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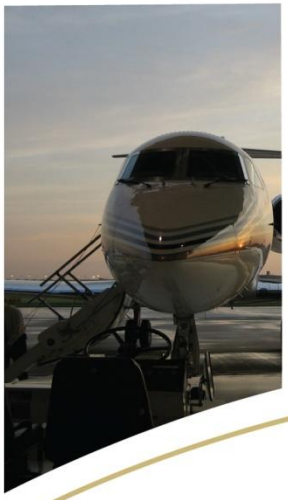

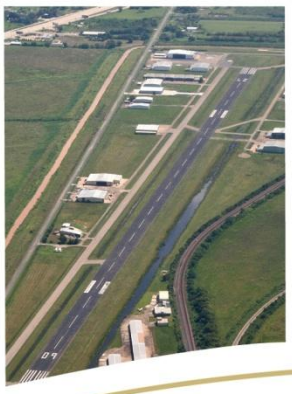

The 2040 Regional Aviation System Plan

The Houston-Galveston Area Council

Houston-Galveston Area Council

Adopted by the H-GAC Board of Directors
March 15, 2011

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Regional Aviation System Plan
2010 Update

Houston-Galveston Area Council

Quadrant Consultants Inc.

in association with

URS Corporation

Vesta Rea & Associates, L.L.C.

TransSolutions, L.L.C.

Adopted by the H-GAC Board of Directors, March 15, 2011

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Summary

The Regional Aviation System Plan (RASP) is a process that evaluates how airports in the Houston-Galveston region are serving aviation needs and recommends measures to improve airports to meet future demand. The mission of the RASP is to establish a balanced system of general aviation, reliever and commercial airports for all aviation users in the 13-county Houston-Galveston region. The RASP seeks to ensure that the airports in the region are preserved, have the facilities and capacity to operate safely and efficiently in their respective roles in the aviation system and provide maximum economic benefits to their local communities and to the region.

The RASP planning process comprises the following steps:

- Establish planning objectives for the regional aviation system
- Inventory the facilities of 26 system airports in the Houston-Galveston region
- Consult with community and economic leaders of the communities where airports are located
- Identify major issues affecting regional aviation and development of goals to guide selection of improvement measures and priorities
- Forecast future aviation demand throughout the system to 2030
- Assess the capacity of each airport for aviation activity to 2030
- Explore scenarios of unexpected events that could affect the system
- Develop an optimal plan that establishes airport roles and improves safety, efficiency and convenience for users of the regional aviation system
- Develop a list of projects that, if done, would result in the optimal plan
- Set priorities for projects to form a logical sequence of plan development, and
- Recommend these projects for the Texas Airport System Plan (TASP) and the National Plan of Integrated Airport Systems (NPIAS)

The airport inventory covers 26 system airports serving general aviation in the Houston-Galveston region. These airports are all open to public use and typically have a paved runway, are owned by one person, entity or partnership, and have basic facilities for airport fueling, repair and storage. Eight of these are owned by private individuals or companies, while 18 are owned by public entities such as cities or counties. The airports have 3,032 based aircraft, of which 72 percent are single-engine propeller aircraft, 13 percent are multi-engine propeller

aircraft, 8 percent are jet aircraft, 4 percent are helicopters, 2 percent are military aircraft and less than 1 percent are other types of aircraft.

Most of the study airports in the Houston-Galveston region are performing well and are benefitting their communities and the region:

- All 26 system airports have at least one paved active runway, with lengths ranging from 3,005 feet to 12,001 feet, and 21 airports have paved taxiways paralleling the full length of at least one runway
- 23 airports have an instrument approach to at least one runway
- 7 airports have published ILS approaches to allow landings in low visibility
- 12 airports have published LPV GPS approaches
- 23 airports have terminal buildings with services for pilots and passengers
- 7 airports have airport traffic control towers
- 23 airports have full-time managers at the airport
- All 26 airports offer aviation fuel for sale
- 20 airports have at least some aircraft repair services available, and
- 14 airports are noted by the Federal Aviation Administration (FAA) for emergency response

In addition, the Houston-Galveston region has relatively complete coverage by its system airports. A system airport is within a 30-minute drive of just about anywhere in the region.

Many communities have supported their airports and have been able to provide transportation, commerce, recreation and emergency readiness. The RASP study includes 24 focus group meetings with city managers, economic development leaders and interested citizens in all communities with system airports in the Houston-Galveston region. More than 200 stakeholders and citizens participated in these meetings. This study finds that a large majority of community leaders perceive their airports to be economic engines that can attract companies and support local businesses with national and international connections.

However, some of the airports in the Houston-Galveston region face serious issues that could affect their future continued operation and potential expansion. The following is a summary of these issues:

- Many airports are near capacity for based aircraft, and demand for hangar space is strong.
- The condition of pavement on runways and taxiways is less than good at nine airports, and five lack full or partial parallel taxiways for their main runways.
- Some airports lack one or more aviation services or navigational aids that, if provided, would improve these airports' functionality.
- Most airports have height hazard obstructions, and many have incompatible adjacent land use, complicating their use and potential expansion.
- Some airports would have better local support and funding if they were perceived more positively by their communities, or if there was more community awareness of their airports.
- Some airports require more funding by their owners to maintain facilities and operations.

These issues result in setting specific goals to guide recommendations towards an optimal system configuration and appropriate actions to realize it. The goals are:

- ***Preserve existing airports*** through public ownership or public/private partnership for all airports in the NPIAS, and regional partnerships for small publicly-owned airports where appropriate.

- ***Improve safety and security*** by bringing airports to the FAA's standards, establishing an emergency airport system, and ensuring security perimeter fencing for all airports.
- ***Improve efficiency*** by building on each airport's strengths for better system integration, adding hangars at airports with pent-up demand and sufficient aviation services, and providing essential services, additional facilities or increasing capacity to eliminate bottlenecks.
- ***Benefit communities*** by establishing protective land use restrictions around airports, adding signs, gateway entrances and landscaping and encouraging community events at airports.

Aviation demand to 2030 is forecast in this study, through a combination of several forecasting methods that use different approaches to estimating future demand:

- ***Multiple regression analysis***, which considers the basic socioeconomic correlates of aviation activity in the local area to forecast demand; and
- ***Market share analysis***, which compares the relative attractiveness of airports in the area to forecast each airport's future share of all regional aviation activity.

These forecasts are compared with published forecasts by the FAA and TxDOT, and a recommended forecast is developed for each airport.

The 26 system airports are expected to grow from 1.94 million operations and 3,032 based general aviation aircraft to over 2.44 million operations and over 3,800 based aircraft in 2030. This growth is at a slightly higher rate than general aviation in the nation and the state. Jets based at regional system airports will increase from 8 percent to 14 percent of the fleet, as the proportion of single-engine propeller aircraft in the fleet drops from 72 percent to 69 percent.

