slope and glide path. Category I precision approaches have minimums of 200-foot ceilings and ¾-nautical-mile visibility. These visibility minimums can be reduced to ½ mile by upgrading the approach lighting system. Because Runway 22 has a medium intensity approach lighting system with runway alignment indicator lights (MALSR), it provides the best approach to the Airport. Runway 4 allows nonprecision approaches using area navigation guided by global positioning system technology. The Runway 4 approach minimums are 410-foot ceiling and 1-½-mile visibility. Runways 17L and 35R only allow visual approaches and no navigational aides are provided.

2.3 LANDSIDE FACILITIES

Ellington's landside facilities include general aviation facilities, special use facilities, other Airport land use facilities, ground support facilities, and utilities. Landside facilities are described in the following section.

2.3.1 General Aviation Facilities

GA facilities, depicted on Figure 2-7, are composed primarily of 90 corporate hangars (1,500 to 3,600 square feet, each), one fixed base operator (FBO), one conventional hanger (owned and operated by the FBO), an aircraft parking apron, and a flight school. For purposes of this section, GA includes the commercial terminal serving Continental Express scheduled flights.

Table 2-1

NAVIGATIONAL AND VISUAL AIDS
Ellington Field

	Runway 4-22		Runway 17R-35L		Runway 17L-35R	
	4	22	17R	35L	17L	35R
Best approach	RNAV (GPS) *(a)*	Cat I ILS	Cat I ILS	Cat I ILS	*(b)*	*(b)*
Runway visual range (miles) *(c)*	1-1/2	1/2	3/4	3/4	n.a.	n.a.
Decision height (feet)	410	200	200	200	n.a.	n.a.
Runway edge lighting	HIRL	HIRL	HIRL	HIRL	None	None
Centerline lights	Yes	Yes	Yes	Yes	None	None
Runway marking	Precision	Precision	Precision	Precision	Basic	Basic
Approach lighting	None	MALSR	SSALF	SSALF	None	None
Visual aides	PAPI	PAPI	PAPI	PAPI	None	None
Touchdown point	Yes, no lights	Yes, lighted	Yes, lighted	Yes, lighted	Yes, no lights	Yes, no lights

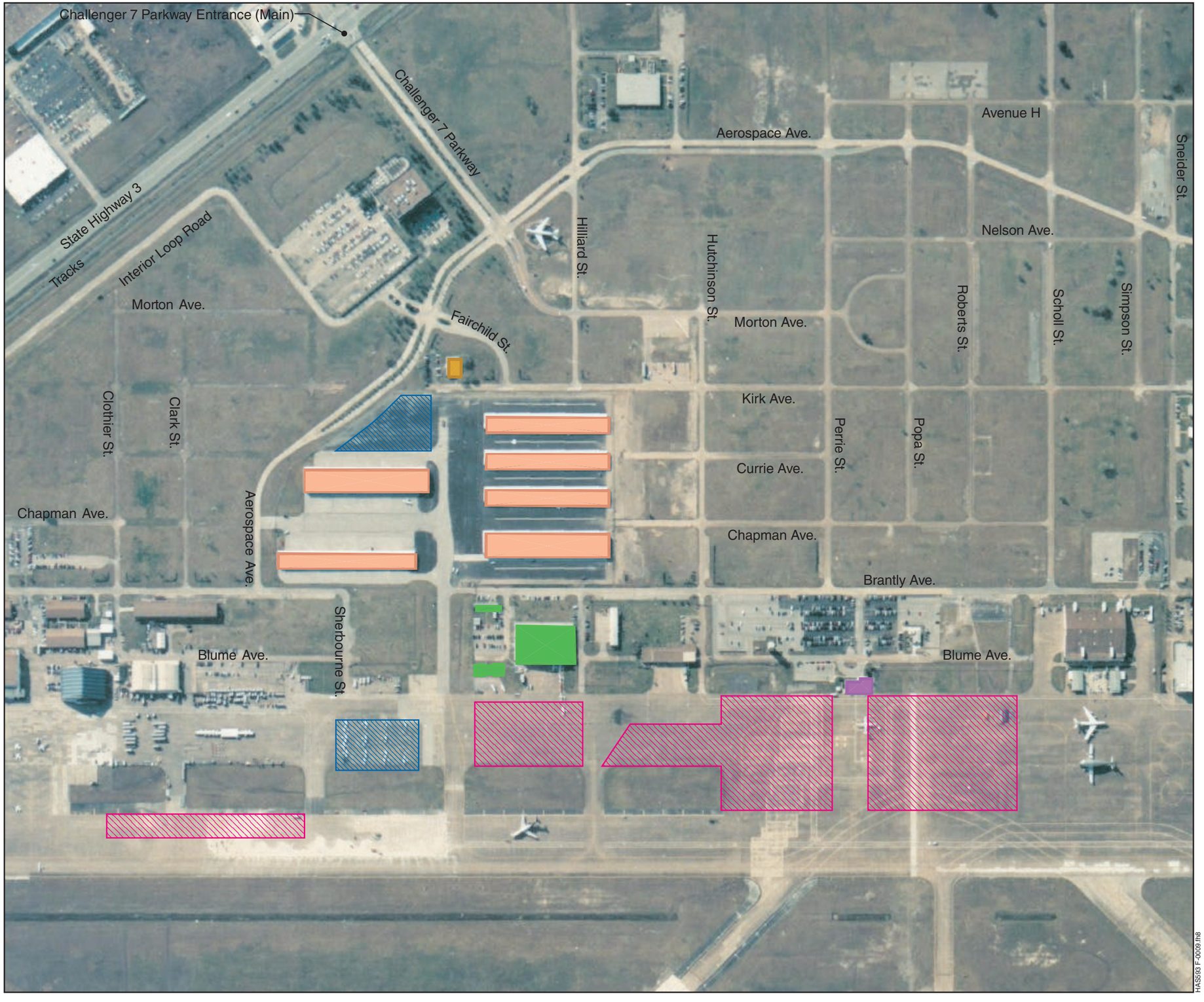
(a) Non-precision approach.
(b) No published approach.
(c) For Approach Category D aircraft.

SSALF = Simplified short approach lighting system with sequenced flashers
PAPI = Precision approach path indicator
MALSR = Medium intensity approach lighting system with runway alignment indicator lights
RNAV (GPS) = Area navigation using global positioning system equipment
Cat I ILS = Category I Instrument Landing System
HIRL = High intensity runway lights

Source: Leigh Fisher Associates, April 2003.

Aircraft Parking and Storage. GA aircraft at Ellington are parked on the apron between the GA facilities and Taxiway H and are stored in one conventional hangar and 90 smaller hangars. Itinerant aircraft parking facilities provide apron and parking space for transient aircraft, while allowing convenient access to FBOs, fueling facilities, and ground transportation. The Airport maintains five areas, totaling approximately 17 acres, for itinerant aircraft parking. Approximately 8.8 acres are located east of the FBO and aircraft rescue and fire fighting (ARFF) station. This area can accommodate approximately 55 aircraft, depending on size. Approximately 6.3 acres are located north of the terminal building and are typically used to park larger transient military aircraft (e.g., C-5, C-17, C-141).

Local pilots store their aircraft in based aircraft parking and storage facilities. Existing based aircraft storage and parking facilities include approximately 45 outdoor aircraft parking positions divided between two locations, located on 1.3 acres of HAS apron at the south end of and 1.5 acres in the southwest corner of the GA area; 66 small corporate hangars, divided between four buildings, providing a total of approximately 100,000 square feet of storage space; 24 large corporate hangars, divided between two buildings, providing a total of approximately 80,000 square feet of storage space; and one large conventional hanger, providing approximately 20,000 square feet of storage space.



HAS593 F-0009.lh8

LEGEND

- Itinerant aircraft parking area
- Based aircraft parking area
- Corporate hangars
- Fixed base operator (conventional hangar)
- Commercial terminal
- Flight school

Source: Carter & Burgess, Inc.
Aerial published in 2002, by Aerial Image

N

200 0 200 400

Graphic Scale in Feet

KEY PLAN

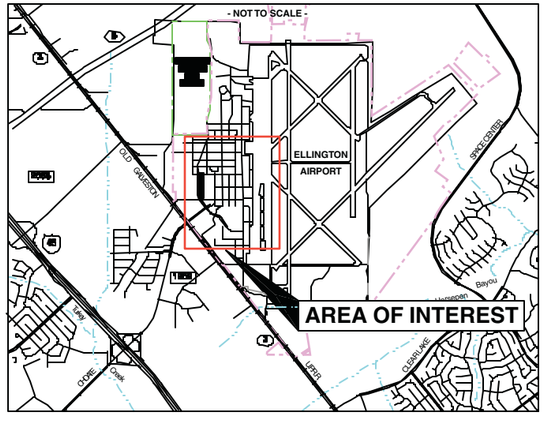


Figure 2-7

GENERAL AVIATION FACILITIES

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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Fixed Base Operator. The Airport currently includes one full-service FBO, Southwest Services, that provides aircraft fueling services for itinerant and based aircraft; aircraft, airframe, and engine maintenance (services are provided by Lentz Flying Service, a subtenant); management of the based aircraft tiedown apron for HAS; flight training; and some limited aircraft storage. The FBO leases approximately 17 acres and operates from a large conventional hangar located south of the ARFF facility, adjacent to the HAS apron. The two-level hangar, leased from HAS, encompasses approximately 35,000 square feet of which 20,000 square feet is used for aircraft storage.

Southwest Services' offices are located in a two-story "general aviation terminal" immediately south of Southwest's conventional hangar. This 10,000-square-foot facility includes a pilot/passenger lounge and office space for lease.

Passenger Terminal. Ellington has a small passenger terminal located north of Ellington Tower. The terminal services Continental Express, which operates up to five flights per day, each way, to and from Intercontinental. The terminal building is approximately 5,200 square feet and includes area for ticket counters and passenger waiting areas. Continental Express parks up to two regional jet aircraft on 0.4 acre of leased apron immediately adjacent to the terminal building.

Flight School. Cliff Hyde Flying Service is the on-Airport flight school and provides flight training in conjunction with San Jacinto Community College. The flight school leases approximately 2 acres; operates from a one-story, 3,700-square-foot building located west of the HAS corporate hangars; and leases 28 aircraft apron parking positions immediately east of their building. The flight school currently operates 17 single-engine aircraft and one multi-engine aircraft.

2.3.2 Special Use Facilities

Ellington is home to three military units and NASA. These four users all own property within the Airport boundary and are not bound by any land lease agreements with HAS.

As shown on Figure 2-1, the northwest section of the Airport is owned by the military. This area is divided between:

- The Texas Air National Guard (TxANG), which owns approximately 225 acres and primarily operates F-16 aircraft. TxANG has numerous buildings on its site, including five hangars.

- The United States Army National Guard (ANG), which occupies approximately 8 acres leased from the TxANG and primarily operates AH-64

Apache helicopters. The ANG operates from one 32,000-square-foot hangar.

- The United States Coast Guard (USCG), which occupies approximately 12 acres leased from the TxANG and primarily operates Dauphin helicopters. The USCG operates from one 21,000-square-foot hangar.

As shown on Figure 2-1, NASA owns property in two areas of the Airport. In total, NASA owns approximately 35 acres within the Airport boundary. NASA has several buildings, including three hangars for aircraft storage, maintenance, and support. NASA uses their property at Ellington primarily for support of aircraft used in astronaut training.

2.3.3 Other Uses and Tenant Facilities

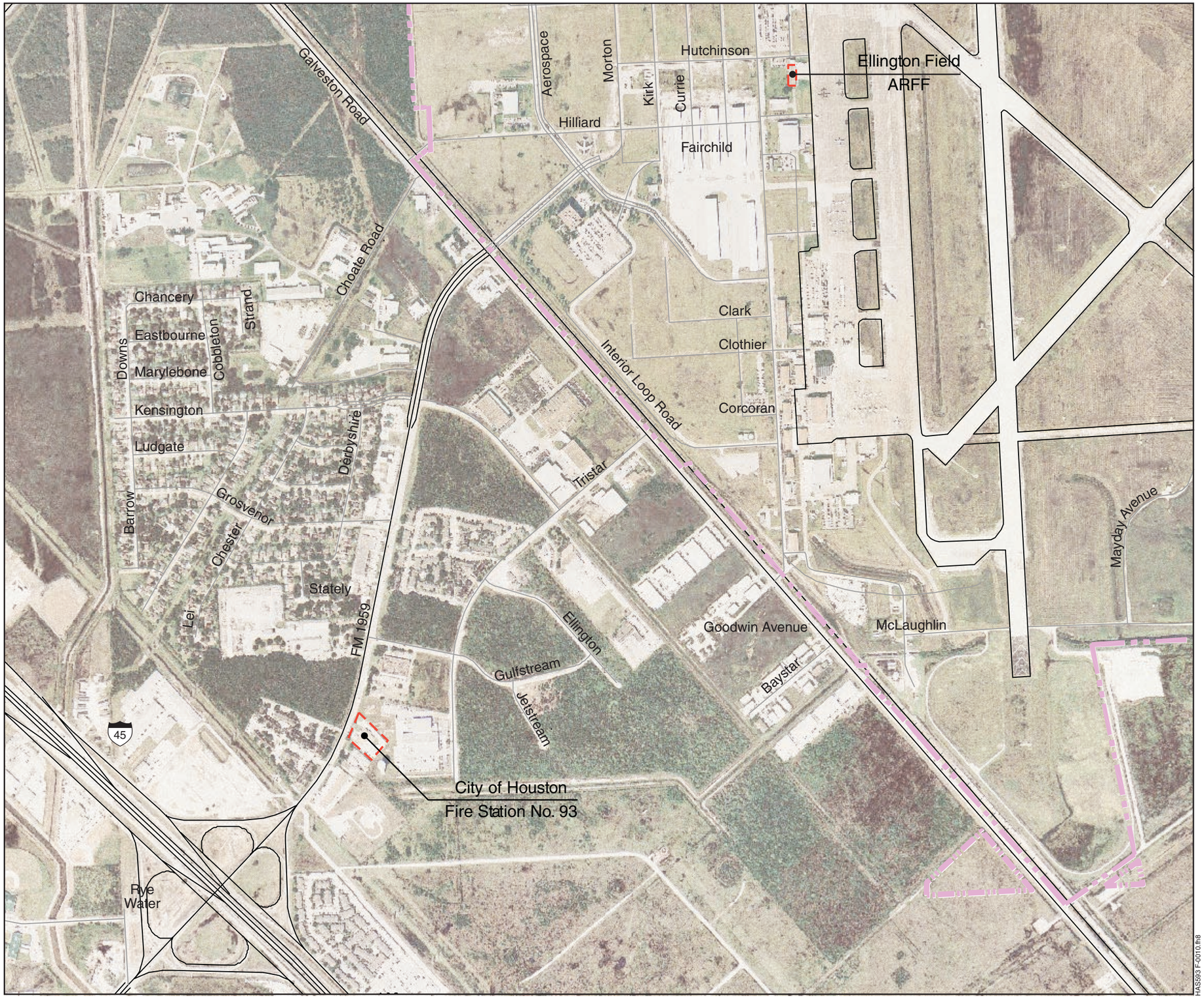
This section summarizes information on other Airport land uses and tenant facilities.

Administration. HAS manages and operates Ellington from administrative offices in Building 510, located off of Challenger 7 Parkway. Building 510 is approximately 21,000 square feet and is comprised of HAS offices and meeting areas.

Aircraft Rescue and Fire Fighting. The ARFF facility is centrally located on the Airport just south of Ellington Tower (see Figure 2-8). The ARFF is operated by the TxANG and serves all events for all tenants located on the airfield.

Fuel Storage. Ellington is currently served by an aboveground storage tank fuel farm located at the south side of the Airport (see Figure 2-9). There are no underground pipelines and hydrant system at Ellington—all fuel is transported to the individual tenants by fuel trucks. The three main fueling suppliers with tanks at the fuel farm are Southwest Services, TxANG, and UPS (UPS has started the process to remove their fuel tanks).

Maintenance. HAS has a single consolidated maintenance and storage yard, the ASC, located just north and east of Runway 17R-35L. The ASC has gone through several expansion programs and serves as the maintenance and storage facility for all Airport equipment and vehicles. Objects stored in the ASC include generators, tractors, mowers, and other assorted vehicles and tools. As shown on Figure 2-10, the ASC has four main structures: a fuel station and wash bay, a covered parking maintenance building, an enclosed maintenance facility, and a vacant building, which will be demolished and a new storage building constructed in its place.



LEGEND

- Airport boundary
- Fire fighting facility

Source: Carter & Burgess, Inc.
Aerial published in 2002, by Landiscor

N

400 0 400 800

Graphic Scale in Feet

KEY PLAN

- NOT TO SCALE -

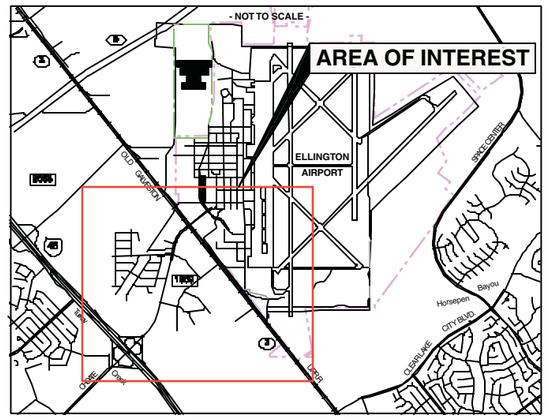


Figure 2-8

AIRCRAFT RESCUE AND FIRE FIGHTING FACILITIES

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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HAS693-F-0010.fh8

HAS593 F-0011.ihl8

LEGEND

- Airport boundary
- Fuel farm

Source: Carter & Burgess, Inc.
Aerial published in 2002, by Landiscor

N

100 0 100 200

Graphic Scale in Feet

KEY PLAN

- NOT TO SCALE -

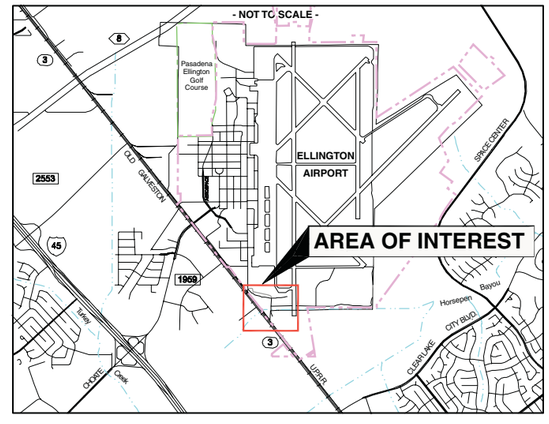

Figure 2-9

FUEL FARM AREA

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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HAS593 F-0012.ai8

LEGEND

Airport boundary

Storage/maintenance area

N

100 0 100 200

Graphic Scale in Feet

Building legend

1. Future sorage building site (existing building to be demolished)
2. Fuel station with wash bay
3. Covered parking
4. Airfield and Ground Division
5. Equipment Support Service Division
6. Physical Plant Division
7. Electrical Division
8. Existing storage building (to be demolished)

KEY PLAN

- NOT TO SCALE -

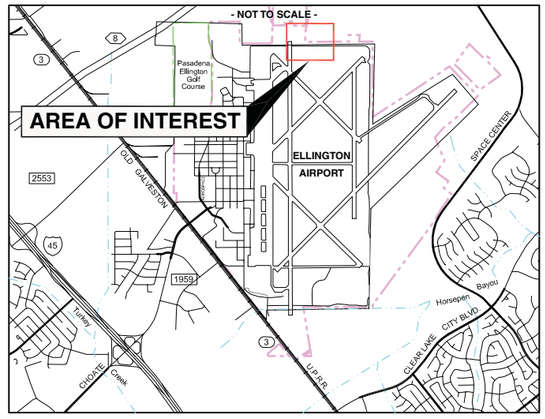

Figure 2-10

AIRPORT SERVICE COMPLEX
EQUIPMENT STORAGE AND MAINTENANCE FACILITIES

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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Commercial. Roche One Interests, L.P., leases approximately 15 acres at the intersection of Challenger 7 Parkway and Aerospace Boulevard. There is one four-story, 28,500-square-foot building on the site (the Grumman Building). SkyPort Technologies, Inc., leases approximately 17.5 acres north of the HAS office building. This lease area contains a small structure and two 40-meter antennas.

2.3.4 Ground Transportation Facilities

Ellington access roadways, on-Airport roadways, public parking facilities, and commercial ground transportation services are described in the following paragraphs.

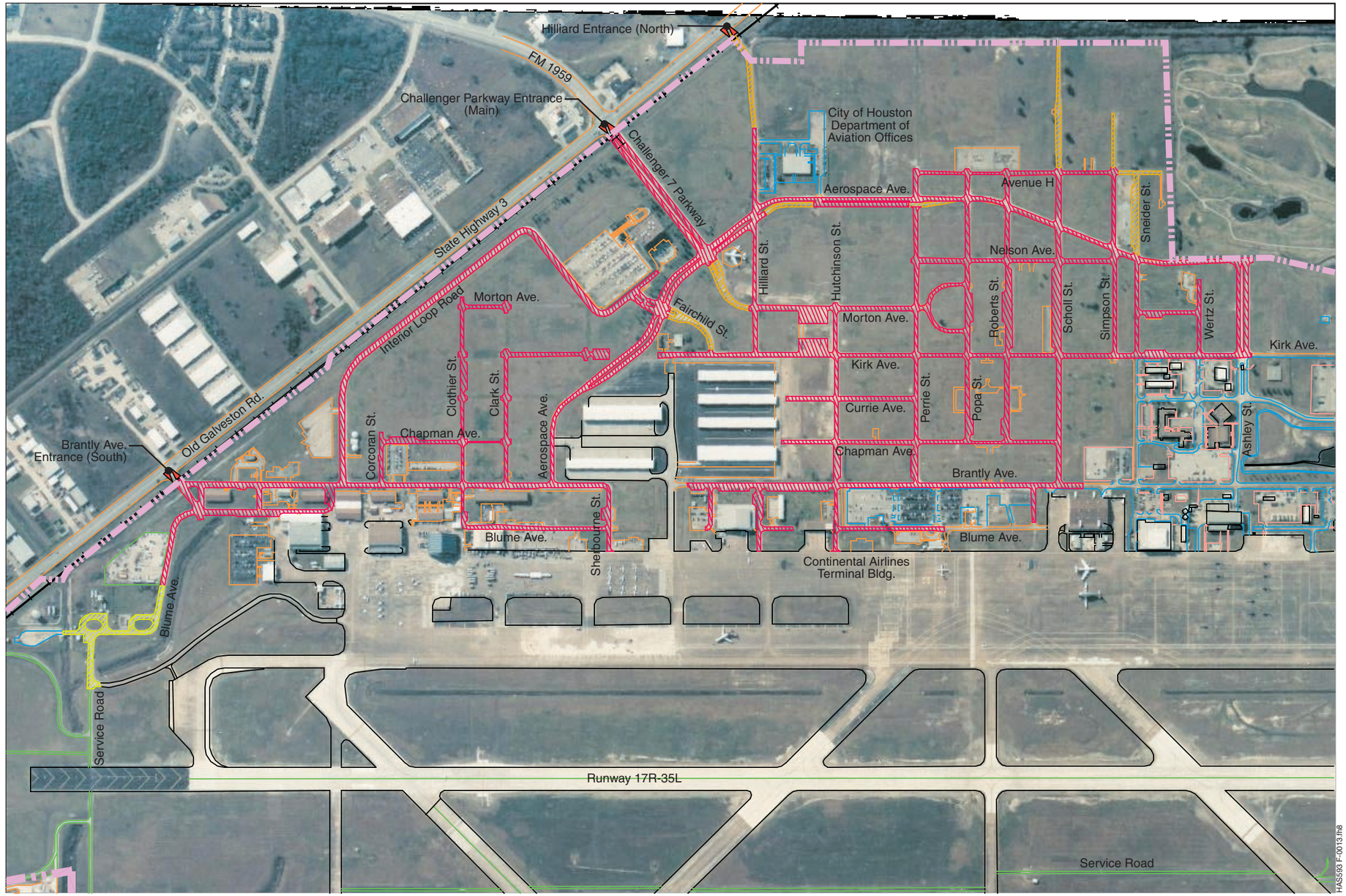
Regional Access. As shown on Figure 2-2, Ellington is located in the southeast corner of Harris County, within the City of Houston. The Airport is located within close proximity of two highways: Beltway 8 (approximately one-half mile north of main Airport entrance) and Interstate I-45 (approximately one mile west of main Airport entrance). Additionally, an existing rail line borders the west side of the Airport, running between State Highway 3 and Ellington property.

Local Access and On-Airport Roadways. Access points to Ellington are shown on Figure 2-10. Primary access from Interstate 45 to Ellington is via Dixie Farm Road (F.M. 1959) heading east to the Main Entrance (Challenger 7 Parkway). The primary route to the Airport from Beltway 8 is State Highway 3 heading south to the Main Entrance. The Main Entrance was reconstructed in 1988 to accommodate the modification of State Highway 3 from an undivided roadway to a divided roadway with two lanes in each direction. The only other public roadway access to Ellington is from the North Entrance (Hilliard Street) and the South Entrance (Brantly Avenue), both located off State Highway 3.

Access to facilities east of the Airport (including the Boeing facility) is via Space Center Boulevard, which connects State Highway 3 to Genoa Red Bluff Road via Clear Lake City Boulevard.

Also shown on Figure 2-11 are the on-Airport public roadways providing access from the Airport entrances to the Airport facilities. As shown, there are many on-Airport roadways constructed to serve the original Air Force Base complex that are not necessary for current Airport operations. In total, there are approximately 9 miles of public on-Airport roadways.

Figure 2-12 depicts the non-public roadways on the Airport. These roadways, totaling approximately 3 miles, are located within property owned by TxANG and the other two military users.



HAS593 F-0013.ai8

LEGEND

- Private roadway (concrete)
- Private service road (asphalt)
- Private service road (concrete)
- Public roadway (asphalt)
- Public roadway (concrete)
- Airport pavement (concrete)
- Ingress/egress point
- Airport boundary

Source: Carter & Burgess, Inc.
Aerial published in 2002, by Aerial Images

N

350 0 350 700

Graphic Scale in Feet

KEY PLAN

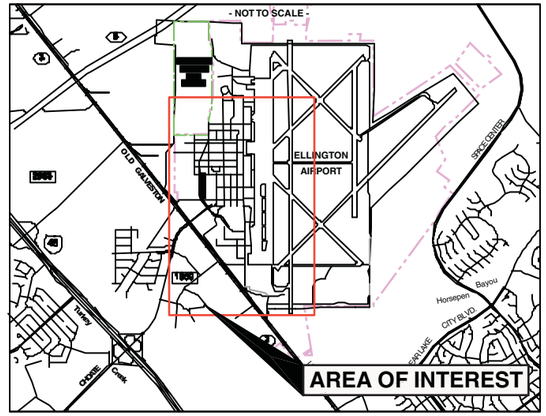


Figure 2-11

ACCESS POINTS AND PUBLIC ROADWAYS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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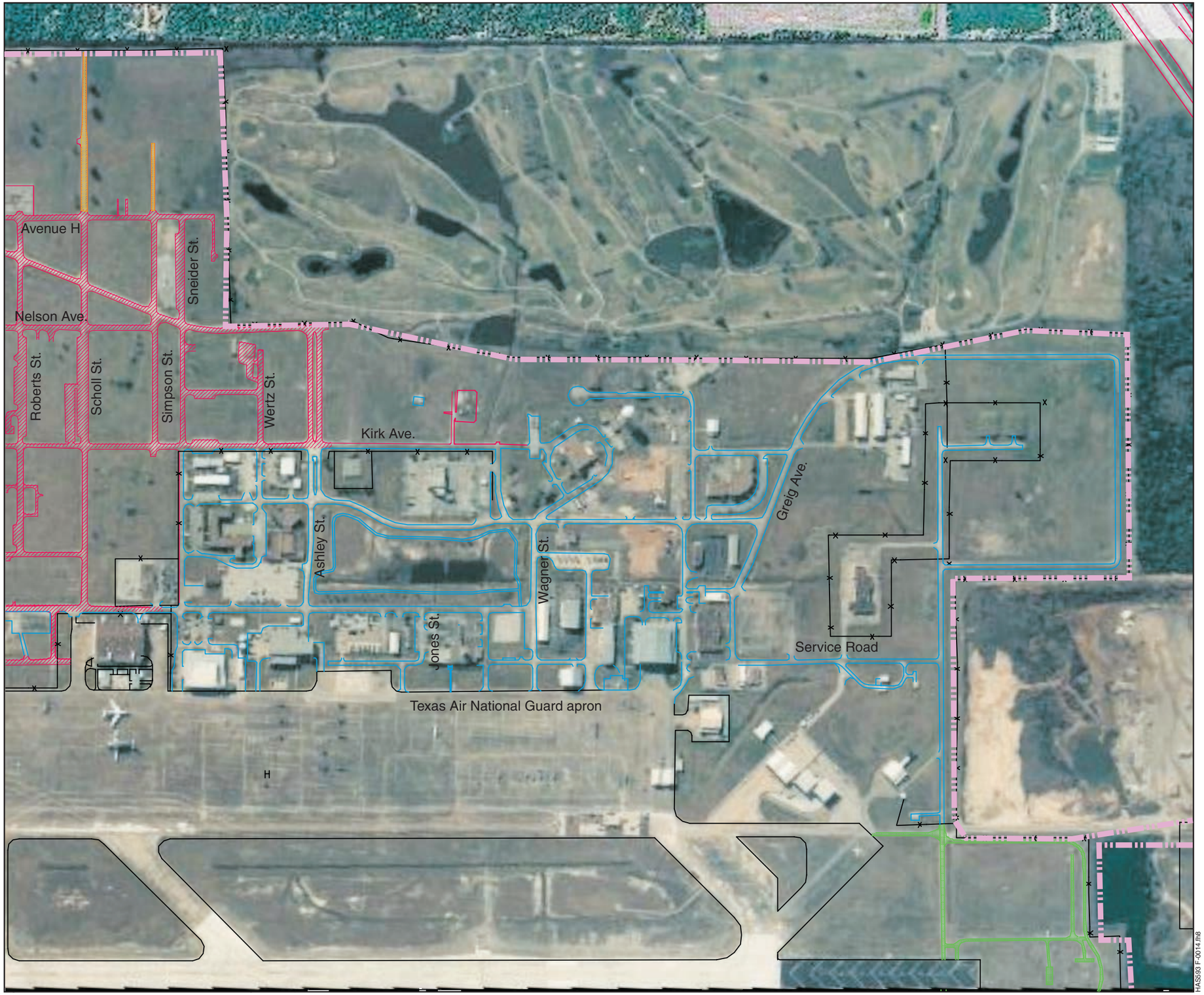

HAS593 F-0014.fh8

LEGEND

- Private roadway (concrete)
- Private service road (concrete)
- Public roadway (asphalt)
- Public roadway (concrete)
- Airfield pavement (concrete)
- Airport fence
- Airport boundary

Source: Carter & Burgess, Inc.
Aerial published in 2002, by Aerial Images

N

250 0 250 500

Graphic Scale in Feet

KEY PLAN

- NOT TO SCALE -

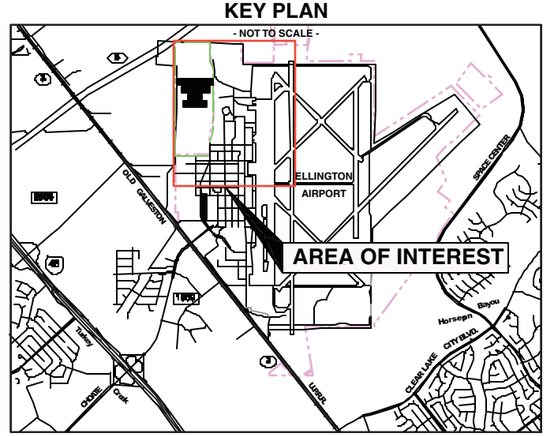

Figure 2-12

EXISTING ROADWAYS, NON-PUBLIC AREA

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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Public and Employee Parking. With the exception of the HAS administration building, the Grumman building, and the military facilities, the majority of the existing structures/facilities at Ellington are located adjacent or connecting to the airfield apron. At tenant facilities, parking is provided adjacent to the individual tenant facility and is considered non-public. The public parking facilities currently available at Ellington are the parking facility at the HAS administration building and the public parking facility serving the terminal building. These parking lots are shown on Figure 2-13. The HAS administration building has 140 parking spaces (including 5 designated handicap spaces) and the lot serving the terminal building has 559 parking spaces (including 13 designated handicap stalls).

Commercial Ground Transportation. The vast majority of ground transportation trips to and from Ellington are via private automobile. Since public parking at Ellington is free, the vast majority of passengers drive to the Airport and park for the duration of their trip rather than using taxicabs or limousines. Furthermore, the Continental Airlines passengers are typically residents of southwest Harris County who wish to fly Continental Airlines but do not wish to drive to Intercontinental. Thus, the vast majority of Ellington's passengers are not visitors and thus, require no on-Airport rental car service.

2.3.5 Existing Utility Infrastructure

Ellington has a well-developed utility network, especially to the west of the airfield. Much of the utility infrastructure was developed when this area represented the housing section of Ellington Air Force Base. The City, after acquiring the property, also installed new or upgraded facilities along Brantly Avenue and Aerospace Boulevard. The utility infrastructure includes sanitary sewer lines, water lines, storm sewer system, natural gas service lines, telephone system, electrical lines, and fuel lines.

HAS593 F-0015.fh8

LEGEND

- Airport boundary
- Public parking area

Source: Carter & Burgess, Inc.
Aerial published in 2002, by Landiscor

N

150 0 150 300

Graphic Scale in Feet

KEY PLAN

- NOT TO SCALE -

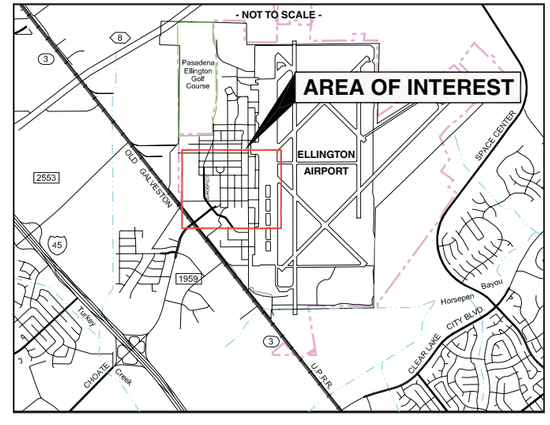

Figure 2-13

EXISTING PARKING FACILITIES

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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Chapter 3

AVIATION ACTIVITY FORECASTS

This chapter presents forecasts of annual aircraft operations, based aircraft and enplaned passengers, and peak hour aircraft operations forecasts at Ellington Field (the Airport) through 2021. These forecasts are unconstrained and do not include specific assumptions about future Airport capacity. Aircraft operations forecasts are also displayed by day and night operations distribution, for the purposes of any subsequent environmental analyses. All years are calendar years (CY) unless otherwise stated. A more thorough discussion of these topics is included in the *Master Plan Technical Report*, Chapter 3.

3.1 ECONOMIC BASIS FOR AVIATION ACTIVITY

Key historical economic growth factors include population, employment, and personal income growth in the Houston area. Historical and forecast socioeconomic data for the Houston Consolidated Metropolitan Statistical Area (CMSA) are summarized in Table 3-1.

Between 1990 and 2000, the Houston CMSA population grew at an average annual rate of 2.3%. During this same period, population in the State of Texas, and the United States as a whole grew at rates of 2.1% and 1.3%, respectively. Projections made by the National Planning Association (NPA) predict a growth rate higher than both the State of Texas and the United States as a whole over the next 15 years.

Between 1990 and 2000, nonagricultural employment in the Houston CMSA grew at an average annual rate of 2.5%. During the same time period, employment in the State of Texas and the United States grew at rates of 2.9% and 1.9%, respectively. The strong growth in employment over the past 10 years is expected to continue in both the State of Texas and in the Houston CMSA over the next 15 years.

Between 1990 and 1999, per capita income in Houston grew at an average annual rate of 2.7% compared to 2.6% and 2.0% for the State of Texas and the United States, respectively. Growth in income is expected to continue to be strong, and similar to the State of Texas and the United States.

Based upon the NPA projections, population and nonagricultural employment growth rates for Houston are expected to be higher than for the state and the nation, while income growth rates are expected to be similar. Although the NPA projections may prove to be optimistic, given the recent recession and the effects of the events of September 11, 2001, they may still be relevant indicators of long-term trends.

Table 3-1

HISTORICAL AND FORECAST SOCIOECONOMIC DATA
Average Annual Growth Rates
Houston CMSA

	Historical	Forecast	
	1990 - 2000	2000 - 2005	2000 - 2015
Employment	2.5%	2.7%	2.3%
Population	2.3	2.0	2.3
Personal income	2.7	2.4	1.9

Sources: *Historical:* Employment: U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, May 2001 edition.

Population: U.S. Bureau of the Census, Current Population Reports, 2000.

Personal income: Key Indicators of County Growth, 1970-2025, 2001 Edition, NPA Data Services, Inc.

Forecast: Key Indicators of County Growth, 1970-2025, 2001 Edition, NPA Data Services, Inc.

3.2 AIRPORT ACTIVITY

This section reviews historical aviation activity at the Airport to provide background for the development of aviation forecasts. The discussion of Airport activity includes a summary of historical aviation activity and a description of aviation activity types.

3.2.1 Historical Aviation Activity

Tables 3-2 and 3-3 summarize historical aircraft operations and based aircraft, respectively. Total aircraft operations and based aircraft grew at 0.5% and 2.0%, respectively, between 1990 and 2001.

Table 3-2

HISTORICAL AIRCRAFT OPERATIONS
Ellington Field
CY 1990 - CY 2001

Year	General Aviation *(a)*	Military	Air carrier	Air taxi	Subtotal air carrier/ air taxi	Total	Annual growth
1990	63,605	46,547	4,383	1,764	6,147	116,299	--
1991	51,454	38,442	8,041	1,951	9,992	99,888	(14.1%)
1992	45,866	36,639	9,902	1,906	11,808	94,313	(5.6)
1993	68,310	31,575	9,264	1,479	10,743	110,628	17.3
1994	51,457	42,148	9,469	1,643	11,112	104,717	(5.3)
1995	57,747	27,300	n.a.	n.a.	8,920	93,967	(10.3)
1996	73,236	29,352	n.a.	n.a.	10,200	112,788	20.0
1997	62,218	27,182	n.a.	n.a.	10,423	99,823	(11.5)
1998	84,042	29,863	n.a.	n.a.	10,729	124,634	24.9
1999	88,479	34,232	6,415	7,907	14,322	137,033	9.9
2000	93,605	33,611	4,328	7,571	11,899	139,115	1.5
2001	83,217	30,272	3,356	5,656	9,012	122,501	(11.9)
January-July							
2001	48,871	15,847	1,917	3,260	5,177	69,895	
2002	58,136	27,390	2,111	3,640	5,751	91,277	30.6
Average annual growth							
1990-1995	(1.9%)	(10.1%)	n.a.	n.a.	7.7%	(4.2%)	
1995-2001	6.3	1.7	n.a.	n.a.	0.2	4.5	
1990-2001	2.5	(3.8)	(2.4%)	11.2%	3.5	0.5	
January-July							
2001-2002	19.0%	72.8%	10.1%	11.7%	11.1%	30.6%	

n.a. = Not available.

(a) Reported to include NASA operations and aircraft transitioning the Airport's airspace.

Source: Airport Traffic Control Tower, Ellington Field, September 2002.

Table 3-3

HISTORICAL BASED AIRCRAFT
Ellington Field
CY 1990 - CY 2001

	Historical 1990 - 2001
1990	144
1991	226
1992	222
1993	222
1994	148
1995	148
1996	148
1997	180
1998	180
1999	178
2000 *(a)*	178
2001 *(b)*	178
Average annual growth	
1990-1995	0.5%
1995-2001	3.2
1990-2001	2.0

(a) 2000 and 2001 are estimated.
(b) Above data shown for the purposes of establishing historical data series. There is inconsistency with Airport data for 2001 shown in Table 3-6.

Source: Federal Aviation Administration, Office of Aviation Policy and Plans, Terminal Area Forecast, 2001.

3.2.2 Description of Aviation Activity Types

The main areas of aviation activity analyzed include general aviation, air taxi, air carrier, and military and government:

General Aviation. The majority of GA operations are training operations, particularly from flying schools such as Cliff Hyde Flying Service. Corporate activity is serviced by the FBO at the Airport, Southwest Aviation Services.

Air Taxi. Included within the air taxi category in 2001 were about 2,400 annual UPS B-727, B-757 and B-767 air cargo aircraft operations, and about 1,000 Martinaire SW-3 Metroliner air cargo aircraft operations. UPS ceased air cargo operations at the Airport at the end of 2002.

Air Carrier. The air carrier operations category in 2001 comprised approximately 3,400 Continental Express commuter aircraft operations, generating approximately 32,000 enplaned passengers.

Military and Government. The different categories of military and government activity include:

- ***Texas Air National Guard—*** As of February 2002, the TxANG based 16 F-16 and one C-26 (equivalent to a Fairchild SW-3 Metroliner) aircraft at the Airport and conducted between approximately 2,100 and 2,500 principally training operations annually.

- ***National Aeronautics and Space Administration—*** As of February 2002, NASA based 41 aircraft at the Airport, most of which were T-38 trainers, together with a smaller number of Gulfstream G-5 aircraft and other make/models. NASA estimate that they conduct approximately 26,000 principally training operations annually, and do not anticipate any significant change to their activities.