An analysis of the capacity for aviation operations at the system airports indicates that there is more capacity in the regional system than forecast operations. System capacity is currently about 4.47 million operations, more than twice the current demand. Although system capacity is predicted to decline slightly to 4.32 million operations by 2030 as larger aircraft (which require larger spacing for takeoffs and landings) increases relative to smaller aircraft in the region, this still exceeds the forecast demand by 56 percent.

Even though the system has excess capacity for aviation operations, much of that capacity is in small airports far from the urbanized area. The scenario analysis in this study asks what would happen to the regional system if a reliever airport or a busy non-reliever general aviation airport were to shut down. The simulations allocate aircraft operations from the closed airport to nearby airports, but only if the receiving airport is able to handle the operations and has sufficient capacity; otherwise, the operations are at risk of leaving the region. Alternatively, if a new reliever-class airport were to open near the urbanized area, the analysis simulates the allocation of aircraft operations to the new airport from nearby airports.

The results of the scenario analysis are as follows:

- The closure of a reliever airport could have a major impact on the system, in lost aviation activity and economic impact.
- The closure of a non-reliever general aviation airport would not cause a significant impact to the system.
- A new reliever-class airport would not cause negative impacts to nearby airports, and could allow some airports to avoid reaching or approaching their airfield capacity by 2030.

An optimal plan is developed, based on the current issues at the airports, predicted airside and landside capacity shortfalls over the next 20 years and potential capacity issues caused by an unexpected airport closing. The optimal plan consists of the current system airports along with a list of proposed projects to increase capacity, eliminate inefficiencies and facility issues, and expand capabilities as appropriate to their roles.

The optimal plan's list of projects includes the Texas Capital Improvements Program (CIP) project list, which is the short-term TASP list, along with projects proposed for direct funding by FAA for Houston Airport System airports and projects recommended by this study. The optimal plan projects are arranged as short term (2010-2015), mid-term (2016-2020) and long term (2021-2030), according to the need and urgency of the project. The total cost of the optimal plan is $2.28 billion over the next 20 years, of which $275 million is for projects planned in the TASP, $1.91 billion is for FAA-funded projects planned by the Houston Airport System, and $87 million is additional projects recommended by this study. Several funding options for these recommended projects are offered in this report.

The optimal plan does not recommend a new airport in the Houston-Galveston regional aviation system. The 26 system airports provide adequate coverage and service to the region. However, this study notes that a new airport, especially one near the Houston metropolitan area, could benefit the system by adding reserve capacity in case an airport should close.

This study recommends several changes in FAA and TxDOT policy towards aviation that would benefit the region. These recommendations include reserving aviation-related state sales taxes for aviation purposes and allowing regionally significant, privately-owned public-use airports to receive FAA and TxDOT grant funds for airport preservation, safety and capacity projects, even if they are not in the NPIAS or TASP, as long as obligations are set to ensure that the airport remains open for long-term public use.

Five airports in the Houston-Galveston regional aviation system are not in the NPIAS and three are not in the TASP. This study does not recommend changes to the NPIAS at this time. However, it recognizes that growth in based aircraft and operations at several airports in the system may warrant reconsideration in the next few years. This study also recommends that Baytown Airport and North Houston Business Airport, which qualify for listing in the TASP, be added to the TASP.

This Regional Aviation System Plan has been conducted with extensive public involvement and input, including nine public meetings at all stages of the planning study, interviews with airport managers and owners, focus groups with community leaders, a Web page on the H-GAC Web site, and newsletters e-mailed to interested citizens, media and elected officials. A Steering Committee consisting of airport managers, aviation agency representatives and aviation-related citizens' groups, met regularly to provide direction and expertise to the planning team.

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Regional Aviation System Plan
2010 Update

1 Introduction

The Regional Aviation System Plan (RASP) is an evaluation of how airport facilities in the Houston-Galveston region are serving aviation needs in the region and a series of recommendations for measures to improve airport facilities to meet the region's future aviation needs.

In this plan, the focus is on optimizing aviation services over the entire Houston-Galveston region rather than improving any specific airport. While the plan will recommend specific facilities at specific airports, the planning process takes a system approach to examine the various roles served by airports in the region. This includes how airplane owners, users and the public benefit from aviation facilities in the region and what aviation facilities may be needed to better meet the needs of the aviation community and the public. A system approach is needed because physical or operational changes at just one airport would affect operations at other airports in the region. For example, closure of a runway at a general aviation airport would decrease the capacity of that airport for airplane operations. The increased congestion caused by the runway closure could result in some aircraft owners moving their aircraft to less busy airports. These airports may need to build additional hangar or apron space, or increase their fuel tank capacities, and so on. Similarly, airport policy changes on the federal, state or local level could reduce or increase aviation capacity at some or all airports in the region.

1.1.1 Mission

The mission of the RASP is to establish a balanced system of general aviation, reliever and commercial airports for all aviation users in the 13-county Houston-Galveston region. The plan should provide for:

- Air access to each of the region's counties
- Preservation of the region's airports
- A safe environment with safe airports
- Capacity to meet current and future aviation demand
- Opportunities for airside and landside development
- Protection from incompatible land uses
- Protection of the environment and sustainable development

- Economic benefits for local communities, and
- Competitiveness with other Texas regional aviation systems

The assessments in the RASP are all performed in the context of the mission. This includes evaluation and analysis of all system elements and project recommendations.

1.1.2 Objectives

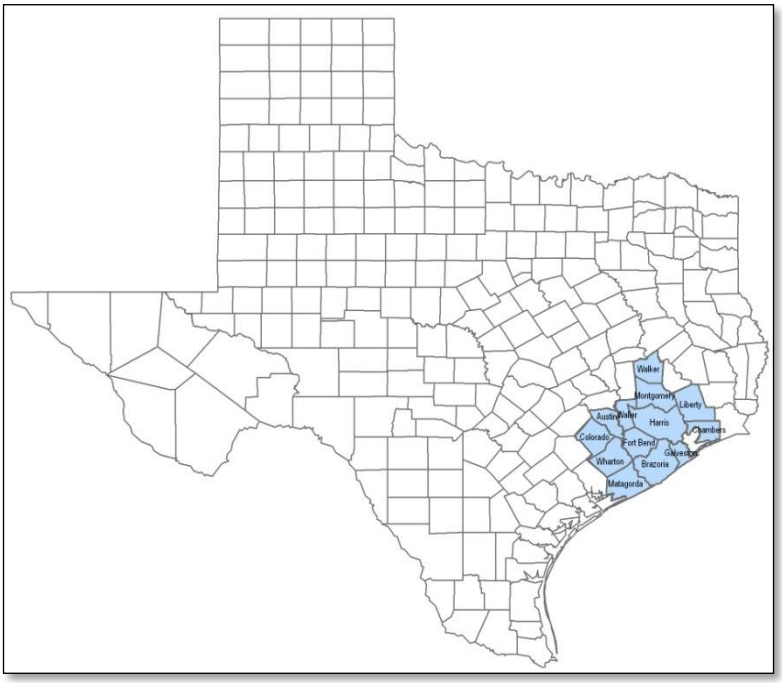
The RASP has the following objectives:

- Determine the opportunities and constraints for aviation users at the system airports in the 13-county Houston-Galveston region.
- Assess the current capacity and demand for aviation facilities in the region's aviation system, forecast the likely future demand, and determine actions that would be needed in the system to meet this demand.
- Establish, with public input, needs, goals and performance measures for future general aviation development in the region.
- Assess alternative means to accomplish these goals and to find the most efficient, cost-effective combination of new facilities, reconstruction of existing facilities and new technology at airports in the region for future general aviation.
- Set priorities, with public input, for new facilities and reconstruction at general aviation and reliever airports in the region and convey these priorities to the Texas Department of Transportation, Aviation Division (TxDOT) and the Federal Aviation Administration (FAA) as funding recommendations.

1.2 Regional Aviation Study Area

The study area for the RASP is the thirteen member counties of the Houston-Galveston Area Council (H-GAC), the regional planning agency of southeast Texas. The study area centers on Harris County, which is the most populous county in Texas. The other counties are Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Liberty, Matagorda, Montgomery, Waller, Walker and Wharton. Figure 1 is a map of Texas counties, showing the thirteen counties in the Houston-Galveston region.

Figure 1: 13-County Houston-Galveston Region



There are 46 airports in the Houston-Galveston region that are open to public use. These airports may be privately or publicly owned. Of these public-use airports, 26 are selected as system airports, as described below in Chapter 7. These system airports have a paved and/or well-compacted turf runway, are owned by a county, city, person, entity or partnership, and have basic facilities for airport fueling, repair and storage. The planning horizon for

this study is 2030 (20 years from the date this report is issued).

1.3 Aviation in the Houston Region

Airports can be classified by purpose into three overlapping types: Air Carrier, General Aviation and Military. All three types are present in the Houston-Galveston region. This RASP is mostly concerned with general aviation airports; however, since air carrier and military airports also have general aviation activity, the plan considers all three types of airports.

1.3.1 Air Carrier Airports

Air carrier airports are public-use airports at which air carrier companies operate scheduled service. Air carriers are companies that own fleets of aircraft and offer scheduled service to specific locations for public or cargo transportation. At present, the only air carrier airports in the Houston-Galveston region are George Bush Intercontinental Airport in north Houston, and William P. Hobby Airport in southeast Houston. The Houston Airport System, a department of the City of Houston, owns and operates both airports.

George Bush Intercontinental Airport is the eighth busiest airport in the United States, with nearly 40 million passengers in 2009 and scheduled non-stop domestic and international service to over 170 destinations. In terms of operations, George Bush Intercontinental Airport is the sixth busiest, with over 538,000 operations in 2009. The airport is the 16th busiest cargo airport in the United States, with more than 336,000 metric tons of cargo moved in 2009. William P. Hobby Airport is the 43rd busiest airport, with nearly 8.5 million passengers in 2009.

1.3.2 Military Airports

There is no military airbase in the Houston-Galveston region. Ellington Airport was a former air force base that closed in 1984 and is now a joint-use airport with the Houston Airport System. Although the ownership of much of the base reverted to the City of Houston, the Texas Air National Guard, Texas Army National Guard, U.S. Coast Guard and NASA maintain a major military presence at the airport. The Army Reserve operates a helicopter battalion based at Lone Star Executive Airport. In addition, military aircraft occasionally use other airports such as D.W. Hooks Memorial Airport, Palacios Municipal Airport and Galveston Scholes International Airport for transient operations and emergency response.

1.3.3 General Aviation Airports

General aviation airports do not have air carrier operations. These airports are devoted to business and personal aviation use. General aviation aircraft range from small single-engine fixed-wing airplanes to large business jets, and may also include ultralight, experimental and antique airplanes, and helicopters. Many airports in the Houston-Galveston region cater especially to business aviation, while others are more oriented to aviation enthusiasts and individuals that fly aircraft for personal use.

2 Aviation in the Houston Region

The FAA ensures that aviation in the United States is as safe and efficient as possible. To this end, the agency allocates airspace to all airports in the nation. Older airports that already have airspace but do not meet current design standards are allowed to keep their airspace if they can still be operated safely. New airports are only allocated airspace if they meet current federal guidelines for airport design. The design guidelines vary by how the airport is classified, which is based on its intended use. In addition, the Texas Department of Transportation, Aviation Division (TxDOT) administers federal grants to airports and develops its own aviation plan and classification system.

2.1 The National Plan of Integrated Airport Systems

The FAA has developed its National Plan of Integrated Airport Systems[1] (NPIAS) to plan for airports and heliports of national importance. The NPIAS classifies airports by their service levels and the roles they play in the national airport system. The service level of an airport reflects the type of public service the airport provides to the community and to the nation. The service level categories are:

- ***Primary Service.*** Public-use airports with scheduled air carrier service for at least 10,000 passengers per year.
- ***Commercial Service.*** Public-use airports with scheduled air carrier service for 2,500 to 10,000 passengers per year.
- ***General Aviation.*** Airports with no scheduled air carrier service or airports with scheduled air carrier service for less than 2,500 passengers per year.
- ***Reliever.*** General Aviation airports that relieve congestion at designated Primary Service airports by redirecting general aviation operations from the Primary Service airports.

Airports in the NPIAS are eligible to receive federal grants for airport planning and construction. All Primary Service, Commercial Service and Reliever airports are in the NPIAS. General Aviation airports and heliports are eligible to be added to the NPIAS if the following requirements are met:

- The airport is owned by an eligible public sponsor;
- The airport has at least 10 based aircraft;
- The airport is not within 20 miles of an airport in the NPIAS; and
- The airport is part of a state or metropolitan airport system plan, or is located on an adequate site to provide safe and efficient airport facilities.

Privately-owned reliever airports subject to grant obligations from the FAA are eligible to remain in the NPIAS if they meet the current reliever criteria. These airports are entitled to retain their reliever status until the grant obligations are met. However, if there is no grant obligation and an airport does not meet the reliever criteria, the airport can be re-designated as a general aviation airport or deleted from the NPIAS.