- ***United States Coast Guard—*** As of February 2002, the USCG based four Aerospatiale H-65 Dolphin helicopters at the Airport, of which one is normally deployed elsewhere. The USCG conducts between approximately 3,000 principally search and rescue and training operations annually, and does not anticipate any significant change to their activities.

- ***Army Air Guard—*** As of February 2002, the AAG based 19 AH-64 Apache helicopters at the Airport. The AAG conducts approximately 1,000 principally training operations annually, and expects to increase this number to approximately 1,500 by early 2004.

3.3 GENERAL AVIATION MARKET ASSESSMENT

There was a national trend of flat GA aircraft operations between 1990 and 2000, comprised of two phases—a period of decline in aircraft operations between 1990 and 1995, and a period of growth in aircraft operations between 1995 and 2000. This national trend was reflected in growth trends at Ellington. The decline was attributed to:

- National economic recession between 1990 and 1991.
- Airline industry contraction, leading to reduced demand for pilot training.
- The ongoing effects of legal action, particularly since the 1980s, against many manufacturers, including Cessna and Piper, who entered Chapter 11 bankruptcy proceedings. This legal action affected GA aircraft manufacturing and had a negative effect on the industry as a whole.

The period of growth was attributed to:

- Improved economic conditions, including average annual gross domestic product (GDP) growth of 4.1%.
- The 1994 General Aviation Revitalization Act (GARA), which, among other things, limited product liability for GA aircraft manufacturers and provided some stimulation to the GA market. With the improving economy and the limited product liability, Cessna, Piper and other manufacturers emerged from Chapter 11.
- Continued reductions in military aviation, leading to increased GA flight training requirements.

3.4 ESTIMATE OF AIRCRAFT OPERATIONS FOR 2002

As shown in Table 3-2, aircraft operations grew 30.6% in the first 7 months of 2002, compared to the same period in 2001. More specifically, GA and military operations grew by 19.0% and 72.8%, respectively. The reasons for this growth included:

- Occupancy by GA aircraft by September 2002 of up to approximately 45 of 60 new GA aircraft hangars opened by the Airport in 2002, leading to increases in local and itinerant GA aircraft operations.
- Heightened military aviation activity as a result of the events of September 11, 2001, and subsequent increased homeland security patrol, training and other activity, leading to increases in local and itinerant military aircraft operations.

- Closure of Houston Gulf Airport in March 2002, leading to increases in itinerant GA aircraft operations.

3.5 AVIATION ACTIVITY FORECASTS

Aviation activity forecasts for the period 2003-2021 were prepared based on recent trends in aircraft operations and the key factors influencing aviation activity.

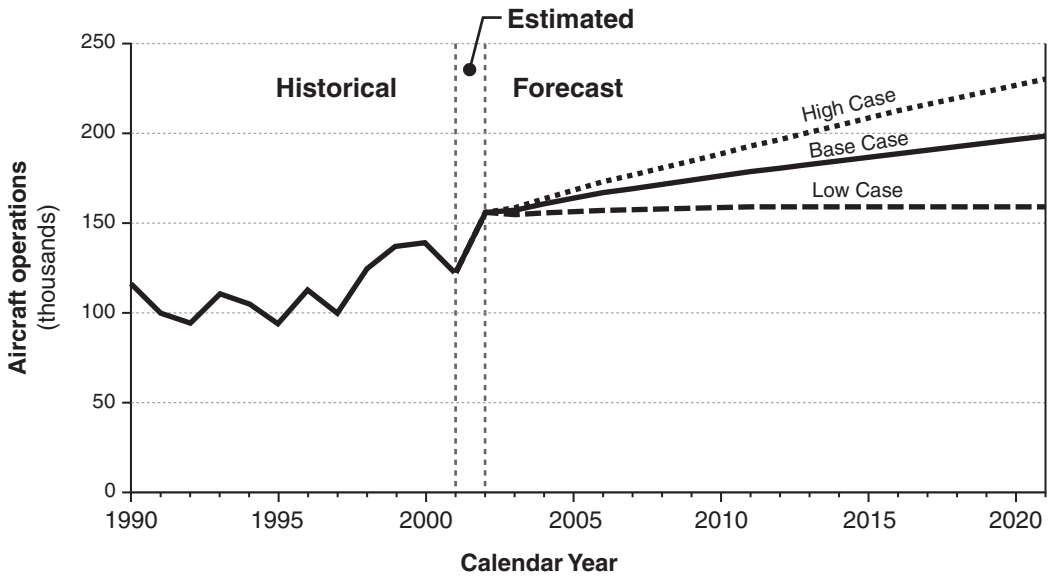
3.5.1 Aircraft Operations

To reflect the range of potential scenarios for future economic growth and airline service development at the Airport, three forecast scenarios were developed—base, high, and low. Figure 3-1 and Table 3-4 summarize estimated and forecast aircraft operations. Low and high case forecast key growth assumptions are discussed in the *Master Plan Technical Report*, Chapter 3. Base case total aircraft operations are forecast to grow at 1.3% between 2002 and 2021, as further described below.

Figure 3-1

HISTORICAL, ESTIMATED, AND FORECAST AIRCRAFT OPERATIONS

Ellington Field



The forecasts presented in this figure were prepared using information and assumptions described in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Sources: Historical—Federal Aviation Administration, Office of Aviation Policy and Plans, Terminal Area Forecasts, 2001.
Forecast—Leigh Fisher Associates, October 2002.

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Table 3-4

HISTORICAL, ESTIMATED, AND FORECAST AIRCRAFT OPERATIONS

Ellington Field
CY 2001 - CY 2021

	Historical	Estimated	Forecast				Average annual growth 2002-	2002-	2002-
	2001	2002	2006	2011	2016	2021	2006	2011	2021
BASE CASE									
Airfield Operations									
General aviation	40,217	50,000	59,000	66,000	72,000	78,000	4.2%	3.1%	2.4%
Air taxi	5,656	6,300	4,700	5,700	6,700	7,700	(7.1)	(1.1)	1.1
Air carrier	3,356	3,700	3,700	3,700	3,700	3,700	0.0	0.0	0.0
NASA	18,000	18,000	18,000	18,000	18,000	18,000	0.0	0.0	0.0
Military	30,272	47,000	47,500	47,500	47,500	47,500	0.3	0.1	0.1
Total airfield operations	97,501	125,000	132,900	140,900	147,900	154,900			
Average annual growth		28.2%	1.5%	1.2%	1.0%	0.9%	1.5%	1.3%	1.1%
Airspace transit operations									
General aviation	25,000	31,000	34,000	38,000	41,000	44,000			
Average annual growth		24.0%	2.5%	2.0%	1.5%	1.4%	2.3%	2.3%	1.9%
Total airfield and airspace transit operations	122,501	156,000	166,,900	178,900	188,900	198,900			
Average annual growth		27.3%	1.7%	1.4%	1.1%	1.0%	1.7%	1.5%	1.3%
HIGH CASE									
Operations									
General aviation	40,217	50,000	63,000	75,000	87,000	98,000	5.9%	4.6%	3.6%
Air taxi	5,656	6,300	5,200	7,300	8,800	10,300	(4.7)	1.7	2.6
Air carrier	3,356	3,700	4,400	5,300	5,800	6,300	4.4	4.1	2.8
NASA	18,000	18,000	18,000	18,000	18,000	18,000	0.0	0.0	0.0
Military	30,272	47,000	47,500	47,500	47,500	47,500	0.3	0.1	0.1
Total airfield operations	97,501	125,000	138,100	153,100	167,100	180,100			
Average annual growth		28.2%	2.5%	2.1%	1.8%	1.5%	2.5%	2.3%	1.9%
Airspace transit operations									
General aviation	25,000	31,000	36,000	41,000	47,000	52,000			
Average annual growth		24.0%	3.8%	2.6%	2.8%	2.0%	3.8%	3.2%	2.8%
Total airfield and airspace transit operations	122,501	156,000	174,100	194,100	214,100	232,100			
Average annual growth		27.3%	2.8%	2.2%	2.0%	1.6%	2.8%	2.5%	2.1%
LOW CASE									
Operations									
General aviation	40,217	50,000	52,000	53,000	53,000	53,000	1.0%	0.6%	0.3%
Air taxi	5,656	6,300	3,900	3,900	3,900	3,900	(11.3)	(5.2)	(2.5)
Air carrier	3,356	3,700	3,700	3,700	3,700	3,700	0.0	0.0	0.0
NASA	18,000	18,000	18,000	18,000	18,000	18,000	0.0	0.0	0.0
Military	30,272	47,000	47,500	47,500	47,500	47,500	0.3	0.1	0.1
Total airfield operations	97,501	125,000	125,100	126,100	126,100	126,100			
Average annual growth		28.2%	0.0%	0.2%	0.0%	0.0%	0.0%	0.1%	0.0%
Airspace transit operations									
General aviation	25,000	31,000	32,000	33,000	33,000	33,000			
Average annual growth		24.0%	0.8%	0.6%	0.0%	0.0%	0.8%	0.7%	0.3%
Total airfield and airspace transit operations	122,501	156,000	157,100	159,100	159,100	159,100			
Average annual growth		27.3%	0.2%	0.0%	0.0%	0.0%	0.2%	0.2%	0.1%

Sources: Historical and estimated: Ellington Field, Airport Traffic Control Tower, with estimated adjustments by Leigh Fisher Associates, September 2002.
Forecast: Leigh Fisher Associates, October 2002.

Key base case forecast key growth assumptions include:

- MSA employment, population, and income growth rates would grow at similar rates to those shown in the NPA Data Services forecasts, summarized in Table 3-1.

- GA single and multi-engine aircraft operations would grow at similar to historical average annual growth rates, reflective of a continuation of incremental growth in flight training and recreational flying.

- Corporate aircraft operations would grow at average annual growth rates significantly higher than overall GA operations, reflective of business aviation growth drivers.

- In addition to the growth described above, short-term (between 2003 and 2006) growth would occur in GA single-engine, multi-engine and corporate aircraft operations as a result of an increase of approximately 20 based aircraft at the Airport by 2006.

- Continental Express air carrier operations and enplaned passengers would not materially change throughout the forecast period.

- Military and NASA operations would not materially change throughout the forecast period.

- UPS aircraft operations (categorized as air taxi operations), transferred to Intercontinental at the beginning of January 2003, would not return to the Airport. The remaining air taxi operations, that principally comprise air cargo operations, would grow consistent with economic activity, as measured by employment.

3.5.2 Based Aircraft

To reflect possible variations in economic growth and airline service development at the Airport, three forecast scenarios were developed—base, high, and low. Table 3-5 summarizes historical and forecast based aircraft for the base, high and low scenarios. The number of aircraft based at the Airport is forecast to grow at 1.4% between 2002 and 2021. Low and high case forecast based aircraft assumptions are discussed in the *Master Plan Technical Report*, Chapter 3. For the base case

Table 3-5

HISTORICAL AND FORECAST BASED AIRCRAFT
Ellington Field
CY 2002 – CY 2021

	Historical	Forecast				Average annual growth 2002-	2002-	2002-
	2002	2006	2011	2016	2021	2006	2011	2021
BASE CASE								
General aviation	105	144	155	160	165	8.2%	4.4%	2.4%
Air Taxi	3	3	3	3	3	0.0	0.0	0.0
Military/NASA	87	87	87	87	87	0.0	0.0	0.0
Total	195	234	245	250	255			
Average annual growth		4.7%	0.9%	0.4%	0.4%	4.7%	2.6%	1.4%
HIGH CASE								
General aviation	105	162	185	210	230	11.4%	6.5%	4.2%
Air Taxi	3	3	3	3	3	0.0	0.0	0.0
Military/NASA	87	87	87	87	87	0.0	0.0	0.0
Total	195	252	275	300	320			
Average annual growth		6.6%	1.8%	1.8%	1.3%	6.6%	3.9%	2.6%
LOW CASE								
General aviation	105	119	119	119	119	3.1%	1.4%	0.7%
Air Taxi	3	3	3	3	3	0.0	0.0	0.0
Military/NASA	87	87	87	87	87	0.0	0.0	0.0
Total	195	209	209	209	209			
Average annual growth		1.7%	0.0%	0.0%	0.0%	1.7%	0.8%	0.4%

Note: Historical based aircraft data are provided by the stated sources up to September 2002. It is possible that the number of based aircraft may change between September and December 2002, but for the purposes of this analysis are assumed to be valid data representing historical based aircraft for the year ending 2002.

Sources: Historical: Ellington Field and Airport tenants, September 2002.
Forecast: Leigh Fisher Associates, October 2002.

based aircraft forecast, it was assumed that based aircraft would grow slightly slower than annual aircraft operations, with the following exceptions:

- Approximately 30 based aircraft would be added between 2003 and 2006 as a result of (1) available hangar space at the Airport, (2) expansion by Cliff Hyde Flying Services, and (3) diversion of based aircraft to the Airport as a result of the closure of Houston Gulf Airport in 2002.

- Included in the approximately 30 based aircraft would be about six additional turbojet based aircraft during the years 2003, 2004 and 2005, as a result of a major FBO expansion planned by Southwest Air Services in 2003.

3.6 PEAK AVIATION ACTIVITY FORECASTS

While the level and type of annual aviation activity at an airport can provide an indication of general facility requirements, a level of activity of shorter duration, typically a day or hour, provides a better measure for assessing specific needs. For the Comprehensive Plan, forecast general aviation aircraft operations during the peak hour of the average day of the peak month (ADPM) were calculated. At the Airport, most operations including military, NASA, and civilian flight school training, are generally spread throughout the day. Consequently, no discernible daily peak hour exists. Weekend days are reported to be busy due to civilian flight school training, and weekdays are busy primarily due to military and NASA training. Table 3-6 summarizes peak aviation activity forecasts.

Table 3-6

ESTIMATED AND FORECAST PEAK HOUR AIRCRAFT OPERATIONS
Ellington Field
CY 2001 – CY 2021

Operations category	Estimated	Forecast								
		Base case			High case			Low case		
	2001	2006	2011	2021	2006	2011	2021	2006	2011	2021
General aviation										
Single engine	34	46	51	59	48	56	70	42	43	43
Multi-engine	4	6	7	8	6	7	10	5	5	5
Corporate jet	2	4	5	6	4	6	10	3	3	3
Subtotal	38	56	63	73	58	69	90	50	51	51
Air taxi	--	--	--	--	--	--	--	--	--	--
Air carrier	--	--	--	--	--	--	--	--	--	--
Military	30	43	43	43	43	43	43	43	43	43
Total	68	99	106	116	101	112	133	93	94	94

Sources: Estimated: Airport Traffic Control Tower and Airport Tenants, April 2002.
Forecast: Leigh Fisher Associates, October 2002.

Chapter 4

DEMAND/CAPACITY ANALYSES

This chapter summarizes the capacity of key components of the Airport to determine its ability to accommodate current and future demand. In addition to the assessment of airfield and aviation facilities, the chapter also briefly reviews the Airport's potential for commercial real estate development. More thorough discussion of these topics is provided in the *Master Plan Technical Report*, Chapter 4.

4.1 FACILITY REQUIREMENTS

This section assesses the adequacy of the Airport's existing facilities to accommodate future demand and identifies any additional requirements in terms of airfield, commercial air carrier, general aviation, vehicular access and parking, and ground support equipment facilities.

4.1.1 Airfield Capacity

Airfield capacity is a measure of the throughput of a runway-taxiway system and, therefore, is not constant over time. Airfield capacity varies considerably during the day and year as a result of physical and operational factors, as well as characteristics of demand. These factors include weather conditions, aircraft fleet mix, and runway use configurations. Based on these factors, it is calculated that the estimated hourly capacity of the airfield, under visual meteorological conditions (VMC), is approximately 141 operations during south flow (the predominant operating condition) and 106 operations during north flow. In instrument meteorological conditions (IMC), the estimated hourly capacity is 61 operations per hour. Maximum hourly capacity is generally greater under VMC, reflecting decreased separation requirements. Typically, GA operations decrease during IMC, thus reducing demand on the runway system.

For planning purposes, airfield capacity is often expressed in terms of the annual service volume (ASV) as a reasonable estimate of annual capacity. In essence, the ASV incorporates weighted hourly capacities for the primary runway use configurations based on the percentage of time in a year that the Airport is operated under each configuration. The ASV for the existing airfield is estimated to be 217,000 operations.

As described in Chapter 3, "Aviation Activity Forecasts," there were approximately 70 peak hour aircraft operations during an average day of the peak month in 2001. By 2021, 116 peak hour aircraft operations are anticipated under the "base case" and 133 and 94 peak hour aircraft operations are anticipated under the "high case" and "low case," respectively. Therefore, for the predominating runway configuration and flow direction (VMC conditions and south flow), the current airfield configuration has adequate capacity to accommodate peak hour demand through the forecast period under either the base or high case forecast scenarios. The north flow hourly capacity would be exceeded by 2013 under the base case forecast, and in 2008 under the high case.

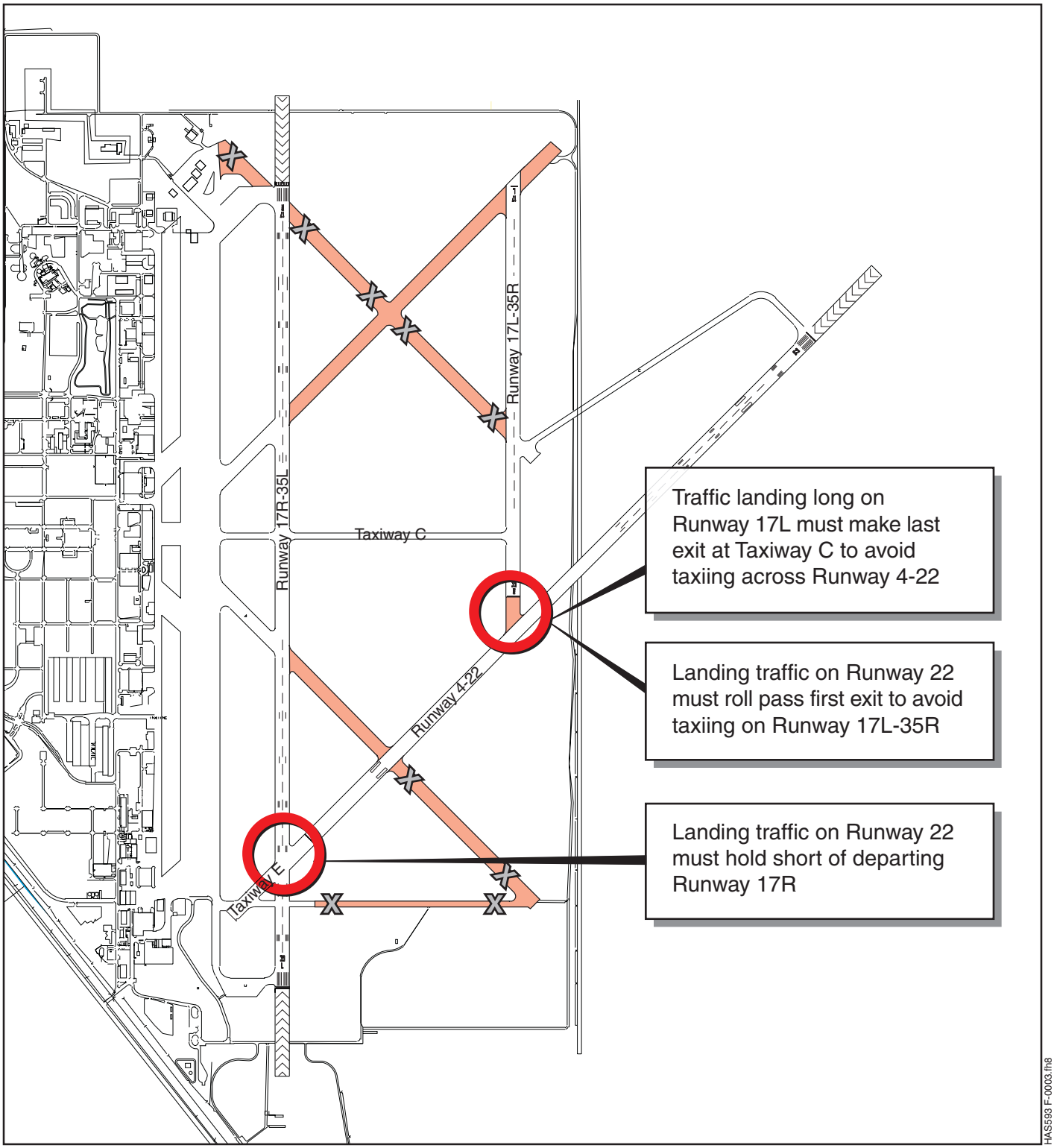
On an annual basis, the ASV would not be exceeded within the planning period under the base case forecast. Under the high case forecast, annual activity would exceed 80% of the ASV by 2021. As noted above, the hourly capacity would continue to exceed peak hour demand in the Airport's predominant operating configuration.

4.1.2 Airfield Configuration

There are numerous closed taxiways and runways at Ellington. Although these runways and taxiways are properly marked as closed, their presence can sometimes cause confusion and decrease the situational awareness of pilots and airport operations personnel. Figure 4-1 shows areas where pavement should be removed to simplify the airfield layout and facilitate situational awareness of airport users and personnel.