2.2 General Aviation Regional Airport System Plan

The Southwest Region of the FAA has instituted a regional system[2] of classifying airports other than Primary Service airports, to supplement the national classification system. The regional system classifies airports by based aircraft, as follows:

- ***Level I.*** General Aviation airports with at least 100 based aircraft or at least five based jet aircraft, and Commercial Service and Reliever airports with at least 50 based aircraft or at least five based jet aircraft.
- ***Level II.*** General Aviation airports with at least 50 based aircraft or at least one based jet aircraft, and Commercial Service and Reliever airports with at least 10 based aircraft or at least one based jet aircraft.
- ***Level III.*** General Aviation airports with at least 10 based aircraft.
- ***Level IV.*** General Aviation airports with less than 10 based aircraft.

2.3 Texas Airport System Plan

TxDOT developed the Texas Airport System Plan (TASP) in 1970 to classify airports and heliports of statewide importance. The most recent update to the TASP was done in 2010[3] and is based on policies and standards issued in 2007. The TASP sets four basic roles for airports (Table 1) and classifies airports on their design characteristics and the types of aircraft capable of operating there. The NPIAS and the FAA Southwest Region's General Aviation Regional Airport System Plan have elements in common with the TASP.

Table 1: Texas Airport System Plan Classification System

Airport Role	Description
Commercial Service	Supports scheduled passenger service by transport aircraft. Primary commercial service airports have more than 10,000 passengers per year; Non-primary commercial service airports have between 2,500 and 10,000 passengers per year.
Reliever	Relieves congestion at a Commercial Service airport by providing an alternative for general aviation; has at least 100 based aircraft or 25,000 annual itinerant operations.
Business/Corporate	Supports use of large twin-engine and jet aircraft, generally for business. Must be beyond 25 miles from a commercial service or business/corporate airport and either serve a concentration of users, have 500 jet operations per year or two based jet aircraft.
Community Service	Supports use of single-engine, light twin-engine and small jet aircraft, for business and personal use. Must be near a congested commercial service, reliever or business/corporate airport or serve a community at least 25 miles away from that airport, and must have at least 20 based aircraft or 6,000 operations per year.
Basic Service	Supports single-engine and twin-engine aircraft (but not turbine aircraft) less than 12,500 pounds generally for personal use, and has an established public investment.

The TASP specifies minimum design standards (Table 2) for each airport class based on FAA standards, including airfield size, instrument approach type, runway dimensions and strength, approach area and taxiway configuration.

Table 2: Texas Airport System Plan Minimum Design Standards for Airports

Category	Commercial Service	Reliever	Business Corporate	Community Service B-II	Community Service B-I	Basic Service
Design Aircraft	Medium to heavy transport	Business jet	Business jet; aircraft <60,000 lbs	Light twin; turbo-prop <30,000 lbs	Single-engine, light twin piston <12,500 lbs	Light twin and single piston
Runway Length	As required by critical aircraft	To handle 100% of small aircraft fleet	To handle 75% of large airplanes <60,000 lbs	To handle 100% of small aircraft fleet	To handle 95% of small aircraft fleet	To handle 95% of small aircraft fleet
Runway Width	100 feet	75 feet	75 feet	75 feet	60 feet	60 feet
Runway Strength	As required	30,000 lbs	30,000 lbs	30,000 lbs	12,500 lbs	12,500 lbs
Runway Lighting	High intensity	Medium intensity	Medium intensity	Medium intensity	Medium intensity	Medium intensity
Taxiway Type	Full parallel	Full parallel	Full parallel	Partial parallel	Stub to runway ends and tie-downs	Stub to runway ends and tie-downs
Approach Type	Precision	Precision	Precision	Non-precision	Non-precision	Visual
Approach Minima	½ mile	¾ mile	¾ mile	1 mile	1 mile	n/a
Services	Full	Terminal, AWOS, fuel	Terminal, AWOS, fuel	Terminal, AWOS, fuel	Terminal, AWOS, fuel	n/a

2.4 Federal Airport Design Standards

Airports included in the NPIAS are expected to adhere to current federal airport design standards.[4] Furthermore, any grant by the FAA to an airport in the NPIAS for new or improved airside facilities must adhere to current standards.

FAA guidance on airport dimensional standards is based on the Airport Reference Code (ARC). This code relates airport design criteria to the operational and physical characteristics of the aircraft operating at the airport. The ARC incorporates the design aircraft features in two components: a letter representing the design aircraft's approach speed, and a Roman numeral representing the design aircraft's wingspan. The following list shows the categories for approach speed:

- **A**: Approach speed less than 91 knots
- **B**: Approach speed 91 knots or more, but less than 121 knots
- **C**: Approach speed 121 knots or more, but less than 141 knots
- **D**: Approach speed 141 knots or more, but less than 166 knots
- **E:** Approach speed 166 knots or more

Aircraft wingspan categories are as follows:

- **I:** Wingspan less than 49 feet
- **II:** Wingspan 49 feet or more but less than 79 feet
- **III:** Wingspan 79 feet or more but less than 118 feet
- **IV:** Wingspan 118 feet or more but less than 171 feet
- **V:** Wingspan 171 feet or more but less than 214 feet
- **VI:** Wingspan 214 feet or more but less than 262 feet

The design aircraft sets the airport's design criteria. As approach speed increases, runway length must be longer, and taxiways must likewise be longer. As wingspan increases, taxiways must have greater separation. Similarly, the loaded weight of the design aircraft determines the criterion for runway strength.

2.5 Airspace Obstruction Regulations

2.5.1 Approach Slope Airspace

A safe airport controls not just the spacing of runways and taxiways to avoid aircraft collisions, but also the surrounding land use to keep it clear of obstructions aircraft could strike during approach and takeoff. The FAA defines the planes ("surfaces") in the 3-dimensional airspace around airports, through which any protruding object would obstruct an airplane on approach or takeoff (Figure 2). For safety's sake, the FAA requires airports in the NPIAS to control land use around airports to prevent obstructions.[5]

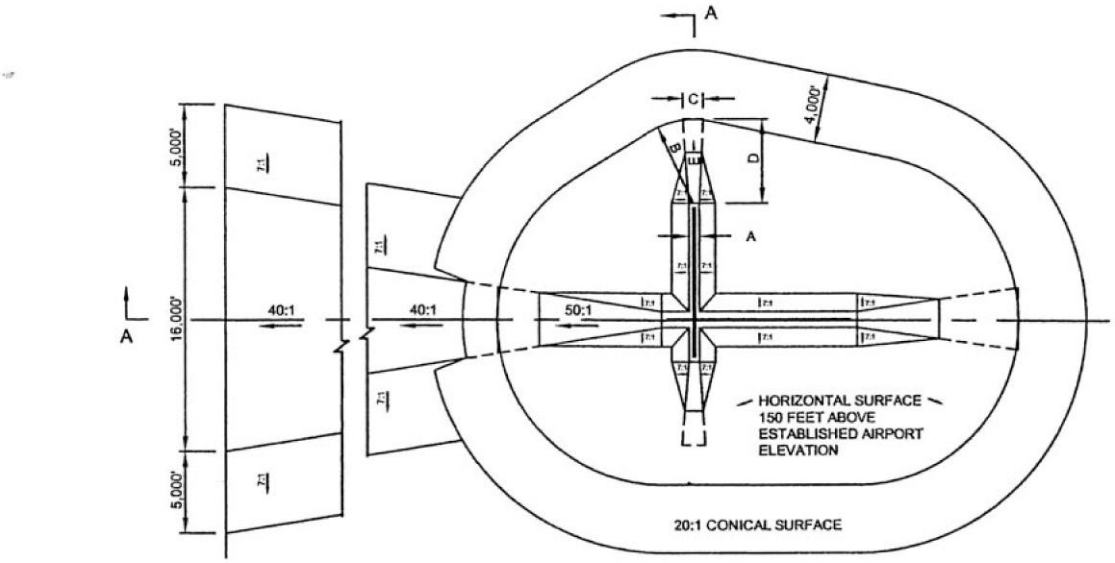
The types of surfaces are as follows:

- ***Primary surface***. A surface aligned with and centered on the runway, extending 200 feet beyond the threshold in each direction.
- ***Approach surface***. An inclined slope extending outward and upward from the ends of the primary surfaces. The innermost part of the approach surface overlaps with the runway protection zone.
- ***Horizontal surface***. A horizontal plane centered on and 150 feet above the airport. The limits of the horizontal surface are the approach surfaces on the inside and a set distance from the runways, depending on the type of airport, on the outside.
- ***Transitional surface***. An inclined slope between the primary or approach surfaces and any other surface.
- ***Conical surface***. An inclined slope extending upward and outward from the outside edge of the horizontal surface.

2.5.2 Airport Instrument Approach Procedures

The FAA publishes instrument approaches for runways at airports, defining the type of instrument approach and the dimensions of the approach surface (especially the length from the primary surface) for each published approach. The instrument landing approach plane for Lone Star Executive Airport's Runway 14 is shown in Figure 3 as an example. Instrument approaches can use either ground-based signals (ILS, VOR) or satellite-based signals (RNAV, GPS, LPV), with the newer satellite-based systems gaining increasing favor as they can be used without expensive and delicate installations at airports.

Figure 2: 14 CFR 77 Imaginary Surfaces Around a Typical Airport



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WITH AT INNER END	250	500	500	500	1,000	1,000
A	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
A	APPROACH SURFACE WIDTH AT END	1,000	1,000	2,000	3,500	4,000	16,000
A	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
A	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A- UTILITY RUNWAYS
B- RUNWAYS LARGER THAN UTILITY
C- VISIBIITY MINIMUMS GREATER THEN 3/4 MILE
D- VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
*- PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET

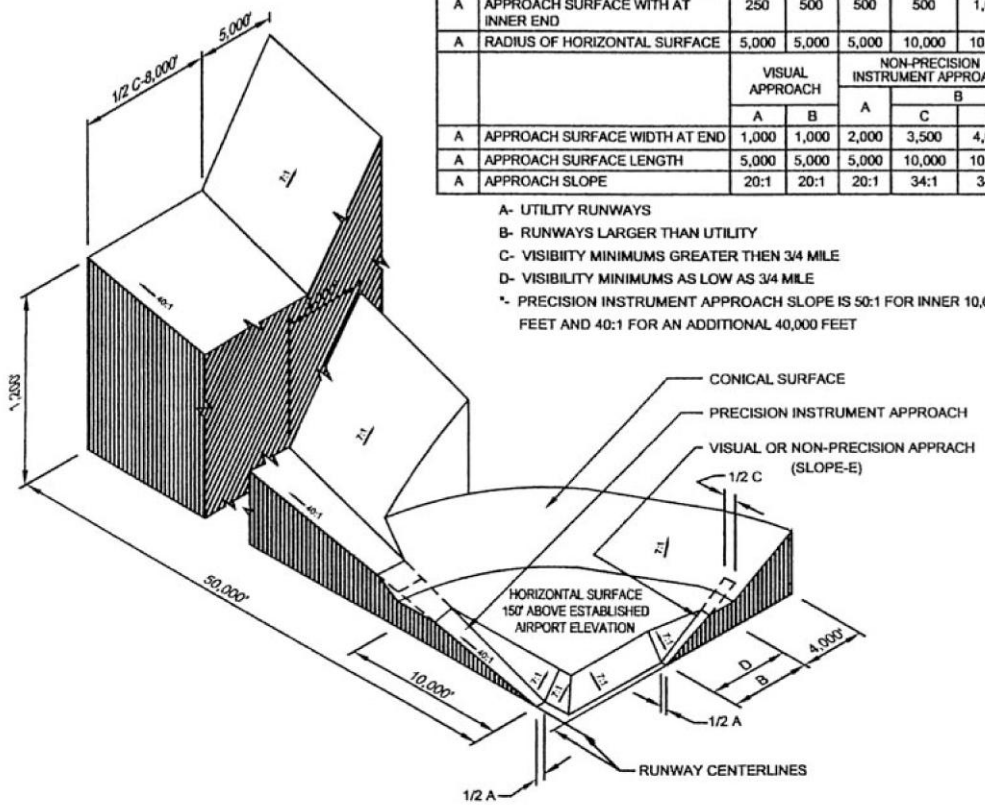
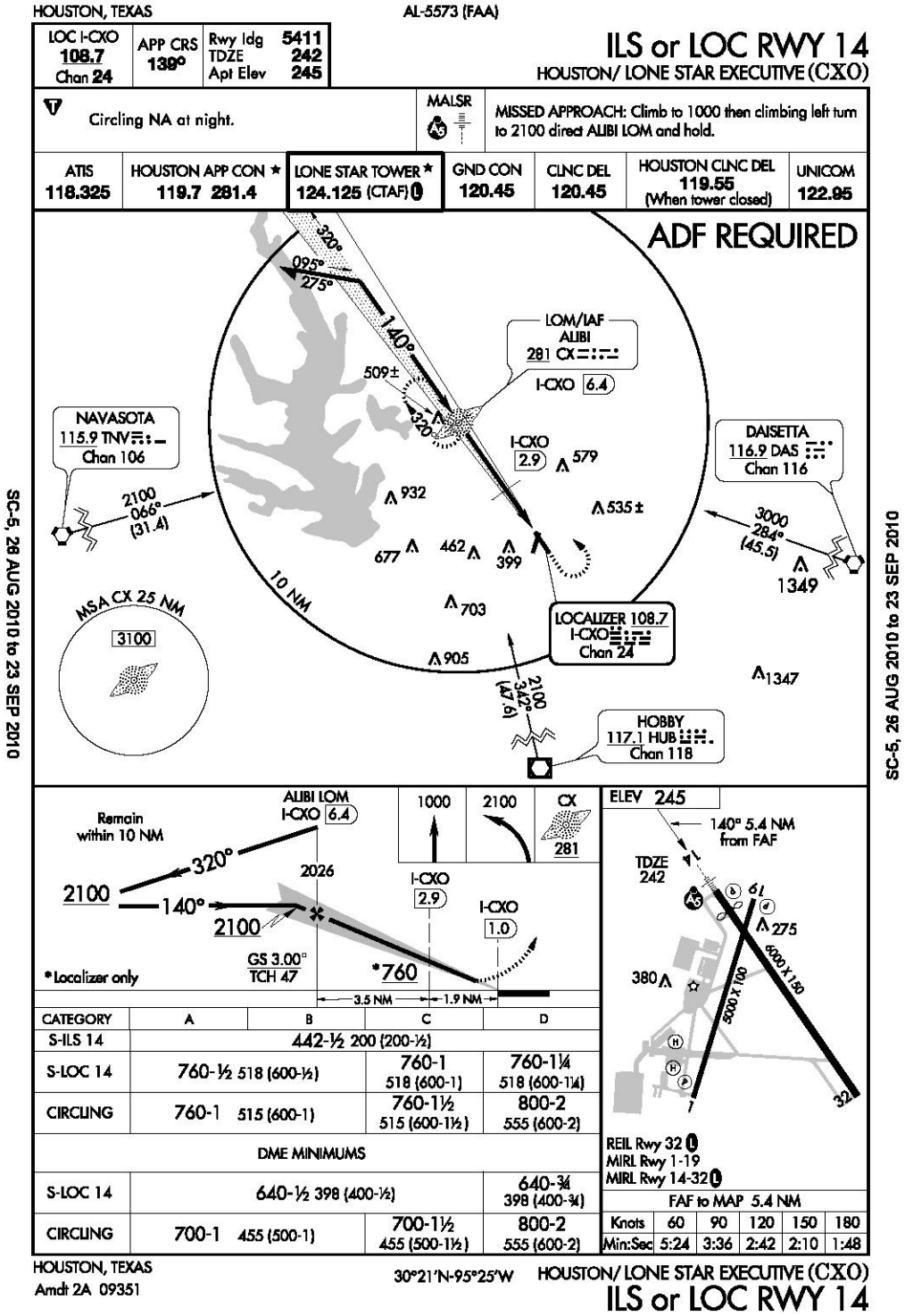