Figure 4-1 also illustrates Ellington's runway incursion* sensitive areas or "hot spots" where runway incursions are more likely to occur. The two hot spots at the Airport represent paved areas extending from the ends of runways that intersect other runways. Runway end extensions that can sometimes be used as taxiways are identified as hotspots because of the potential for aircraft to land long or exit onto an active runway.

*A runway incursion is defined by the FAA as "any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in a loss of separation with an aircraft taking off, intending to take off, landing, or intending to land."



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LEGEND

- Runway incursion "Hot Spots"
- Pavement to be removed to increase situational awareness
- Currently closed taxiway and runway pavement

Notes: "Hot Spots" are points on the airport surface where runway/taxiway position errors are more likely to occur.

N

750 0 750 1,500

Graphic Scale in Feet

Figure 4-1

AIRFIELD OPERATION AND SAFETY ISSUES

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES

4.1.3 Commercial Air Carrier

As described in Chapter 3, "Aviation Activity Forecasts," Ellington commercial air carrier traffic is limited to a few Continental Express flights and this activity is expected to remain constant throughout the 20-year planning period. Thus, facility requirements are not expected to increase beyond the facilities currently provided. In the event that the commercial terminal is relocated, it is recommended that the new site include the characteristics summarized in Table 4-1. Terminal area and aircraft parking position requirements are similar to those currently provided at the Continental Express terminal. Public parking requirements are based on observed maximum occupancies, as described in Chapter 2, "Existing Airport Conditions."

Table 4-1

COMMERCIAL TERMINAL REQUIREMENTS

Component	Quantity
Terminal area	5,200 square feet
Aircraft parking positions	2 positions (17,000 square feet of apron)
Public and employee parking	350 parking spaces

Source: Leigh Fisher Associates, April 2002.

4.1.4 General Aviation

General aviation facility requirements were developed to provide near- and long-term planning targets for general aviation development at the Airport. Requirements were based on a review of existing facilities, field observations, discussions with airport stakeholders, and the forecast data provided in Chapter 3. Requirements were developed for itinerant aircraft parking, based aircraft parking and storage facilities, general aviation support facilities, and vehicular access and parking for 2006 and 2021. To ensure that future plans provide sufficient room for growth, these requirements were based on the high case forecast, recognizing that facilities would only be developed as demand warranted.

Table 4-2 summarizes facility requirements identified for 2006 and 2021 and provides the basis for the conceptual land use plans described in Chapter 5, "Facility and Development Strategies."

Table 4-2

SUMMARY OF GENERAL AVIATION FACILITY REQUIREMENTS

Facility	2006	2021
Itinerant aircraft parking apron		
Spaces	70	110
Apron (square yards)	25,000	40,000
Based aircraft parking apron		
Spaces	30	30
Apron (square yards)	9,000	9,000
T-hangars		
Units	20	60
Storage space (square feet)	24,000	72,000
Apron (square yards) *(a)*	3,000	8,000
Corporate hangars		
Units	80	80
Storage space (square feet)	200,000	200,000
Apron (square yards) *(a)*	22,000	22,000
Conventional hangars		
Units	3	7
Storage space (square feet)	30,000	70,000
Apron (square yards) *(a)*	3,000	6,000
Aviation support hangars		
Units	6	9
Storage space (square feet)	15,000	23,000
Apron (square yards) *(a)*	1,700	2,600
Fixed base operator (square feet)	12,000	24,000
Fuel storage capacity (gallons/week)	320,000	490,000
Vehicular parking *(b)*		
Spaces	430	650
Parking area (square yards)	17,000	25,000
Ground support equipment parking		
Spaces	11	16
Parking area (square yards)	800	1,200
Total aircraft parking and storage		
Storage space (square feet)	269,000	365,000
Apron (square yards) *(b)*	63,700	87,600

Note: Totals may not add due to rounding.

(a) Outdoor maneuvering apron only.
(b) Includes parking requirements for the commercial terminal.
(c) Includes itinerant and based aircraft parking aprons, and apron area for maneuvering outside of storage facilities.

Source: Leigh Fisher Associates, October 2002.

4.2 REAL ESTATE ASSESSMENT

This real estate market assessment briefly reviews the uncertainties regarding the market for aircraft maintenance, repair, and overhaul facilities before examining the site's potential for commercial development. Following this examination of traditional commercial development, the real estate market assessment reviews typical land prices for commercial uses, identifies nontraditional commercial development that might be considered, and summarizes potentially appropriate uses for Ellington.

4.2.1 Aviation Maintenance Repair/Overhaul

The market for aviation related maintenance, repair, and overhaul (MRO) uses is not deep, and there is abundant competition from closed bases and other existing facilities. Competing for large aviation related uses is very difficult if the airport does not have adequate existing facilities and is not able to offer substantial economic incentives packages. While MRO facilities could make excellent use of available land, candidate operators are too few to generate a high probability that the Airport would attract such a use. Consequently, this real estate market assessment focuses on other potential uses.

4.2.2 Typical Commercial Development

Typical commercial development includes office, industrial, and retail. Assessments of the potential for each development type at Ellington follow.

Office Development. Demand for office space is linked to employment growth. Annual employment growth for Houston Metro region is about 3%. Growth in the Ellington/Southeast Houston area is slower than for the overall region. Categories of office developments could include major corporate facility (possibly NASA related), technology/campus office, mid-rise office, and call/data center.

Ellington is located between clusters of office development in the NASA/Clear Lake and South/Southeast Houston sub-markets. It is not in the mainstream of either sub-market. A new office development there would be an "outlier" that is not near other office buildings and related amenities. This would mean the development would be in a less congested area, but would be less convenient than competitor buildings.

A limited amount of new office development, located at the main airport entrance could be successful. Rental rates in the sub-market would need to increase 10% to 15% to be at levels that would merit new construction. Also, there are other, potentially more attractive, sites available that would compete with Ellington.

There is little immediate need for more office space in the area; however, over the long term, growth should merit more space. A location like Ellington would rely on growth in residential areas and the petrochemical industries, rather than NASA-related businesses, for tenants to fill up office space. Office building development would be an attractive addition to Ellington that would not create disruptions for other tenants and Airport users.

Industrial Development. This analysis addresses "investment grade" industrial development, meaning that facilities are developed for the market rather than by an individual enterprise for its own use. Categories of industrial development uses include warehouse/distribution, light manufacturing, service center, rail yard, air cargo, U.S. Postal Service, and public storage.

There is little immediate pressure to construct new buildings in the area; however, over the long run, the industrial market will grow. Ellington could have new industrial development, but there are several other locations that have existing business parks or potential business parks that are superior to Ellington. Development is likely to take place at locations that are directly on Beltway 8, as this location has superior visibility, access, and travel times for service-related companies.

Major warehouse/distribution operations at Ellington, particularly in the west land areas, would not likely be a good fit without improvements to road infrastructure. A direct link to Beltway 8, wider secondary entries at the railroad tracks, and general management of truck traffic would be desirable to reduce conflicts. The prime tracts at the main entry could be used for office/warehouse or service center development, taking advantage of the visibility and attractive surroundings. Again, there are many other sites where this type of development could take place that are better than Ellington.

The southeast land area desirability could be increased significantly if Space Center Boulevard were extended south to Highway 3. This could make that area much more attractive for development due to improved access and visibility.

Retail Development. The market potential for retail development is related to residential growth. Retail development is also very dependent upon site-specific characteristics including access and visibility. Categories of retail developments include neighborhood center, regional center, mall (outlet or traditional), and big box superstore.

Ellington is not seen as a viable location for significant retail development. It is not located at a major intersection that would be valuable for a regional center, and it is not close enough to the residential areas to merit community center or grocery-anchored developments. The fact that the streets do not go through Ellington

creating corners and providing connections between major destinations makes it unsuitable for retail development.

4.2.3 Typical Land Prices for Commercial Uses

The HAS is required by the FAA to obtain fair market value for the sale or lease of airport land. The following examples of land prices provide guidance in estimating market value of land suited for typical commercial uses.

		Value per square foot
Office	Campus office in business park	$2.50 – $ 4.00
	Low rise suburban in office park	$4.00 – $10.00
	Premium suburban office	$8.00 – $20.00
Industrial	Low density industrial use	$0.50 – $ 1.50
	Warehouse/distribution	$1.50 – $ 3.00
	Office/warehouse	$2.50 – $ 4.00
	Service center	$3.00 – $ 4.50
Retail	Neighborhood center	$5.00 – $ 9.00
	Regional center	$4.00 – $10.00
	Mall (outlet or traditional)	$2.00 – $ 3.50
	Big box superstore	$6.00 – $10.00

Table 4-3 summarizes land parcels in the area. Currently the existing and anticipated annual operating deficit at the Airport is approximately $1 million. A preliminary analysis of what would be necessary to cover that deficit concludes that it would take approximately 25 years (153 acres absorbed at 6 acres per year) to lease enough land to cover the operating deficit. This analysis leads to the conclusion that larger deals that would consume significant acreage, beyond the average 6-acre deal, are necessary to overcome the deficit in any near to medium term. Further investment by the Airport is necessary to make the sites readily sellable, which could increase the deficit before reducing it.

Table 4-3

LAND PARCELS IN ELLINGTON AREA

Location	Area (acres)	Price	Agent	Comment
Highway 3 at Space Center	80	$4.00	Staubach	Major intersection
Highway 3 (across from Ellington Field)	7.9	2.95	Zann	Highway 3 frontage
Highway 3 (across from Ellington Field)	7.9	4.00	CBRE	Highway 3 frontage
Highway 3 (across from Ellington Field)	5	1.50	Zann	Recent sale
Highway 3 at Beltway 8	80	1.50	CBRE	Southway BP

Source: Trammell Crow Company, April 2002.

4.2.5 Nontraditional Commercial Development

The previous analyses indicate that additional development types should be considered to enhance the revenue generating potential of land not required for aviation uses in the near term. Uses that have been proposed or might be considered for properties such as Ellington could include:

- Amusement park
- Conference/convention center
- Rodeo uses
- Golf course
- Auto auction
- Institutional
  - Educational campus for major university, community college, or high school
  - Hospital
  - Church, including community center and seminary
- Public
  - Sports complex for baseball, soccer, tennis, skating rink
  - Park
  - Flood control
  - Park-and-ride facility

4.2.6 Potentially Appropriate Uses

Given Ellington's government and military orientation, finding other uses that are consistent with, and would benefit from these existing uses is appropriate. Ellington would appear to offer several unique advantages for government/military operations.

- It already has a military history and character.
- The airfield could be used for related operations.
- The air show and other traffic could be positive for recruiting.
- Security of operations could be shared by various agencies.
- The land could be reasonably priced.

Federal uses might include:

- The FBI or Customs
- Department of Defense
- The Army or Navy recruiting/training centers

The Army and Navy currently have recruiting centers right next to each other on Old Spanish Trail, north of the Astrodome and south of the Texas Medical Center. The Army and Navy each have about 8 acres and are on land that is quite valuable. The sites are in the midst of a planned 64-acre Biotech Park. Most of the land surrounding the Army and Navy is owned by University of Texas, MD Anderson. The University has made offers to the Army and Navy to buy its sites, but the offers have not advanced. The Army and Navy would need new sites on which to relocate their facilities. If the Army and Navy centers were to move to Ellington, several objectives could be achieved at the same time.

The land might also be used for other City of Houston needs. The City could benefit by leasing from itself instead of owning or leasing land from others. The land should be competitively priced relative to many other alternatives.

Chapter 5

FACILITY DEVELOPMENT STRATEGIES

Based on conclusions described in Chapter 4, "Demand/Capacity Analysis," this chapter summarizes the various airfield, landside, and nonaviation area alternatives developed to address identified deficiencies. This chapter includes the site suitability analysis, airfield development plan, general aviation development plan, access and utility plans, and recommended actions to lease property. A complete discussion of the assumptions, analyses, and conclusions included in this chapter is provided in Chapter 5 of the *Master Plan Technical Report*.

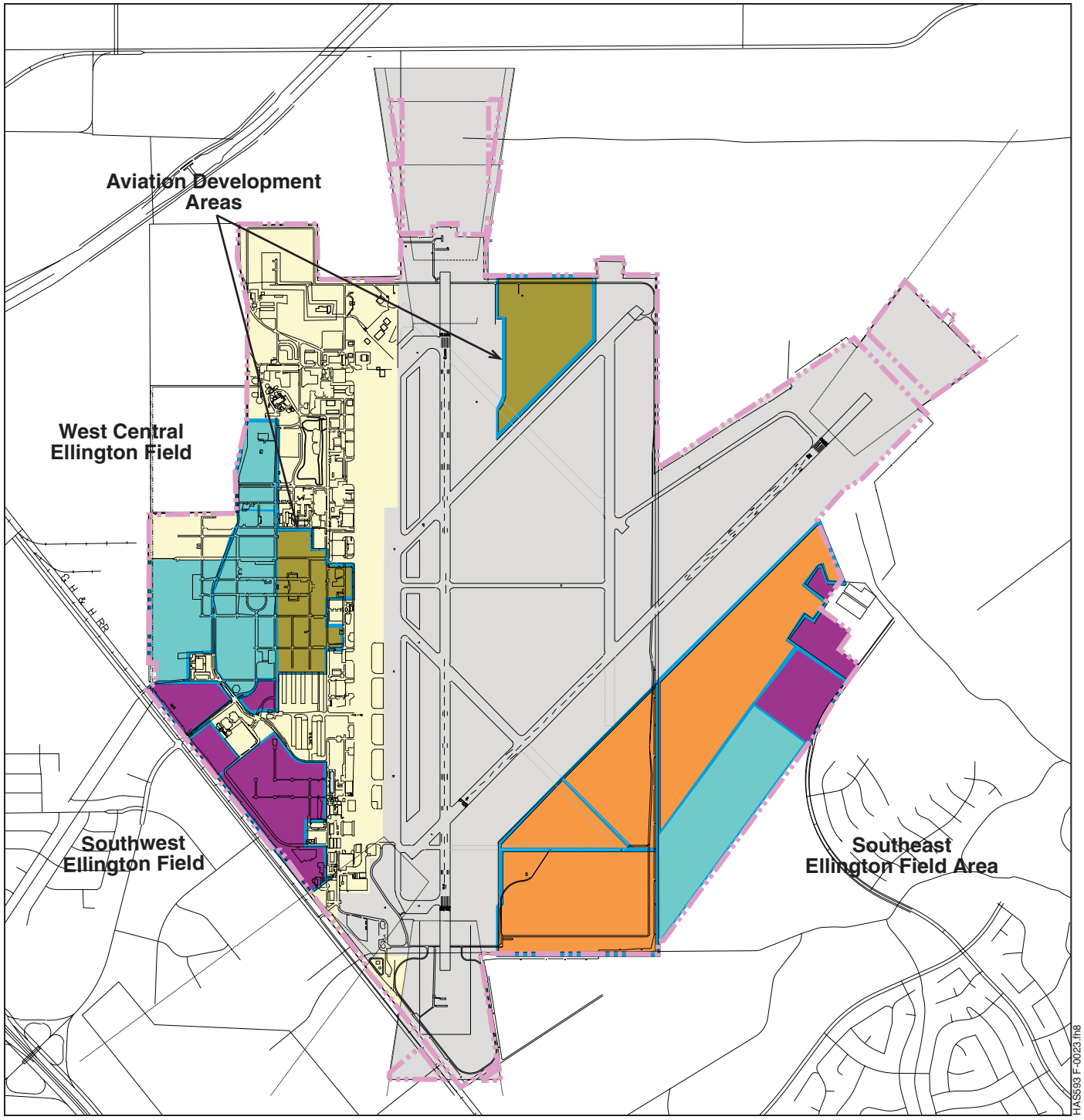
5.1 SITE SUITABILITY ANALYSIS

Unlike the other HAS airports (Intercontinental and Hobby), Ellington has a substantial amount of land in excess of its identified aviation needs. Accordingly, the Airport has an unusually wide range of available development options. The airfield could accommodate a substantial increase in aviation activity and also has large tracts of land that could be made available for aviation development. The Airport could therefore be developed as one of the region's largest general aviation airports. Additionally, the Airport's two air carrier aircraft capable runways could support commercial service if it were decided to make the other required infrastructure investments. Finally, the Airport has several hundred acres that could be made available for commercial development. Revenue from such development would enable the HAS to meet the aviation needs of the Houston metropolitan area with less cost to the airlines and other aeronautical users of the three HAS airports.

Ellington has approximately 700 acres available for development. Based on projected aviation activity, up to 50 acres should be reserved to accommodate growth in general aviation (GA) under the high growth scenario. Thus, approximately 650 acres are available for other types of use. Depending on the location of individual parcels, this acreage has a wide range of characteristics that would determine the suitability of a given parcel for a specific type of use.

Figure 5-1 depicts existing Airport facilities and identifies areas available for development. For each area, potential acceptable land uses are identified based on considerations including:

- Noise compatibility
- Hazards to air navigation
- Airspace protection
- Community compatibility
- Economic development goals
- Revenue potential



LEGEND

- Office - Industrial
- Institutional - Industrial
- Industrial - Aviation
- Aviation
- Airfield
- Unavailable area
- Airport boundary

N

1,200 0 1,200 2,400

Graphic Scale in Feet

Figure 5-1

DEVELOPMENT AREAS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES

For each area, potential acceptable land uses are as follows:

- ***Aviation Development Areas*—**As noted above, up to 50 acres would be required to accommodate anticipated growth in GA. Approximately 45 acres were reserved immediately north of the existing T-hangars and west of the ATCT for this purpose. In addition, an isolated parcel located at the north edge of the Airport was identified as being appropriate for aviation uses should the reserved area be insufficient.

- ***Southwest Ellington Field*—**Generally, the area adjacent to or visible from State Highway 3 would be attractive for commercial (especially office), institutional, or light industrial development. Given that this area is the most attractive for developers, this area should be reserved for uses that would justify the highest lease rates and/or purchase price.

- ***West Central Ellington Field*—**Areas more distant from State Highway 3, but west of the airfield, would be suitable for institutional or light industrial use. These uses would be compatible with existing and planned adjacent uses and would not require the visibility needed by commercial development and office/industrial parks.

- ***Southeast Ellington Field*—**The southeast area of the Airport would be appropriate for a variety of uses. Parcels close to Space Center Boulevard would be the most marketable and, given the proximity of residential development in Clear Lake City, would be appropriate for office, institutional, or light industrial uses. Parcels closer to the airfield would be appropriate for heavier industrial development (since they are further from Clear Lake City). Aviation and/or aviation industrial uses would also be appropriate given the proximity of the airfield.

5.2 AIRFIELD AND AIRSPACE

As described in Chapter 4, "Demand/Capacity Analysis," the airfield has sufficient capacity to accommodate forecast operations, under the base case scenario, through the planning period. As noted earlier, the airfield does have several closed runways and taxiways that may confuse Airport users and operations personnel. In some cases, these conditions represent potential runway incursion risk areas, or "hot spots." In addition, the limited number of taxiways frequently requires circuitous routes, especially between the GA development area and the GA runway, and/or the use of runways as taxiways. Although runway incursions have not been cited as a problem in the past, the use of runways as taxiways, coupled with potentially confusing runway/taxiway connections could contribute to runway incursions. Such concerns are likely to become more important as GA activity increases. Accordingly, the following airfield circulation improvements are recommended to reduce runway incursion "hot spots" and enhance efficiency for Airport users.

Hot Spot Mitigation. As depicted on Figure 4-1, there are two identified hot spots on the airfield. At each of these spots, pilots may inadvertently taxi onto or across a runway, causing a runway incursion. The recommended airfield configuration depicted on Figure 5-2 includes modifications that remove the potential for runway incursions at these spots.