Figure 3: ILS Approach Plane for Lone Star Executive Airport Runway 14



2.5.3 Controlled Airspace

The FAA and the Department of Defense control parts of the airspace over the United States according to a system of airspace classes. Controlled airspace is classified as follows:

- ***Class A airspace*** covers the United States and includes all airspace from 18,000 feet to 60,000 feet, where larger jet aircraft typically fly. Aircraft flying in Class A airspace must operate under instrument flight rules.

- ***Class B airspace*** is a circular airspace over and 30 nautical miles around the nation's busiest airports, within which all aircraft must receive clearance and follow instructions from the airport traffic control tower. Class B airspace grows in diameter with increasing steps in elevation, to include approaching aircraft. George Bush Intercontinental, William P. Hobby and Ellington Airports are circled with overlying Class B airspace.
- ***Class C airspace*** is a circular airspace over some of the larger, more congested airports that accommodate instrument landings and have airport traffic control towers. All aircraft within Class C airspace must communicate with and follow instructions from Air Traffic Control. There is no Class C airspace over the Houston-Galveston region.
- ***Class D airspace*** is a circular airspace over smaller, less congested airports that have airport traffic control towers and accommodate instrument landings. All aircraft within Class D airspace must communicate with and follow instructions from the tower when it is operating. An example of Class D airspace is at D.W. Hooks Memorial Airport, which operates within a volume of Class D airspace carved out of the Class B airspace around George Bush Intercontinental Airport.
- ***Class E airspace*** is the space outside of other controlled airspace below 18,000 feet elevation and generally above 700 feet above the ground, within which aircraft may fly under visual flight rules without communicating with ground controllers, or under instrument flight rules while communicating with ground controllers. VOR or Victor airways, a system of air traffic routes radiating from very high-frequency omni-directional radar, are also Class E airspace. There are 13 Victor airways crossing the 13-county Houston-Galveston region. The FAA can also designate Class E airways and approaches within Class B, C or D airspace to accommodate small airports close to larger airports.
- ***Class G airspace*** is the remaining uncontrolled airspace that is generally close to the ground, where aircraft may fly under visual flight rules with no restriction.
- Special use and other controlled airspace types also exist, for example, around military and aerospace installations.

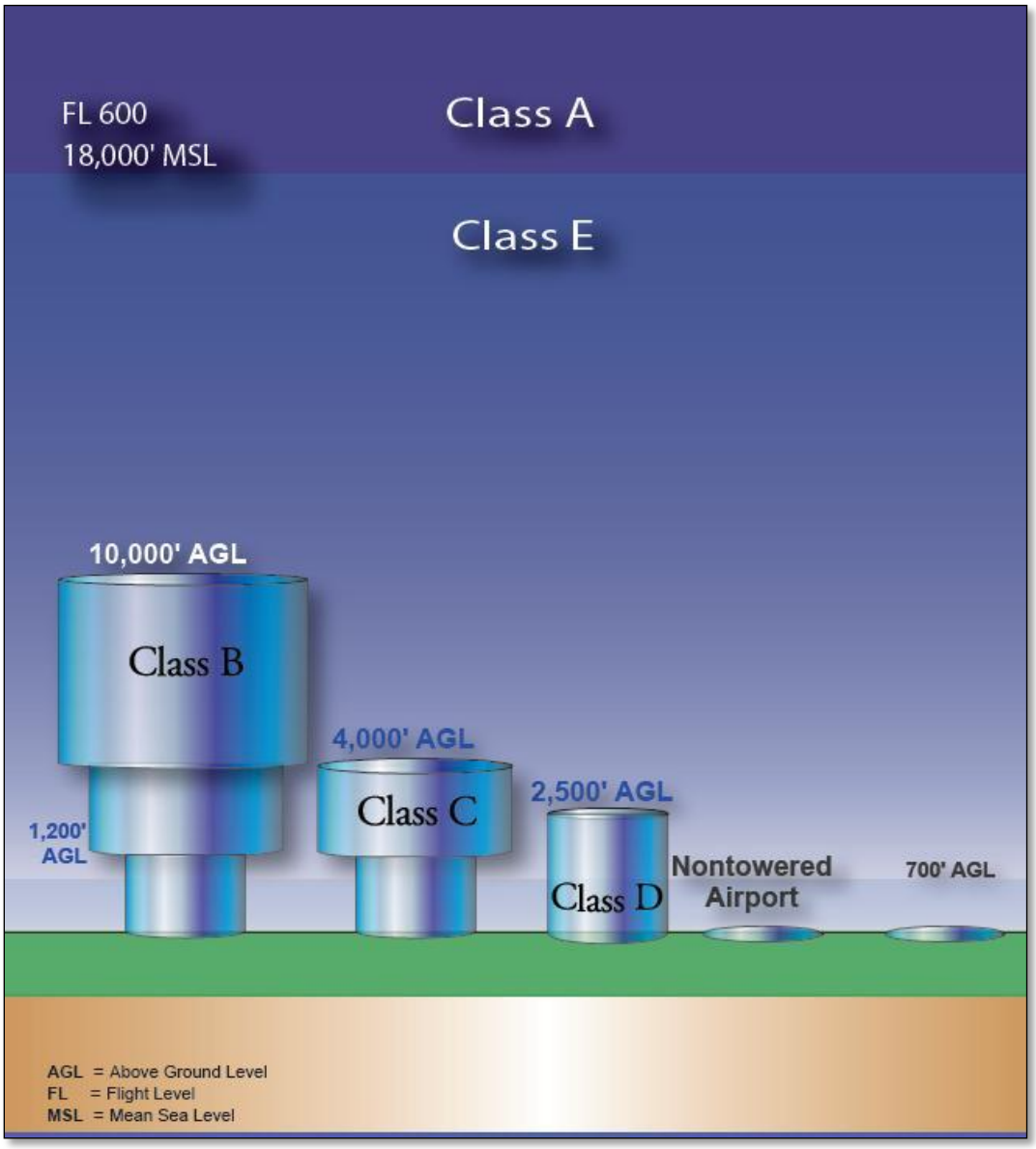
Figure 4 is a diagram of airspace classes and their relative sizes and locations.

2.6 Next Generation Air Transportation System (NextGen)

Air traffic control is carried out by operators using radar images and hard-wired analog signals, using systems developed 40 years ago. The FAA has begun to convert the aging air traffic control system to a new satellite-based digital system called NextGen. In the NextGen system, most communications will be digital data shared among system users through network-enabled information access. The NextGen programs for communications, navigation and air traffic management are:

- ***Automatic Dependent Surveillance-Broadcast*** uses Global Positioning Systems (GPS) to broadcast the position and intent of the aircraft automatically to air traffic managers and pilots. This system will allow more efficient separation of airplanes, and pilots will have access to information on weather, traffic and flight restrictions. In December 2009, air traffic controllers at the Houston Center began using Automatic Dependent Surveillance-Broadcast to separate and manage air traffic flying over the Gulf of Mexico efficiently and safely. Before then, this area did not have radar coverage.
- ***System-Wide Information Management*** is an information technology program that identifies industry standards and commercially available products to ensure interoperability between National Airspace System operations. The program's first phase will focus on

Figure 4: Airspace Classes



applications for managing air traffic flow and aeronautical information and for disseminating weather data.

- ***NextGen Data Communications*** will give controllers and flight crews a way to exchange operationally critical information such as air traffic clearances and instructions, and routine information such as advisories and flight crew requests and reports.
- ***NextGen Network Enabled Weather*** will be the infrastructure core of the aviation weather service in NextGen. It will provide access to a common weather picture across the national airspace system.
- ***National Airspace System Voice Switch*** is a program that will allow the FAA's air traffic control to evolve into a more flexible communications system using network-based infra-structure.

3 PREVIOUS STUDIES

H-GAC has issued RASPs or plan updates since 1973 with the goal of updating the plan every five years. Plan updates have been issued in 1977, 1981, 1986 and 1992.

The 1986 Regional Aviation Plan[6] considered the activity at 26 existing system airports (out of 43 public-use airports) and one proposed system airport in the Houston-Galveston region. Five of these airports had been designated reliever airports for the City of Houston's two air carrier airports by the FAA by 1986. The 1986 plan examined growth of passenger service on air carriers at the City of Houston's main airports. It also examined aviation needs west of Houston and concluded that development of a new West Side Airport and a new airport near Sealy in Austin County was desirable.

By the time the 1992 Regional Airport/Airspace System Plan Update[7] was issued, there were 25 existing system airports and two proposed new system airports, of which eight existing and two proposed airports were recommended as reliever airports for George Bush Intercontinental and Hobby Airports. The two proposed airports were the West Side Airport, which was in the planning stage by the City of Houston, and the East Grand Parkway Airport, which had a proposed location in Baytown that was not in planning in 1992. Planning for the proposed Sealy airport had ended by 1992 and the airport was eliminated from the 1992 plan.

Two other reports by the H-GAC are relevant to this study. One recommends additional reliever airports in the Houston-Galveston region, and the other inventories and assesses land use near the airports in the region.

In 1991, the H-GAC issued the Reliever Airport Study.[8] This study recommended airports in the region to be designated by the FAA as reliever airports for George Bush Intercontinental Airport and Hobby Airport, to re-base and re-route general aviation activity to airports other than these two air carrier airports, so that they can use more of their capacity for air carrier service. This study is an update of a previous study that recommended five airports (Table 3) as relievers; the 1991 study recommended adding five other airports, totaling ten reliever airports, one of which was proposed to be built.

The 1995 Regional Airport Land Use Survey[9] determined and mapped land uses around 30 airports in the Houston-Galveston region. The study checked for noise-sensitive land uses, height hazards and landfills near the airports, and whether land uses near the airport were controlled by municipal zoning ordinances.

Table 3: Recommended Reliever Airports in 1983 and 1991 Plans

1983 Plan	1991 Plan
D.W. Hooks Memorial Airport	D.W. Hooks Memorial Airport
Ellington Field (now Ellington Airport)	Ellington Field (now Ellington Airport)
Houston Hull Airport (now Sugar Land Regional Airport)	Houston Hull Airport (now Sugar Land Regional Airport)
Montgomery County Airport (now Lone Star Executive Airport)	Montgomery County Airport (now Lone Star Executive Airport)
West Houston Airport	West Houston Airport
	Brazoria County Airport (now Texas Gulf Coast Regional Airport)
	Clover Field (now Pearland Regional Airport)
	La Porte Municipal Airport
	Scholes Field (now Scholes International Airport)
	West Side Airport (proposed)

4 Study Design

The RASP is a two-year effort. In the first year, the planning team conducted an inventory of facilities, aircraft activity and operations at all system airports in the Houston-Galveston region. Planners interviewed airport owners and managers and provided a questionnaire regarding airport facilities, activities and issues. Planners also interviewed local leaders and elected officials in the airports' communities about community goals for, and local concerns about, the airports.