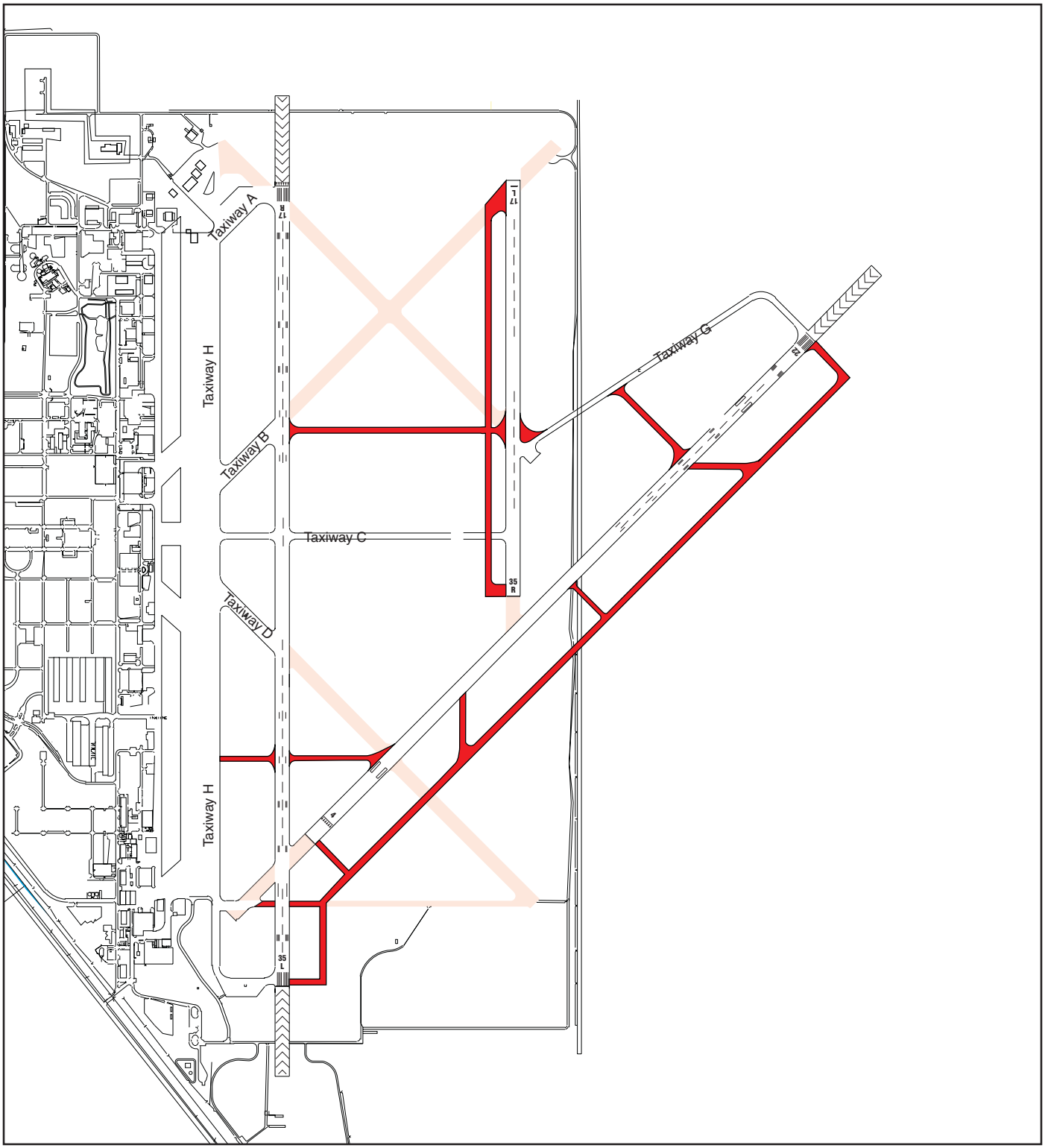
Pilot Wayfinding. There are numerous closed taxiways and runways at Ellington. Although these runways and taxiways are properly marked as closed, their presence can sometimes cause confusion and decrease the situational awareness of pilots. The recommended airfield configuration depicted on Figure 5-2 identifies pavement recommended for removal to reduce the potential for confusion. Figure 5-2 also shows new taxiways that will allow for (1) movements currently provided on pavement that will be removed and (2) a more conventional airfield layout and aircraft flow pattern.

5.3 GENERAL AVIATION DEVELOPMENT PLAN

This section presents a conceptual land use plan for development of the designated general aviation area at Ellington to provide a framework within which future public and private development of the Airport's general aviation area can be accomplished. Most analyses and recommendations of this plan focus on the ultimate build-out of the general aviation area. This long-range perspective is intended to define how the Airport's general aviation area may eventually be developed given foreseeable trends in general aviation, both locally and nationally.

5.3.1 Study Area

The site suitability analysis described earlier indicates that development of additional GA facilities could and should be accommodated in the area currently designated for GA development plus the area immediately west of the existing GA facilities.



HAS593 F-0025.fh8

LEGEND

New Pavement

Removed Pavement

N

750 0 750 1,500

Graphic Scale in Feet

Figure 5-2

PROPOSED AIRFIELD IMPROVEMENTS

Comprehensive Plan
Ellington Field
Houston Airport System

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5.3.2 Conceptual Development Plans

Four conceptual development plans were developed to accommodate future GA requirements. These plans explored the potential benefits, costs, and operational impacts of the:

- Number and location of vehicular access points into the GA area
- Number and location of taxilanes and aprons
- Orientation of T-hangars and corporate hangars
- Long-term location of commercial passenger terminal
- Future location of additional FBO and other support facilities

These concepts were reviewed and evaluated by HAS staff and two were selected for further consideration.

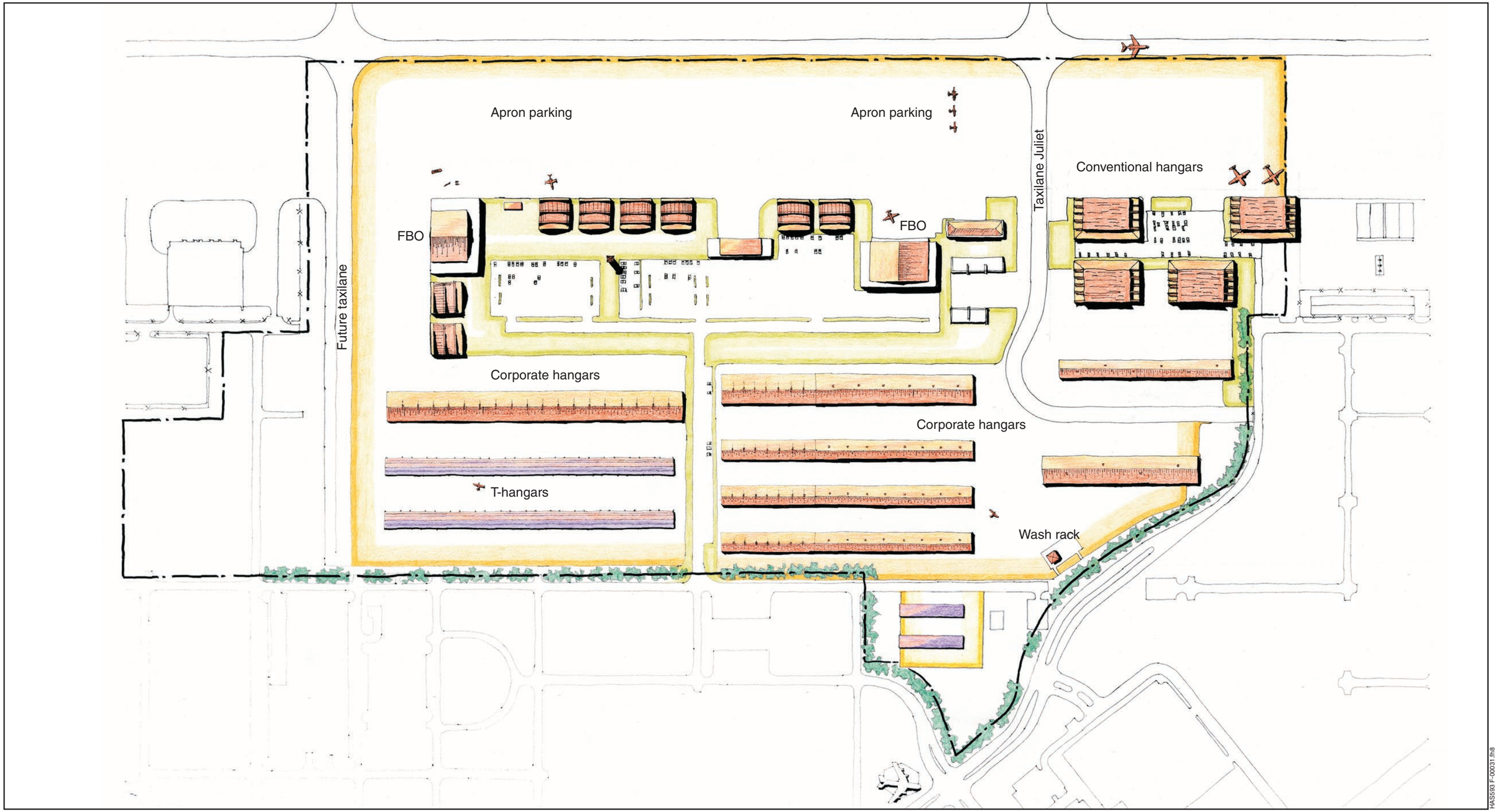
5.3.3 Concept Refinement

Refinement of Concepts 1 and 2 and the resulting selection of the preferred alternative are discussed here. The refinement process starts with the land use plan for each concept and lays out the required building and parking facilities (as described in Chapter 4) using estimated building geometry, building spacing and set-backs, and parking lot design guidelines, while respecting the imaginary surfaces associated with airfield facilities (e.g., RPZ, taxiway, and taxilane object free areas). Once the requirements are accommodated, the layout is expanded to fill the study area.

The concepts are very similar in the number of available hangars and the area available for apron parking. The fundamental difference is the alignment of Taxilane J and the associated impact on hangar locations. Based on discussions with HAS staff, Refined Concept 1 depicted on Figure 5-3, is the preferred concept because it requires the least disruption of existing facilities and incorporates the expansion plans of the FBO (a long-term tenant).

5.3.4 Estimates of Costs to Houston Airport System

It is assumed that all development of aircraft storage and general aviation support facilities will be done by private parties. All areas identified for aircraft apron parking are either currently paved or will be paved as part of already programmed projects. Access and public parking facilities associated with the GA area are the only developments that may be funded by HAS.



N

150 0 150 300

Graphic Scale in Feet

Figure 5-3

ILLUSTRATIVE SITE PLAN—
ULTIMATE DEVELOPMENT OF THE PREFERRED ALTERNATIVE

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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Approximately 650 public parking spaces will be required in the GA area by 2021. Though many parking spaces are currently available in the proper locations, the following cost estimate for parking construction is provided should HAS wish to initiate development of a consolidated public parking area for use by all GA users (including commercial passengers). It is estimated that the construction of 650 parking spaces would cost approximately $3 million. Further discussion of the assumptions behind this estimate is provided in the *Master Plan Technical Report*, Chapter 7, "Finance and Implementation Plan."

5.4 UTILITIES

Recommended HAS development projects potentially affecting demand for utilities include airfield pavement removal, new taxiways, and new roadways. Projects developed by other parties (e.g., additional GA facilities and commercial or industrial facilities) would also increase demand for most utilities.

As described in Chapter 2, "Existing Airport Conditions," Ellington has a well-developed utility network, especially to the west of the airfield. Much of the utility infrastructure was developed when this area represented the housing section of Ellington Air Force Base. The City, after acquiring the property, also installed new or upgraded facilities along Brantly Avenue and Aerospace Boulevard. Table 5-1 summarizes recommended projects that would meet utility requirements identified in Chapter 4.

Table 5-1

SUMMARY OF UTILITY PROJECTS
Ellington Field Master Plan Update

Utility	Identified need	Recommended action
Natural gas	None	None
Electricity	None	None
Water	None	None
Telecommunications	None	None
Sanitary sewer	Future on-Airport development may exceed capacity of nearby lift station	Houston Airport System should require developers to determine if development will require upgrades to sanitary sewer system.
Storm sewer	Future on-Airport development may exceed capacity of storm sewer components	Prepare a Drainage Master Plan to determine existing and future system requirements.

Source: Leigh Fisher Associates, October 2003.

5.5 AIRPORT ACCESS

As described in Chapter 4, existing Airport access facilities have sufficient capacity to accommodate demand throughout the forecast period. However, regional access and noncapacity issues may warrant development of new access facilities. Potential Airport access projects include a North Access Road and an extension to Space Center Boulevard.

5.5.1 North Access Road

Currently, all access to the west side of the Airport is off of State Highway 3, via Challenger 7 Boulevard, Brantly Avenue, and Hilliard Street. Potentially, a stalled train could simultaneously block these entrances. To provide an additional Airport entrance and exit, it is recommended that an access road be constructed between the Airport and Beltway 8. This connection would provide:

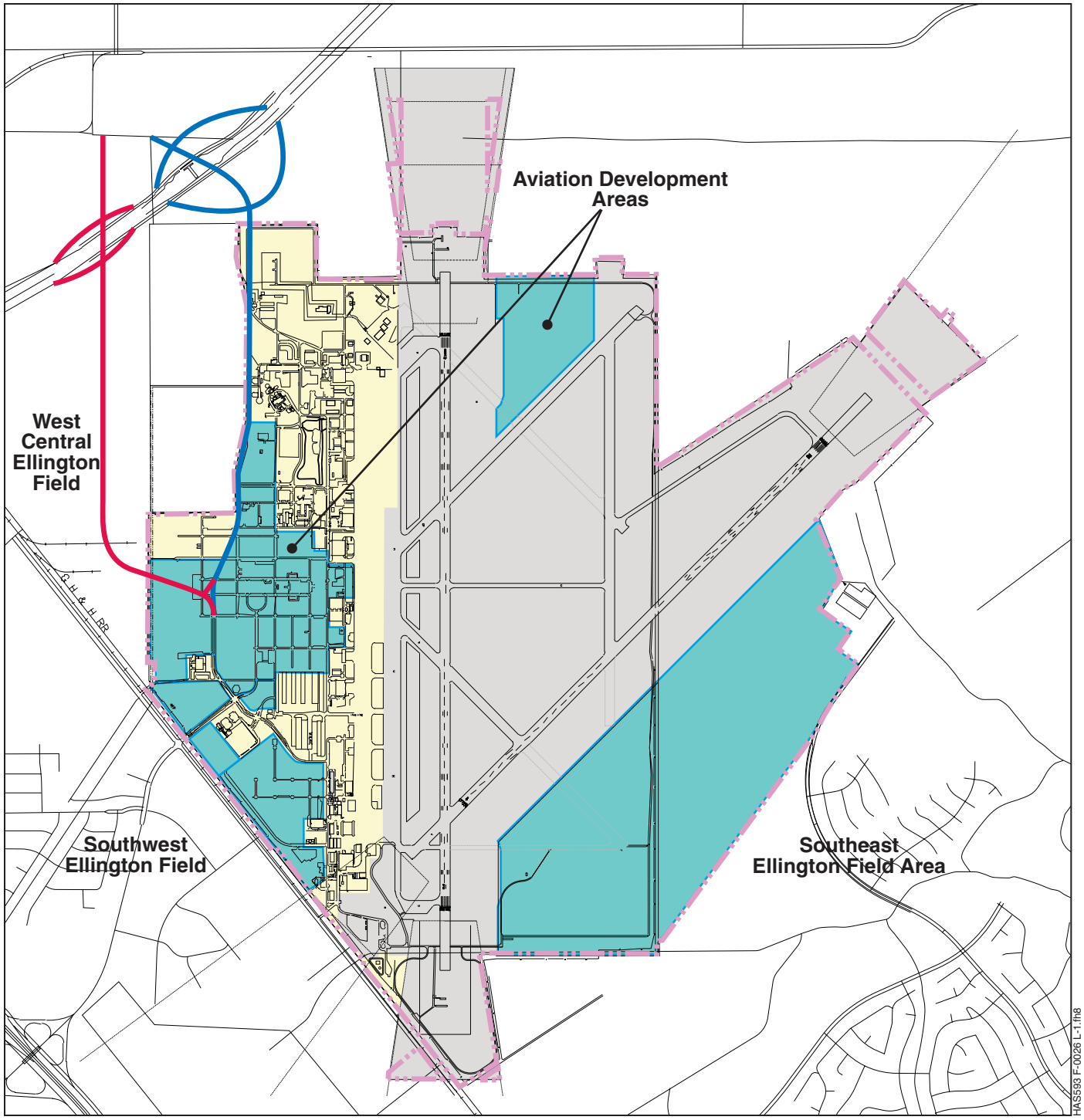
- Access to and from Airport- and military-operated facilities in case the State Highway 3 entrances are obstructed or closed
- Access between the Airport and the City of Pasadena
- A direct connection between the Airport and the regional freeway system

Two alignments, depicted on Figure 5-4, are proposed for the north access road.

Option 1 extends Aerospace Boulevard to the north on property owned by the TxANG. As shown, the road would connect to Beltway 8 with a full-movement interchange in the vicinity of an existing toll plaza. Option 2 constructs a new road intersecting Aerospace Boulevard in the vicinity of Perrie Street. The road starts at Aerospace Boulevard and goes west toward the Airport boundary. West of the Airport, the road turns north through privately held property and intersects Beltway 8. Initially, the road could intersect the southern frontage road with a future extension across Beltway 8 for access to and from the westbound lanes of Beltway 8 and Burke Road in the City of Pasadena.

Option 2 is recommended for the following reasons:

- Option 1 requires access through secure property controlled by TxANG.
- Option 1 could conflict with any TxANG plans to construct a northern entrance to their property.
- The Beltway 8 interchange in Option 1 requires a much longer bridge over Beltway 8 since the bridge would have to cross at, or near, the toll plaza.



LEGEND

- Potential development area
- Airfield
- Unavailable area
- Option 1
- Option 2
- Airport boundary

N

1,200 0 1,200 2,400

Graphic Scale in Feet

Figure 5-4

NORTH ACCESS ROAD OPTIONS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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5.5.2 Ellington Field Bypass

As described in Section 5.1, a large developable area is located on the southeast side of the Airport. Currently, only one of these parcels has access to an existing roadway. To increase the attractiveness of these parcels for potential developers, it is recommended that a new roadway, the Ellington Field Bypass, be constructed between Space Center Boulevard and State Highway 3. In addition to the increased attractiveness of property on the southeast side of the Airport, this roadway would have additional benefits for the cities of Clear Lake and Pasadena. Figure 5-5 depicts the proposed alignment of the Ellington Field Bypass, which is consistent with the realignment adopted by the City of Houston Planning Commission and City Council in the Major Freeway and Thoroughfare Plan.

The proposed alignment runs along the southeast property line. The alignment curves south of the Wastewater Treatment Plant and intersects State Highway 3 south of the current Wastewater Treatment Plant access road. This adjustment allows deep development parcels between the new roadway and the airfield, and preserves development flexibility.

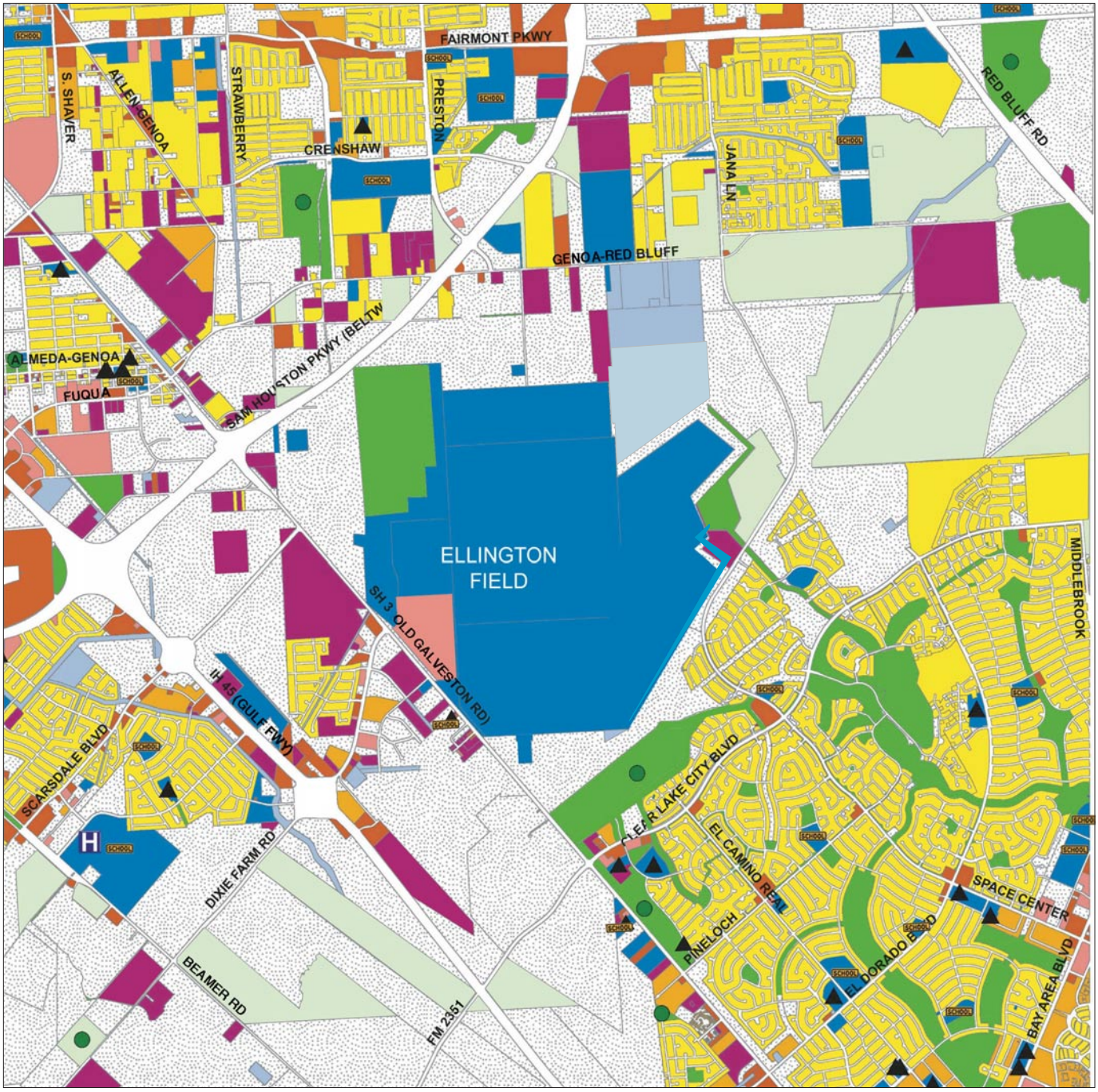
5.6 REVISED LAND USE PLAN

The GA and roadway development recommendations described above require modifications to land use plan described in Section 5.1. The resulting development plan, including recommendations for airfield, access, and the general aviation area, is provided in Chapter 6.

5.7 COMMERCIAL DEVELOPMENT

As described in Section 5.1, many areas on the Airport are appropriate for commercial development. To increase the marketability of these areas, it is suggested that HAS:

- Remediate, as necessary, areas of environmental concern
- Extend utilities to unserved areas
- Identify, using signage, a selected area or areas as a business park
- Create favorable lease terms for the land
- Consider offering very favorable or discounted lease terms for the first deal in order to establish momentum for development
- Hire a developer or broker to actively market the property
- Offer tax exemptions and other economic development incentives



HAS571 F-0007 L-2.fh8

LEGEND

- Single Family Residential
- Multi-Family Residential
- Commercial
- Office
- Industrial
- Public & Institutional
- Transport & Utilities
- Parks & Open Space
- Undeveloped
- Agricultural Production
- Churches
- Hospital
- Public Parks
- Schools

N

0.6 0 0.6 1.2

Graphic Scale in Miles

Source: City of Houston; Knudson & Associates

Figure 5-5

OFF-AIRPORT LAND USES

Master Plan Update
Ellington Field
Houston Airport System

September 2003

LEIGH FISHER ASSOCIATES

Chapter 6

AIRPORT DEVELOPMENT PLAN

This chapter consolidates the recommendations presented in Chapter 5. Figure 6-1 depicts the recommended development projects and land uses. The recommended projects include modifications to the taxiway system, delineation of a taxilane in front of the general aviation area, and construction of two Airport access roadways. Other recommendations, not shown on Figure 6-1, include the preparation of a Drainage Master Plan and maintenance of the Real Estate Resource Guide.

6.1 AIRFIELD

Based on the findings of Chapter 4 and the analysis described in Chapter 5, the recommended plan includes airfield modifications intended to (1) mitigate "hot spots" that have potential for runway incursions, (2) increase pilot awareness and facilitate wayfinding, and (3) enhance efficiency. These modifications include the construction of parallel taxiways for Runways 4-22 and 17L-35R, a new east-west taxiway parallel to existing Taxiway Charlie, and the removal of pavement that is either abandoned or relocated as part of the new taxiway construction.

6.2 SITE SUITABILITY ANALYSIS

The recommended plan incorporates the findings of the site suitability analysis described in Chapter 5. This analysis identifies 15 parcels available for aviation or nonaviation development and recommends uses as follows.

6.2.1 Southwest Ellington Field

Development parcels in the Southeast Ellington Field area are the most marketable parcels on the Airport. The Southwest Ellington Field area also provides access to the GA development area, passenger terminal, and NASA facilities. These parcels are visible from State Highway 3 and are the most easily accessible from the regional roadway system. While airfield access could be provided to these parcels, there are other locations on the Airport that would continue to have superior airfield access. Because these parcels have the greatest potential to generate revenue, they should be reserved for office and light industrial uses that would be compatible with existing and future development, and would justify the highest lease rates and/or purchase price.

North Access Road

G H & H R R

See Figure 5-3 for detailed layout

Ellington Field Bypass

HAS593 F-0029.fh8

LEGEND

- Airport boundary
- New access roads
- Existing pavement (roadways and airfield)
- Designated taxilane
- Existing taxiway to be demolished
- Proposed taxiway to be constructed
- Airfield
- General aviation area
- Aviation
- Aviation/Institutional/Light industrial
- Institutional/Light industrial
- Institutuional/Office
- Unavailable

Source: Basemap—Carter & Burgess, Inc.
Recommended improvements—Leigh Fisher Associates

N

750 0 750 1,500

Graphic Scale in Feet

Figure 6-1

RECOMMENDED DEVELOPMENT PLAN

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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6.2.2 West Central Ellington Field

West Central Ellington Field parcels do not have the same degree of visibility or accessibility that would justify the higher purchase and/or lease rates that might be achieved in the Southwest Ellington Field area. With respect to airfield access, this area is similar to the Southwest Ellington Field area in that access could be provided; however, other areas would continue to have superior access. Since these parcels are adjacent to existing and proposed office, light industrial, and institutional uses, heavy industrial development would not be appropriate. In addition to light industrial uses that would be compatible with adjacent uses, this area would be suitable for institutional uses that do not require the visibility needed by commercial development and office/industrial parks.

6.2.3 Aviation Development Areas

Two areas are recommended for GA development. Both of these areas are adjacent to the airfield. The parcel adjacent to the existing GA area is large enough to accommodate a 100% increase in based GA aircraft—more than the forecast growth over the 20-year planning period. The parcel at the north end of the Airport contains even more area than Parcel H, but does not currently have roadway or taxiway access. Substantial investment in infrastructure would be required to make this parcel useful for aviation uses. Because the northern-most parcel is not well suited for commercial development, the opportunity cost of reserving this area for long term aviation demand is low. If an aviation industrial use (e.g., aircraft manufacturing, overhaul, and repair) is proposed, the northern-most parcel, with appropriate roadway and airfield access improvements, would be a suitable location.

6.2.4 Southeast Ellington Field Area

This area includes land that is on Ellington Field as well as land acquired by the City of Houston after the Ellington Field transfer to prevent future residential development adjacent to the Airport. At present, access to this area is limited. Of all of the Ellington Field development areas, this area is closest to residential development. A review of the land use recommendations for parcels in this area follows.

- Parcels located closest to residential areas of Clear Lake City are not recommended for heavy industrial uses. Appropriate uses for these parcels include light industrial and institutional uses. The parcel directly accessible from Space Center Boulevard is the most marketable parcel in this area. Accordingly office and light industrial uses are recommended for this area.

- The remaining parcels in the Southeast Ellington Field area would be buffered from residential development by the parcels adjacent to Clear Lake City. Thus, heavier industrial development could be accommodated with minimal impact to residential areas. Also, since this area could have airfield

access if desired, aviation and/or aviation industrial uses would be appropriate.

6.3 GENERAL AVIATION DEVELOPMENT PLAN

The recommended plan serves to guide the ultimate development of the general aviation area, and facilitate future airport planning and decision-making. Land uses are organized to ensure the Airport maintains sufficient flexibility to respond to fluctuations in aircraft operations and changes in market opportunities. General adherence to the land use plans should permit the orderly development of general aviation facilities and ensure a mutually compatible arrangement between general aviation activity and other Airport development.

The recommend general aviation plan, shown on Figure 5-3, assumes that aircraft apron parking continues to occur on the existing apron area. New aircraft storage facilities (T-hangars, corporate hangars, and conventional hangars) as well as support hangars are constructed north of the existing rows of corporate hangars and along the existing flightline. These storage facilities include four new conventional hangars south of Taxilane Juliet, constructed by the existing fixed-based operator.

Access to the general aviation area north of Taxilane Juliet is via the existing route and access to area south of Taxilane Juliet is via Aerospace Boulevard. Area is also reserved for two future consolidated public parking facilities serving the areas north and south of Taxilane Juliet. The remaining GA development area is reserved as open space for future development.

6.4 UTILITIES

The Airport's utility infrastructure is able to accommodate substantial new development in the areas to the west of the airfield. More recently acquired areas to the southeast of the airfield will require new utilities. It is recommended that HAS develop a Drainage Master Plan that would assist in determining the drainage requirements for existing and future developments as well as determine the potential for an Airport-wide consolidated detention facility.

6.5 AIRPORT ACCESS

The recommended plan includes two new roadways providing Airport access. One roadway, the North Access Road, starts at Aerospace Boulevard and goes west toward the Airport boundary. West of the Airport, the road turns north through privately held property and intersects Beltway 8. Initially, the road could intersect the southern frontage road with a future extension across Beltway 8 for access to and from the westbound lanes of Beltway 8 and Burke Road in the City of Pasadena.

This road replaces the previously recommended north access road, which is no longer considered to be feasible.

The other roadway, the Ellington Field Bypass, connects Space Center Boulevard to State Highway 3 along an alignment running along the southeast property line. The alignment curves around the south side of the Wastewater Treatment Plant and intersects State Highway 3 south of the current Wastewater Treatment Plant access road.

Chapter 7

FINANCIAL ANALYSIS AND IMPLEMENTATION PLAN

This chapter summarizes the financial analysis and implementation plan for the Airport. Because the Airport currently generates negative net revenue, the focus of this analysis is to identify opportunities for the Airport to generate additional revenue from both aeronautical and nonaeronautical sources to decrease the Airport's financial dependency upon the remainder of the HAS. More detailed financial information can be found in Chapter 7 of the *Master Plan Technical Report*.

7.1 AIRPORT REVENUES AND EXPENSES

The initial process to enhance the Airport's net revenues is to: (1) examine the existing relationship between costs and revenues (net revenues); (2) project future net revenues based on existing cost and revenue sources, including forecasts of aviation activity; (3) investigate additional aeronautical and nonaeronautical revenue enhancement opportunities; (4) develop assumptions regarding additional revenue enhancement; and (5) project revenues and expenses under several revenue enhancement scenarios. Accordingly, this section briefly reviews current and near term projections for revenues and expenses and projects future revenues and expenses under several revenue enhancement scenarios.

7.1.1 Near-Term Financial Outlook

Recent changes in the Airport's revenue and cost structure are expected to continue for at least the near term. The near-term outlook for revenues and expenses is influenced by historical trends and recent developments at the Airport. Accordingly, this analysis of the Airport's financial condition is based on estimated fiscal year (FY) 2004 revenues and costs in addition to the historical FY 2003 conditions based on historical data. A summary of this analysis follows.

Current and Projected Revenue. Airport revenues come from both aeronautical and nonaeronautical sources. Aeronautical revenues are largely generated by aircraft operations and fixed base operator (FBO) fees. Growth in aeronautical revenues are therefore related to forecast growth in aviation activity. Nonaeronautical revenues are primarily generated by ground and building leases and various administrative charges. Growth in nonaeronautical revenues is primarily related to the assumed future absorption of land leased for commercial (principally nonaviation) uses.

Current and Projected Operating Expenses. Operation and maintenance (O&M) expenses include wages and salaries, supplies, utilities, services, and certain capital and noncapital equipment costs, including vehicle and equipment acquisition. O&M expenses were projected based upon several factors including the consumer price index (CPI) and projected equipment purchases. The recommended development program assumes that no material increase in the developed area managed by the HAS, or HAS staffing levels, and that any future commercial development would be undertaken by third parties that would not require preparation or maintenance by the HAS.

Current and Projected Financial Conditions. Table 7-1 summarizes historical and estimated near term revenues and O&M expenses for FY 2003 and FY 2004. The FY 2004 conditions represent a more realistic basis for projecting net revenues than FY 2003 because: (1) recently developed hangars have increased hangar rental revenues; (2) landing fee revenues have reduced as a result of the withdrawal of operations by UPS in December 2002; (3) O&M expenses have increased as a result of new hangar and airfield facility expansion; and (4) the cost of doing business has continued to increase due to inflation.

7.1.2 Long-Term Revenue and Expense Scenarios

Three financial scenarios were prepared to examine the consequences of alternative management actions. As noted earlier, revenue growth would be linked to aeronautical and nonaeronautical property absorption, forecast growth in aircraft operations, and price escalation. O&M expenses are the same in all scenarios and are assumed to increase as a result of anticipated equipment purchases; rising wage, salary, and benefit levels; incremental Airport facilities expansion; and general inflation. HAS is assumed to have little opportunity to substantially reduce O&M expenses and this analysis focuses on alternative revenue generation as the main variable between scenarios.

Revenue Enhancement Potential. Any substantial revenue growth at the Airport would likely come from new or expanded FBO development, and/or lease of additional commercial land.

- ***Aeronautical*—**FBO development could occur as a result of expansion of the existing FBO, or by the decision of another FBO to locate at the Airport from William P. Hobby Airport or another regional GA airport. Southwest Airport Services, the Airport's only existing FBO, has the option to lease an additional 447,212 square feet (about 10 acres). To estimate the additional revenue if Southwest exercises its option, it was assumed that the annual rental rate for the options would be the same as the existing rate of approximately $0.075 per square foot. The existing FBO leases at Hobby were

Table 7-1

HISTORICAL AND ESTIMATED ANNUAL REVENUES AND EXPENSES
Ellington Field
FY 2003 - 2004

	Historical FY 2003	Estimated FY 2004
Revenues		
Hangar rental		
Fixed base operator	$ 56,560	$ 56,560
Other hangar rental	593,224	642,809
Subtotal	$ 649,784	$ 699,369
Tiedowns	$ 6,075	$ 9,100
Fuel flowage	228,586	303,270
Aviation land leases	93,179	93,705
Landing fees	499,231	423,826
Ground leases *(a)*	141,409	96,734
Total	$1,618,264	$1,626,004
Expenses		
Personnel	$1,178,264	$1,304,959
Supplies	151,209	190,014
Utilities	325,074	356,428
Other services	246,149	334,778
Capital and noncapital costs *(b)*	116,209	170,639
Total	$2,016,905	$2,356,818
Net revenues	($398,641)	($730,814)

(a) Nonaeronautical revenues.
(b) Included in Houston Airport System revenue and expense data for the Airport.

Sources: Houston Airport System, August 2004.

reviewed to develop assumptions about: the timeframe in which such relocation might occur; the typical lease area (approximately 450,000 square feet); and average ground rental rates (approximately $0.18 per square foot).

- ***Nonaeronautical*—**Figure 7-1 shows parcels of land available for nonaeronautical use. Ground rental rate estimates for unimproved commercial land in this area run from $0.12 per square foot for light industrial property up to about $0.35 per square foot for office use. In comparison, aeronautical lease rates average about $0.18 per square foot. The following parcels, or lots,

LEGEND

- Office - Industrial
- Institutional - Industrial
- Industrial - Aviation
- Aviation
- Airfield
- Unavailable area
- Recommended access roadway
- Recommended new taxiway
- (A) Parcel name

N

1,200 0 1,200 2,400

Graphic Scale in Feet

Figure 7-1

REVISED LAND USE PLAN

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

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were considered to be most attractive for nonaeronautical commercial development: (1) Lots A and C, 64 acres, in the southwest area of the Airport adjacent to Highway 3; (2) Lot E, 30 acres, in the western area of the Airport; and (3) Lot N, 33 acres, in the southeast area of the Airport with access to Space Center Boulevard and adjacent to the proposed extension of that road.

Growth Scenarios. Base, high, and low scenarios were examined, which differ only with regard to revenue levels—aircraft operations growth projections, the timing of an additional FBO development, the timing of Southwest Airport Services exercising its existing land options, and nonaeronautical property absorption rates. Major assumptions for each scenario include:

- ***Base Case***—The Airport would actively market a high quality mixed-use (office/light industrial) business park resulting in the annual absorption of about 3 acres of land leased for commercial (nonaeronautical) development. A second FBO would lease a 5-acre (217,800-square-foot) plot at the Airport in 2005. Southwest Airport Services would exercise its options and lease additional space between 2006 and 2009.

- ***High Case***—The Airport would actively market a high quality mixed-use business park, resulting in annual absorption of about 5 acres (217,800 square feet) for commercial nonaeronautical development. A second FBO would lease a 5-acre (217,800-square-foot) plot at the Airport in 2004, and an additional 5 acres in 2012. Southwest Airport Services would exercise its options and lease additional space between 2005 and 2008.

- ***Low Case***—No additional aeronautical or nonaeronautical development at the Airport would occur.

Summary of Financial Projections. Table 7-2 and Figures 7-2 through 7-4 show projected aeronautical and nonaeronautical revenues, expenses, and the break-even point, for the base, high, and low cases, respectively. In the base and high cases, the Airport would generate break-even Net Revenue in 2022 and 2012, respectively. In the low case, which reflects no additional aeronautical or commercial land leases, break-even would not occur because existing revenue sources do not currently generate sufficient revenue to cover O&M expenses, and O&M expenses are assumed to increase at a slightly faster rate than existing revenues. Therefore, to break even, the Airport would need to generate additional income through new nonaeronautical lease development, as shown in the base and high cases.

Table 7-2

HISTORICAL, ESTIMATED AND PROJECTED NET REVENUES
Ellington Field

Year	Net revenues – base case	Net revenues – high case	Net revenues – low case
2002	$ (489,338)	$ (489,338)	$ (489,338)
2003	(398,641)	(398,641)	(398,641)
2004	(730,814)	(730,814)	(730,814)
2005	(793,000)	(630,000)	(802,000)
2006	(746,000)	(548,000)	(822,000)
2007	(704,000)	(470,000)	(842,000)
2008	(658,000)	(387,000)	(862,000)
2009	(611,000)	(303,000)	(885,000)
2010	(573,000)	(217,000)	(909,000)
2011	(529,000)	(126,000)	(932,000)
2012	(488,000)	12,000	(957,000)
2017	(258,000)	409,000	(1,091,000)
2022	15,000	784,000	(1,232,000)

Sources: 2002-2004: Houston Airport System.
2005-2022: Leigh Fisher Associates.

Figure 7-2

HISTORICAL, ESTIMATED, AND PROJECTED REVENUES AND EXPENSES—BASE CASE

Ellington Field

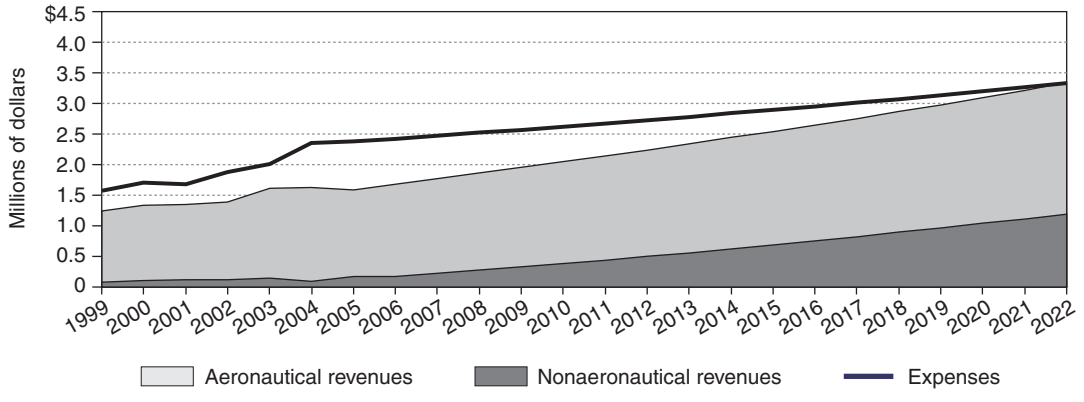


Figure 7-3

HISTORICAL, ESTIMATED, AND PROJECTED REVENUES AND EXPENSES—HIGH CASE

Ellington Field

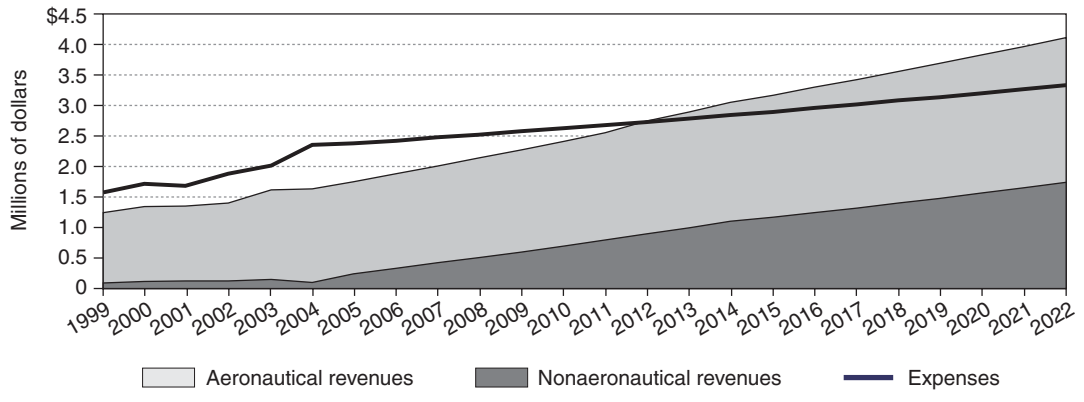
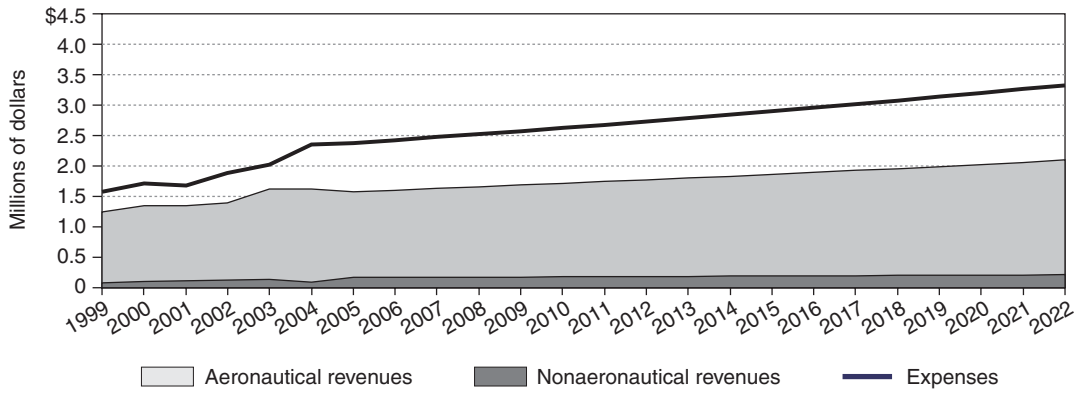


Figure 7-4

HISTORICAL, ESTIMATED, AND PROJECTED REVENUES AND EXPENSES—LOW CASE

Ellington Field



7.2 FUNDING FOR RECOMMENDED CAPITAL PROJECTS

Recommended capital projects address long term airfield, roadway, and storm drainage needs. This section describes: (1) the recommended capital projects; (2) potential funding sources; (3) a proposed funding plan; (4) revised financial projections; and (5) follow-on activities to enhance the Airport's financial position.

7.2.1 Recommended Capital Improvements

Airfield projects have been recommended to reduce runway incursion "hot spots," and enhance airfield circulation efficiency for airport users. Nonairfield projects have been recommended to enhance accessibility, provide additional parking, and initiate a comprehensive drainage master plan. These recommendations were grouped into project packages, as shown on Figure 7-5, for the purposes of funding and project management. Table 7-3 provides cost estimates for all packages. Supplementary data for the cost estimates is provided in the *Master Plan Technical Report*.

7.2.2 Potential Funding

The financial scenarios presented earlier do not reflect the fiscal impact of these projects. Accordingly, other sources of revenue would be required to make these investments feasible. The Airport does not meet the threshold levels of 10,000 annual enplaned passengers for the receipt of FAA Airport Improvement Program (AIP) entitlement funds, although FAA AIP discretionary funding could be sought. The FAA typically accepts applications for discretionary funding until the end of March for the next federal fiscal year (FFY) beginning October 1st. HAS could submit an application in March 2005 for discretionary FFY 2005 funding for October 1, 2004 through September 30, 2005. HAS would compete with other airports for any discretionary funds. Projects related to safety and capacity are more likely to receive grant funding. To assist the process, HAS can support additional capacity funding requests with information that shows other regional airports providing general aviation services are reaching capacity and have limited expansion capability, or that such capacity is being reduced through airport closures.

The Airport could also enhance its position to receive funding by initiating dialog with FAA at an early stage. The FAA monitors airport AIP spending through the year and, usually in July through September, determines which available AIP funds will not be spent. Airport operators can ask the FAA for a portion of the unspent monies, which are awarded at FAA's discretion, typically at the regional level. This is a less formal process than the standard application process described above. Airport sponsors that have projects ready for bid are in a better position to receive "end of year" funding. Accordingly, one strategy is to prepare plans and specifications to make upcoming projects ready to bid in the event that funding becomes available.

LEGEND

- Airport boundary
- Recommended new/relocated taxiway
- Recommended new taxilane
- Package boundary
- Recommended pavement removal
- Recommended access roadway
- Roadway currently under construction
- (A) Package name

N

700 0 700 1,400

Graphic Scale in Feet

HAS593 F-0030.fh8

Figure 7-5

RECOMMENDED AIRFIELD DESIGN PACKAGES AND ACCESS ROADWAYS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES

Table 7-3

DEVELOPMENT PACKAGES
Ellington Field

	Description	Costs: Construction *(a)*	Design *(b)*	HAS contract administration *(c)*	Total
Airfield					
Package					
A	Pavement removal (wayfinding)	$ 762,000	$ 76,200	$ 90,000	$ 928,200
B	Pavement removal (wayfinding)	2,921,000	290,000	350,000	3,561,000
C	Taxiway Bravo relocation (wayfinding)	13,335,000	1,330,000	1,610,000	16,275,000
D	Pavement removal (wayfinding)	5,461,000	550,000	660,000	6,671,000
E	Taxiway Echo relocation (safety)	6,350,000	640,000	770,000	7,760,000
F	Pavement removal (safety)	4,699,000	470,000	570,000	5,739,000
G	Parallel taxiway for Runway 04-22	23,495,000	2,350,000	2,840,000	28,685,000
H	New taxiway (level-of-service)	2,540,000	250,000	310,000	3,100,000
I	Pavement removal (leaseable area)	3,175,000	320,000	390,000	3,885,000
J	Apron-front taxilane (circulation)	6,350	600	800	7,750
	Total	$62,744,350	$6,276,200	$7,590,000	$76,611,950
Access and Parking					
	North Access Road	$ 3,937,000	$ 390,000	$ 480,000	$ 4,807,000
	Ellington Field Bypass	4,826,000	480,000	580,000	5,886,000
	General Aviation parking facility	1,905,000	190,000	230,000	2,325,000
Drainage	Drainage Master Plan	n.a.	180,000	20,000	200,000
Total		$73,412,350	$7,516,800	$8,900,800	$89,829,950

Notes: In Fiscal Year 2003 dollars.

(a) Includes construction cost, plus a 17% contractor's markup and a 10% contingency applied to that construction cost.
(b) Comprises 10% of the construction cost.
(c) Comprises 11% of the construction cost plus design.

Source: Leigh Fisher Associates, August 2003.

7.2.3 Proposed Funding Plan

The projects described above would be incorporated in the Airport's capital improvement program (CIP). Assuming that FAA discretionary grants could be obtained, about 10% of total costs, or $9 million, would be contributed by HAS as its matching requirement. While the timing and amount of FAA funding is uncertain, it is assumed that HAS would earmark about $450,000 annually to provide matching funds. This contribution level would allow HAS to spread its total contribution of $9 million over the 20-year planning period. It is further assumed that this HAS funding would be principally assigned to planning and design to prepare projects for bid in the event that end-of-year AIP funds become available.

As shown in Table 7-3, the design component of many of the packages exceeds this assumed HAS annual investment level. In these cases, HAS will need to decide whether to (1) delay design on the projects for sufficient time to accumulate the required funding, (2) spend multiple future years' contributions as needed to prepare one design package, or (3) slow the design process to conform with year-to-year funding availability. The following priority list of design packages is based on the rationale behind each package (e.g., safety and level-of-service). In some cases, the timing for design will be most likely be linked to factors other than funding availability.

1. **Drainage Master Plan**. This plan should be prepared prior to any significant development of vacant property. Because commercial development is critical to the Airport's ability to fully fund its operating and maintenance costs, this project is a high priority.

2. **Airfield Package J.** The parallel taxilane would facilitate aircraft movement in the general aviation area and addresses Airport stakeholder concerns over the limitations of one-way operations on Taxiway Hotel. This project is inexpensive and could possibly be accomplished through the Airport's existing maintenance program.

3. **Space Center Boulevard.** This project would greatly enhance the development potential of property on the southeast side of the Airport. Given the coordination that will be required among numerous participating agencies, any HAS funding for this project may be governed by factors beyond HAS control.

4. **North Access Road.** This project provides an entry/egress route that is independent from operations on the rail line running parallel to the Airport's western boundary.

5. **Airfield Package E.** This project addresses safety concerns with existing airfield operations, including potential runway incursions.

6. **Airfield Package F.** This project addresses safety concerns with existing airfield operations, including potential runway incursions.

7. **Airfield Package C.** This project addresses pilot wayfinding concerns by replacing an unconventional taxiway alignment with one that will reduce pilot confusion and removing unnecessary pavement.

8. **Airfield Package D.** This project improves the ability of pilots to cross Runway 17R-35L on Taxiway Delta.

9. **Airfield Package B.** This project addresses pilot wayfinding concerns by removing unnecessary pavement.

10. **Airfield Package G.** This project improves aircraft operations on Runway 4-22 and facilities airfield access for properties on the southeast side of the Airport. If there is an identified need for airfield access to the southeast side, this project will warrant a higher priority.

11. **Airfield Package A.** This project addresses pilot wayfinding concerns by removing unnecessary pavement.

12. **Airfield Package H.** This project improves the level-of-service by reducing some taxiing times.

13. **Airfield Package I.** This project facilitates the development of parts of the southeast side of the Airport. If there is an identified interest in leasing this property, this project will warrant a higher priority. Funding for this project could also be tied to any lease agreement arranged for the affected property.

14. **General Aviation Area Parking Lot.** This project provides a consolidated parking facility for the general aviation area. This project may not be required until demand starts to approach the limits of the available area and existing parking areas are more valuable for other uses.

7.2.4 Revised Financial Projection

Table 7-4 summarizes the anticipated annual cash flow under the base, high, and low cases presented earlier in this chapter, excluding financing costs or funding. Under the base case, annual Airport income would not exceed annual expenses by the end of the planning period. Under the high case, the annual Airport income is anticipated to exceed annual expenses near the end of the planning period. Under the low case, the annual deficit between expenses and income would continue to increase.

Table 7-4

PROJECTED NET REVENUES, FOLLOWING CAPITAL EXPENSES
Ellington Field

Year	Net revenues – base case	Net revenues – high case	Net revenues – low case
2005	$(1,243,000)	$(1,080,000)	$(1,252,000)
2006	(1,196,000)	(1,000,000)	(1,272,000)
2007	(1,154,000)	(922,000)	(1,292,000)
2008	(1,110,000)	(841,000)	(1,312,000)
2009	(1,063,000)	(757,000)	(1,335,000)
2010	(1,025,000)	(672,000)	(1,359,000)
2011	(982,000)	(582,000)	(1,382,000)
2012	(941,000)	(446,000)	(1,407,000)
2017	(715,000)	(52,000)	(1,541,000)
2022	(455,000)	319,000	(1,682,000)

Source: Leigh Fisher Associates, August 2004.

7.3 RECOMMENDED ACTIONS

Assuming the Airport pursues the recommended capital program, Airport income would exceed expenses by the end of the planning period if the high case revenue projections are realized. To reach a break-even scenario if the high case is not realized, or to enhance revenue generation in any event, it is recommended that HAS pursue the following next steps:

- Identify potential ways in which HAS could reduce O&M expenses, for example, reducing staffing levels, if appropriate, by means such as natural attrition transfer to other functions in HAS or transfer of activities to the private sector (outsourcing).

- Analyze further aeronautical and nonaeronautical revenue enhancement opportunities, including: (1) updating the *Ellington Field Real Estate Resource Guide* as needed to respond to changing conditions on-Airport and in the real estate market; (2) determining whether the Joint Use Agreement adequately compensates HAS for the costs required to maintain military and NASA operations; (3) extending the schedule for airfield and other capital improvements; and (4) considering incentives for FBOs to relocated from Hobby.

Chapter 8

ENVIRONMENTAL OVERVIEW

This chapter summarizes the environmental issues that may be raised by planning recommendations and identifies typical National Environmental Policy Act (NEPA) requirements for implementation of those recommendations. The chapter does not constitute an environmental assessment (EA) of the recommended Master Plan Update improvements. More detailed information is provided in Chapter 8 of the *Master Plan Technical Report*.

8.1 OVERVIEW

Three types of airport improvements are recommended in the *Master Plan Technical Report*. A brief summary of the recommended improvements, their potential environmental impacts, and the probable NEPA and/or permitting requirements follows.

- ***Airfield improvements*—** A series of taxiway improvements would be initiated by HAS to enhance safety and improve airfield circulation. Federal actions required to implement these projects would include approval of the Airport Layout Plan (ALP), possibly grant funding under the Airport Improvement Program, and approval to use passenger facility charge (PFC) revenues. Consequently, these improvements would be subject to FAA environmental review under NEPA.

- ***General aviation development*—** New GA facilities would be initiated by private developers in response to demand. The recommended GA development is located entirely within areas already designated for general aviation development on the current ALP. Accordingly, the proposed GA development would not require a federal approval, funding, or NEPA documentation. Because the recommended GA development area was previously devoted to aviation and related industrial activities, it is possible that hazardous materials from these previous activities will require remediation as a part of the development process.

- ***Off-airport roadway improvements*—** Improvements to the roadway network providing access to the Airport would be initiated by the City of Houston and/or other transportation planning agencies. The on-Airport segments of these roadway improvements might be constructed by the HAS, or the HAS might only provide rights of way for roadways to be constructed by others. Because these roadway segments would be functionally linked to new off-Airport roadways, NEPA documentation would be required. Depending upon the nature of the project, NEPA

documentation might be initiated by the appropriate agency as part of the implementation process.

As shown on Figure 8-1, implementation of the recommended airfield improvements would, in most cases, not generate adverse environmental impacts.

Similarly, implementation of the recommended GA development is not expected to result in adverse impacts. The potential for the off-Airport roadway improvements recommended in the Master Plan Update to generate adverse impacts can not be precluded at this time. A summary of anticipated environmental effects of these project categories follows.

The potential impacts of airport development projects are dependent upon the environmental setting of the Airport as well as the nature of the proposed development. The following sections focus on the potential effects of recommended development on that environment.

8.2 AIRCRAFT NOISE AND COMPATIBLE LAND USE

The existing noise environment at the Airport is largely influenced by the tactical jet operations conducted by the Texas Air National Guard and NASA. Figure 8-2 shows the existing noise contours. Military and NASA activities would not be affected by proposed airport development. Forecast growth in aviation activity would not result in a "significant" increase in noise exposure as defined by federal guidelines. Accordingly, development of facilities to accommodate forecast demand would not exceed the federal threshold of significance for noise exposure. Figure 8-3 illustrates that in 2021, even the high growth scenario would not exceed the threshold of significance at any location. Most, if not all, of the forecast growth in aircraft activity would occur without implementation of the recommended Master Plan Update development. Even if the recommended Master Plan Update improvements were required to accommodate this level of activity, the resulting noise impacts would be less than significant.

The future (2021) noise contours shown on Figure 8-3 reflect increased use of Runway 22 for arrivals. This assumption is consistent with the airfield capacity analysis indicating that the highest capacity configuration available at the Airport would be used more frequently. Table 8-1 summarizes the population and dwelling units within the noise contours shown on Figure 8-3.

Master Plan Update Development Projects

	Noise & Land Use	Social	Water Quality	Air Quality	Historic/Sec. 4 (f)	Biotic, E&T Species	Wetlands	Floodplains	Energy & Resources	Construction	HAZMAT	Env. Justice	Cumulative
Airfield: Closure and realignment of aircraft taxiways to enhance safety and improve circulation.													
A - Pavement removal (safety/wayfinding)	1	0	2	1	0	4	3	3	1	2	3	0	1
B - Pavement removal (safety/wayfinding)	1	0	2	1	0	4	3	3	1	2	3	0	1
C - Taxiway Bravo relocation (safety/wayfinding)	1	0	2	1	0	4	3	3	1	2	3	0	1
D - Pavement removal (safety/wayfinding)	1	0	2	1	0	4	3	3	1	2	3	0	1
E - Taxiway Echo relocation (safety)	1	0	2	1	0	4	3	5	1	2	3	0	1
F - Pavement removal (safety)	1	0	2	1	0	4	3	3	1	2	3	0	1
G - Parallel taxiway for 4-22 (airfield access for leasable area)	1	0	2	1	0	4	3	3	1	2	3	0	1
H - New taxiway near Runway 22 (level-of-service)	1	0	2	1	0	4	3	3	1	2	3	0	1
I - Pavement removal (leaseable area)	1	0	2	1	0	4	3	3	1	2	3	0	1
General Aviation: Expansion and improvement of General Aviation facilities to enhance efficiency and provide additional FBO opportunities.													
New taxiway/apron pavement	1	0	2	1	0	1	3	3	1	2	4	1	1
New hangar development	1	0	2	1	0	1	3	3	1	2	4	1	1
New vehicular parking and circulation	1	0	2	1	0	1	3	3	1	2	4	1	1
Airport Access: Reservation of land to accommodate an extension to Space Center Blvd. to Route 3 and alternative connection northward to Beltway 8.													
Ellington Field Bypass (accessibility for leasable area)	0	2	2	2	4	4	4	5	2	2	4	2	2
North Access Road (enhanced airport access)	0	2	2	2	4	4	5	3	2	2	4	2	2
Service road realignment (if parcel 'I' is leased)	0	0	2	1	1	4	3	5	2	2	3	2	2

LEGEND

0	Not applicable or unknown
1	No adverse impact anticipated
2	No significant adverse impact anticipated
3	Preliminary analysis indicates no likely impact
4	Further site specific analysis will be required
5	Preliminiminary analysis cannot preclude potentially significant impact

E&T = Endangered and threatened
FBO = Fixed base operator
HAZMAT = Hazardous materials

Sources: Leigh Fisher Associates and EnviroStudy International, Inc.

HAS593 F-0034.fh8

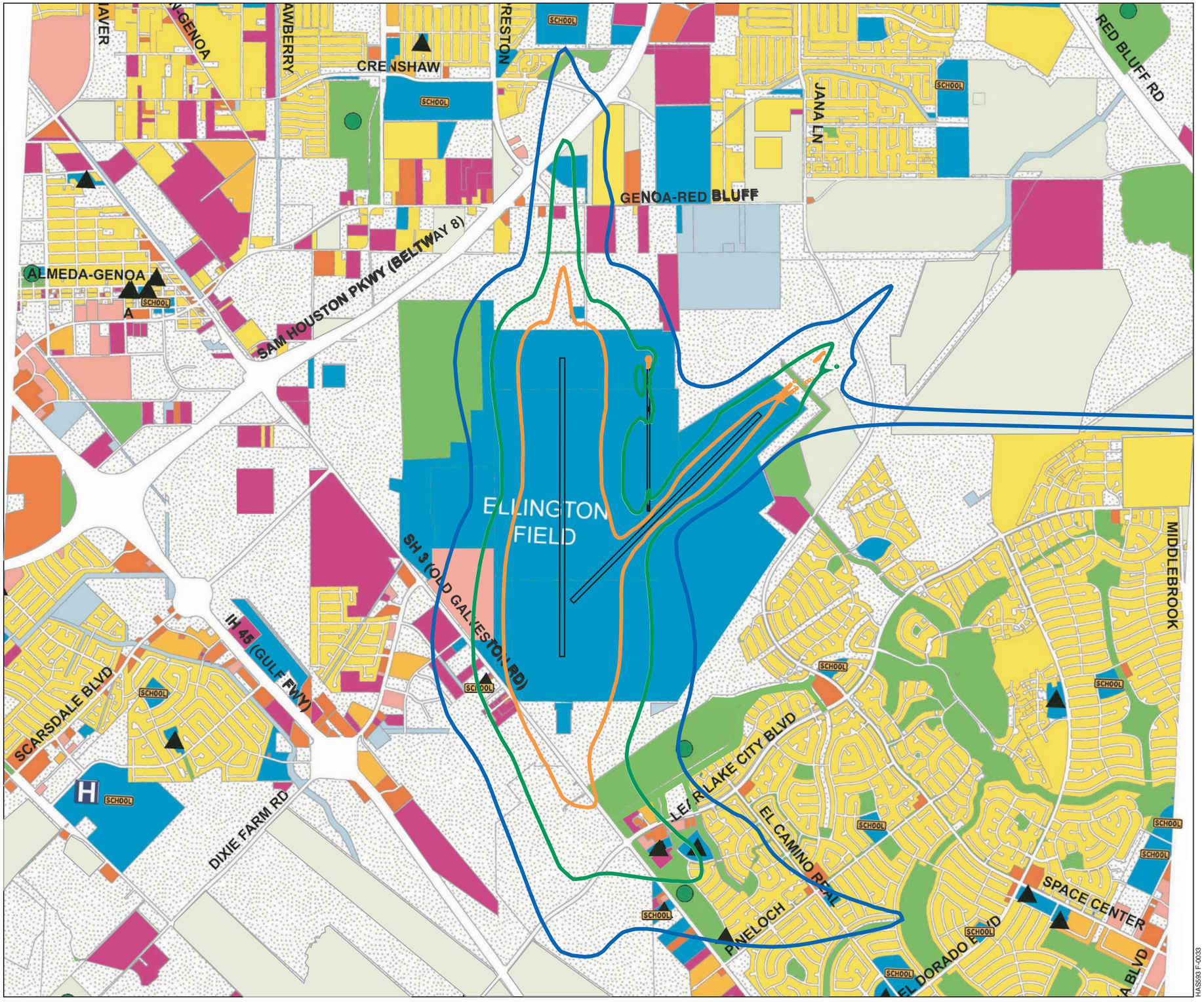
Figure 8-1

GRAPHIC SUMMARY OF ENVIRONMENTAL SCREENING RECOMMENDED MASTER PLAN UPDATE IMPROVEMENTS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES



LEGEND

- 65 DNL
- 70 DNL
- 75 DNL

LEGEND

Single family residential	Public and institutional	Churches
Multi-family residential	Transport and utilities	Hospital
Commercial	Parks and open spaces	Public parks
Office	Undeveloped	Schools
Industrial	Agricultural production	

Source: City of Houston, Knudson & Associates.

DNL = Day-night average sound level

Source: Land use map provided by Knudson & Associates

N

1,500 0 1,500 3,000

Graphic Scale in Feet

HAS593 F-0033

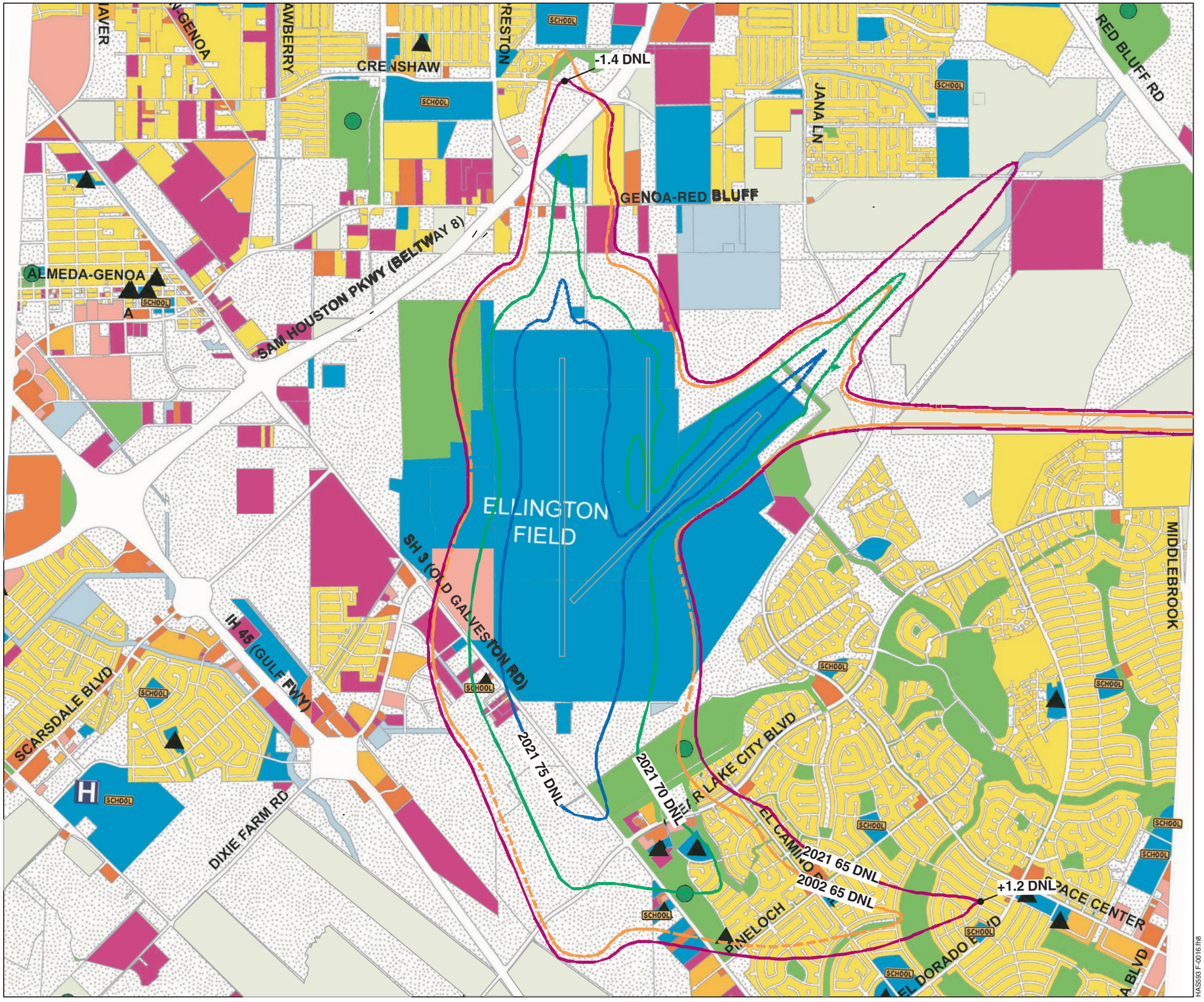
Figure 8-2

EXISTING NOISE EXPOSURE

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES



LEGEND

- Year 2021 65 DNL
- Year 2021 70 DNL
- Year 2021 75 DNL
- Year 2002 65 DNL
- 0.0 DNL — Change in noise exposure, 2002 to 2021, at key 2021 65 DNL locations

LEGEND

Single family residential	Public and institutional	Churches
Multi-family residential	Transport and utilities	Hospital
Commercial	Parks and open spaces	Public parks
Office	Undeveloped	Schools
Industrial	Agricultural production	

Source: City of Houston, Knudson & Associates.

DNL = Day-night average sound level

Source: Land use map provided by Knudson & Associates

N

1,500 0 1,500 3,000

Graphic Scale in Feet

HAS593 F-0016.ai8

Figure 8-3

FUTURE NOISE EXPOSURE

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES

Table 8-1

POPULATION AND DWELLING UNITS BY CONTOUR INTERVAL, YEAR 2021
Ellington Field

	Noise contour			
	65 DNL	70 DNL	75 DNL	Total
Population	7,604	775	--	8,379
Dwelling units *(a)*	2,866	258	--	3,124
Sensitive receptors *(b)*	2	1	--	3

(a) Single- and multi-family housing units.
(b) Hospitals, churches, and schools.

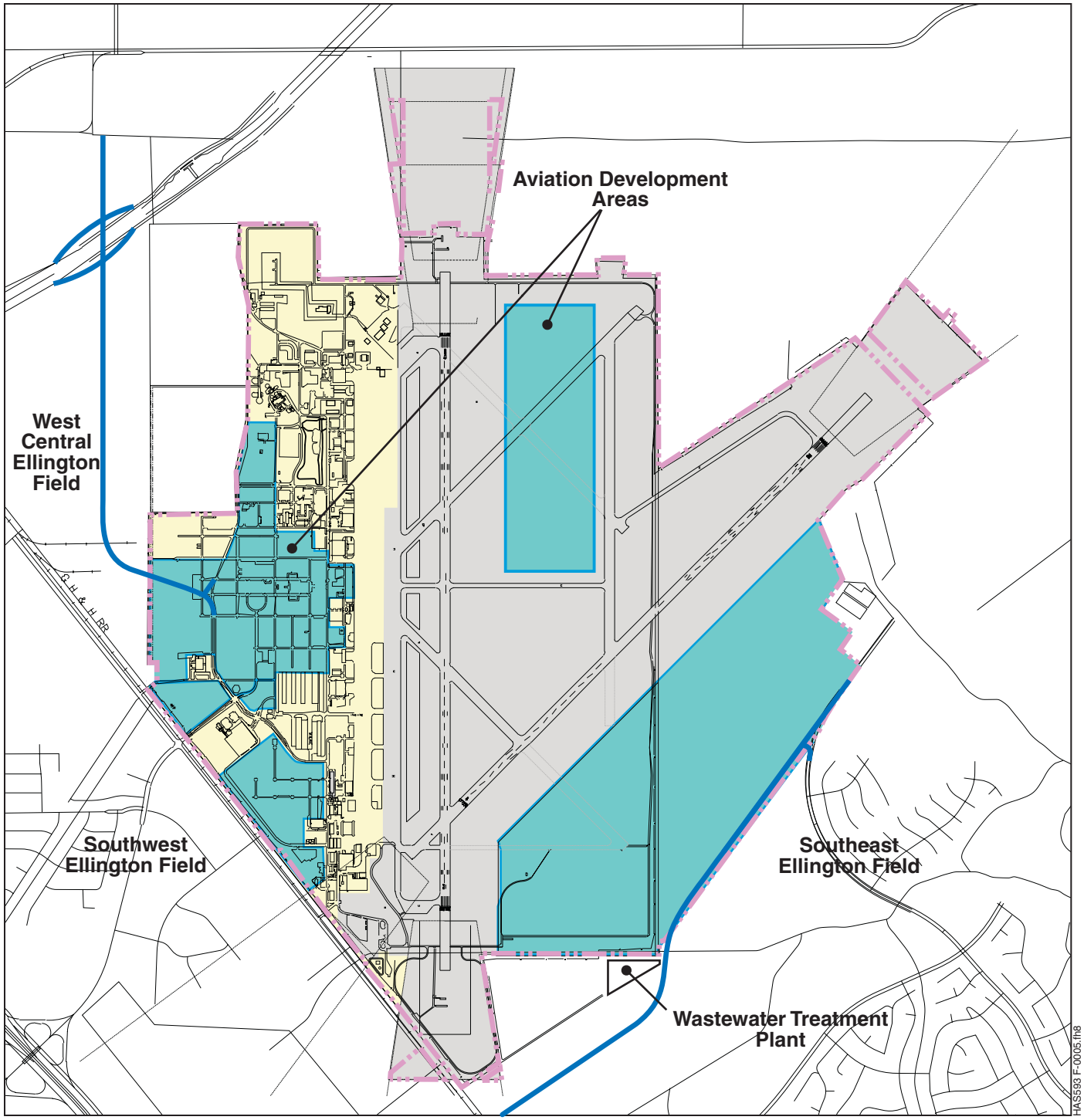
Source: Knudson & Associates, from Harris County Appraisal District data.

8.3 AIR QUALITY

Federal actions, including FAA approval of an ALP must conform to the State Implementation Plan (SIP). Most, if not all, of the forecast growth in Airport activity would occur without implementation of the recommended Master Plan Update development. Even assuming that the recommended Master Plan Update improvements were required to accommodate the forecast level of activity, the resulting activity levels would be less than the assumptions incorporated in the SIP. Accordingly, it is likely that implementation of the Master Plan Update recommendations would be consistent with the SIP.

8.4 SOCIAL AND SOCIOECONOMIC FACTORS

Social and socioeconomic effects are typically caused by acquisition or realignment of roadways that displace residences and businesses, or that change surface traffic patterns of transportation. The recommended access improvements would entail off-Airport roadway construction and would alter the roadway network in the Airport environs. None of the recommended improvements would disrupt existing or planned communities and might reduce through traffic in existing residential areas (see Figure 8-4). For these reasons, significant adverse impacts would not be anticipated.



LEGEND

- Potential development area
- Airfield
- Unavailable area
- Proposed roadway alignment
- Airport boundary

N

1,200 0 1,200 2,400

Graphic Scale in Feet

Figure 8-4

PROPOSED ROADWAY IMPROVEMENTS

Comprehensive Plan
Ellington Field
Houston Airport System

May 2004

LEIGH FISHER ASSOCIATES

8.5 NATURAL ENVIRONMENTAL FACTORS

Figure 8-5 provides an overview of the natural environmental features that could be affected by Airport development. A brief summary of these potential effects follows.

8.5.1 Stormwater Runoff

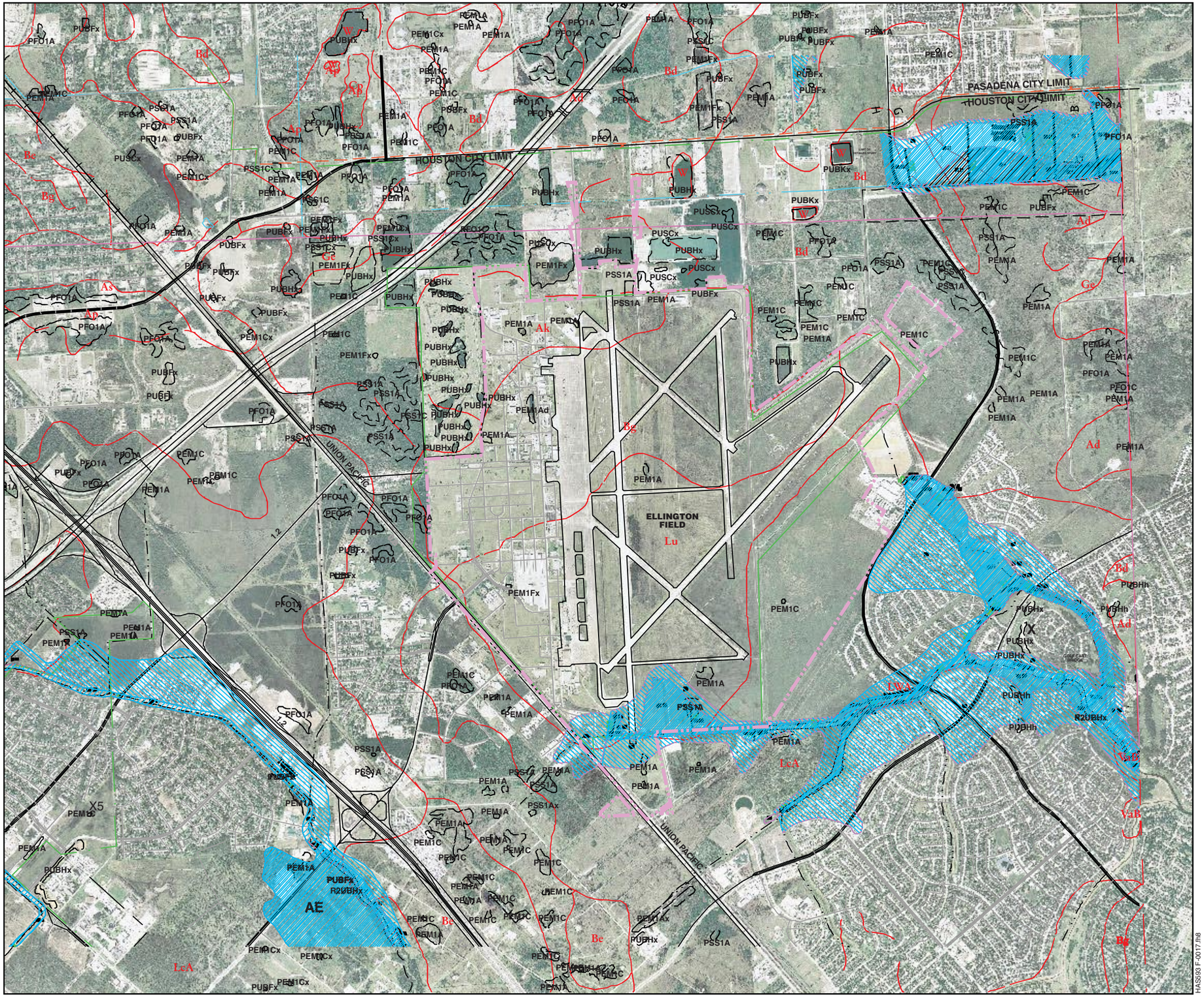
Due to the demolition of facilities associated with the former Ellington Field Air Force Base, much of the Airport is less extensively covered than it was when the storm sewer system was installed. Accordingly, this system may have the capacity to accommodate additional development in the original military area to the west of the airfield. On the airfield itself, recommended new pavement would be largely offset by recommended pavement removal. The area to the southeast of the airfield is not served by the existing storm sewer system, and would therefore require the construction of additional detention facilities. Specific requirements would be determined through the City of Houston development approval process. The Airport currently operates under a National Pollutant Discharge Elimination System (NPDES) permit. This permit would be revised to accommodate new development.

8.5.2 Water Quality

Potential impacts to water quality and water supply that could result from the development projects recommended in the Master Plan Update relate to runoff from paved surfaces, such as new taxiway or aircraft parking apron surfaces; vehicle parking areas; and structures. Pollutants that could possibly affect surface waters as a result of the development plan include oils and greases that build up on the Airport roadways, parking surfaces, aircraft parking aprons, taxiways, and runways. The impact of the development plan on groundwater may include potential sedimentation and erosion during construction as well as leakage or seepage of fuels and lubricants during airfield operations. These potential impacts may be addressed through proper design, construction, and operational practices. In addition, implementation of the development plan is likely to require amendment of the NPDES permit.

8.5.3 Floodplains

The 100-year floodplain is limited to the southern perimeter of the Airport, largely to the east of Runway 17R-35L. One proposed taxiway improvement providing alternative access across the approach end of Runway 35L would intrude into the 100-year floodplain. Because it is federal policy to avoid encroachment into floodplains when practicable, an EA would typically be required to document



LEGEND

Airport boundary		Flood way - zone AE	
Soil delineation		100-year flood - Zone	
Lu	Soil description	500-year flood - Zone X	
Wetland delineation		PEM1A	Wetland description

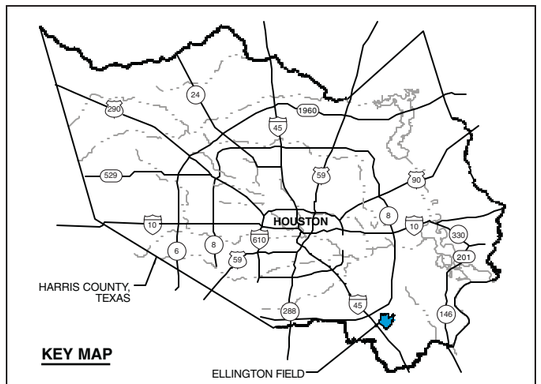
Notes: Key map not to scale

Source: Carter & Burgess, Inc.
Aerial published in 2001, by Landiscor
Flood Insurance Rate Map, November 6, 1996

N

1,200 0 1,200 2,400

Graphic Scale in Feet



Soil Definition:

Soil Description:	Component/inclusion	Hydric (C)/(1)
Ad–Addicks loam	Addicks/inclusions	Yes/No
Ak–Addicks-Urban land complex	Addicks/urban land	Yes/Unranked
Bd–Bernard clay loam		
Bg–Bernard-Urban land complex		
Ge–Gessner loam	Gessner/inclusions	Yes/No
LcA–Lake Charles clay, 0-1% slopes		
Lu–Lake Charles-Urban land complex		

Soil Definition:

Class — Subclass
System → P E M 1 A ← Modifier (Mod.)

System:	P–Palustrine				
Class:	**Subclass:**				
EM–Emergent	1–Persistent		2–Nonpersistent		
FO–Forested	1–Broad leaved deciduous		2–Needle leaved deciduous		
SS–Scrub shrub	1–Broad leaved deciduous		2–Needle leaved deciduous		
UB–Unconsolidated bottom	1–Cobble–Gravel		2–Sand		3–Mud
US–Unconsolidated shore	1–Cobble–Gravel		2–Sand		3–Mud
Water regime mod.: (Flooded)	A–Temp.	C–Seas.	F–Semi.	H–Perm.	K–Arti.
Special mod.:	x–Excavated				

Figure 8-5

SOILS, WETLANDS, AND FLOOD PLAINS

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Houston Airport System

May 2004

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consideration of alternatives that would avoid the encroachment and to assess the impacts of the project. Floodplain impacts would not likely be significant because they could be mitigated by (1) commitments to floodplain design criteria, (2) elevation of facilities above the floodplain, and/or (3) minimized fill in floodplains.

8.5.4 Wetlands and Associated Natural Habitat

A few isolated wetlands are located on the airfield. None of the airfield or GA development recommendations are expected to involve wetlands impacts. The recommended alignment for the north Airport connection to Beltway would cross through identified wetlands. The NEPA process associated with this project would need to consider alternatives that would avoid or minimize wetlands impacts. In addition, a Section 404, Wetlands, Permit would be required from the U.S. Army Corps of Engineers.

8.5.5 Endangered and Threatened Species

Correspondence with the Texas Commission on Environmental Quality (TCEQ—formerly the Texas Natural Resource Conservation Commission) early in the planning process indicated that no state or federal endangered or threatened species were found in the local environment. Subsequently, an Environmental Impact Statement (EIS) for a railroad right of way in the Airport environs determined that the prairie dawn, a federally listed species, was found in the local area. Because the habitat for the prairie dawn is common in undeveloped portions of the Airport's environs, site specific investigations will be required to determine the presence or absence of the prairie dawn as individual projects are initiated.

8.6 HAZARDOUS MATERIALS

As a part of the Comprehensive Plan, a Phase I screening analysis was conducted to determine the presence of known contamination or sources of pollution. Figure 8-6 shows that many of the known potential hazardous material locations are located along the eastern edge of the apron area. Due to its access to the airfield, this area is the logical location for continued GA development. Development of new facilities may require remediation of hazardous materials impacts if site investigations reveal the continued presence of hazardous materials.

LEGEND

- Airport Boundary
- Asbestos
- Aboveground storage tank
- Underground storage tank
- Leaking petroleum storage tank
- Hazardous spill
- Firing range (closed)
- Landfill
- Hazardous waste storage
- Emergency Response Notification System (ERNS)

N

750 0 750 1,500

Graphic Scale in Feet

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Figure 8-6

POTENTIAL HAZARDOUS MATERIAL LOCATIONS

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