The inventory results were published in 2009 as the *Regional Aviation System Plan for the Houston-Galveston Area: Phase 1 Report*. The report describes the results of the airport inventory, identifies issues affecting airport capacity, efficiency, safety and community acceptance, and developed system goals and performance measures.

The second year of the planning effort consists of analysis and synthesis tasks. Planners used the inventory information along with information and forecasts from the FAA and TxDOT to develop forecasts of aviation operations and based aircraft at each system airport over the next 20 years. The capacity of each airport to handle these forecasts was assessed using FAA procedures, and shortfalls were identified. Scenarios of unexpected events that would stress the system, such as an airport closing, were analyzed to determine the impacts these events could have on the aviation system. The results of all these analyses are synthesized into an optimal plan for the Houston-Galveston regional airport system that remedies current problems, provides for expected growth, handles potential contingencies and brings regional aviation toward the goals established in the plan. The elements of the optimal plan become lists of recommended projects at the airports, supplementing TxDOT's Airport Capital Improvements Program and TASP.

The study design and schedule of milestones for the RASP was reviewed and approved by the H-GAC and the RASP Steering Committee.

5 Airport Inventory

Each of the 26 system airports in the Houston-Galveston region was visited and their staff was interviewed to develop an inventory of its facilities and assess its condition. The interviews and site visits were conducted from December 2008 to March 2009. The inventory describes the current state of each airport and is the basis for estimates of current capacity and forecasts of aviation demand. Each of the following items is evaluated at each airport:

- Airport management and ownership
- Runway configuration, length, width, surface and condition
- Taxiway configuration, width, surface and condition
- Ramp configuration, area, surface and condition
- Number, ownership and occupancy of hangars, by type
- Navigational aids for the airport and for each runway, by type
- Number of based aircraft, by type
- Aircraft operations for an average day, by type
- Fuel facilities and availability, by type of fuel
- Terminal facilities and condition of terminal building
- Aviation maintenance and repair services
- Airport development plans, including approved airport layout plan
- Land use in the surrounding area
- Land use controls for height hazard and noise incompatibility

Where information was not obtained in the interview questionnaire or by the airport visit, it was obtained from published reports by the FAA, TxDOT and the H-GAC:

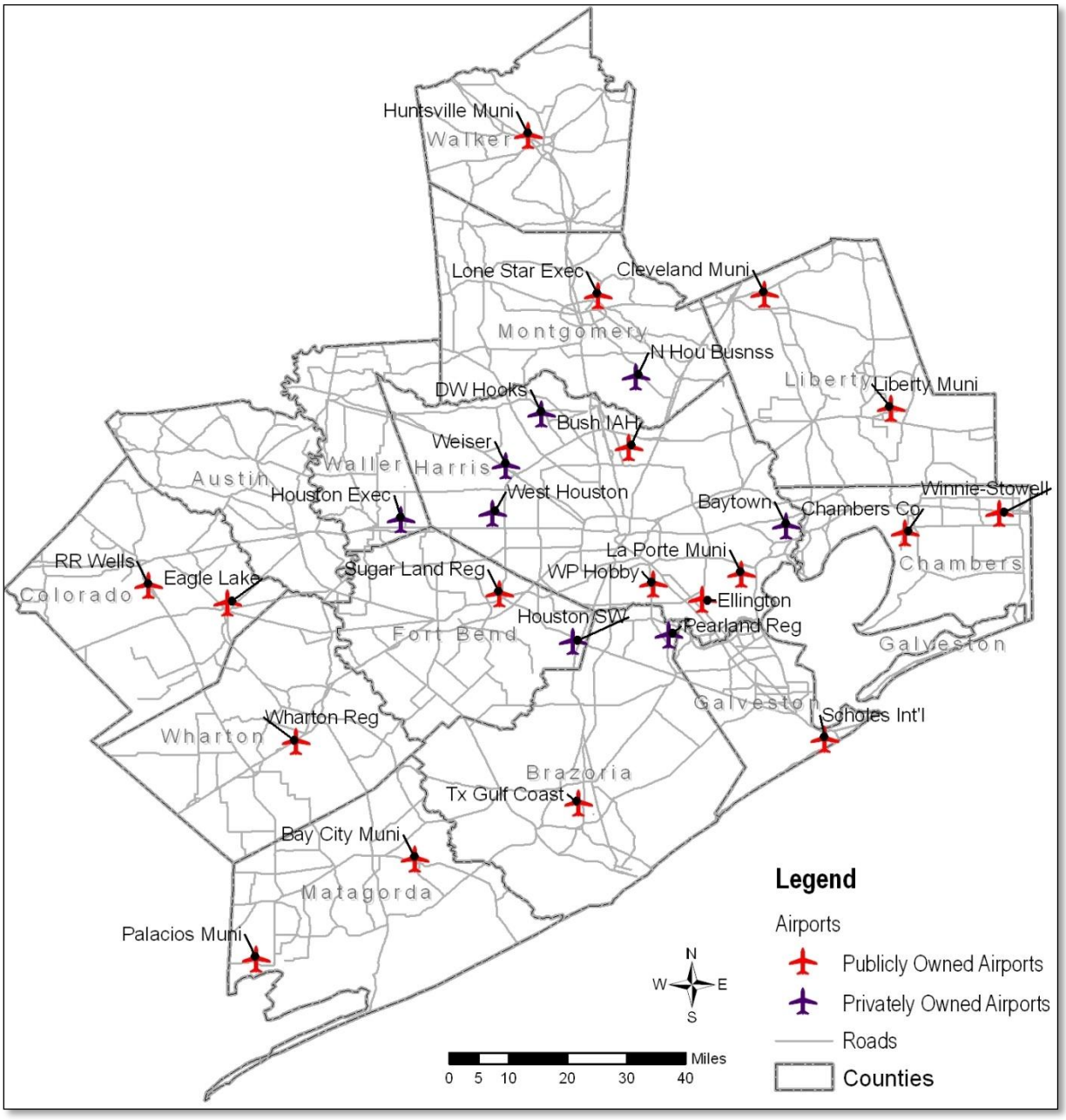
- 2008-2025 Aerospace Forecasts, FAA[10]
- 2020-2030 Long-Range Aerospace Forecasts, FAA[11]
- 2009-2020 Terminal Area Forecast (TAF), FAA[12]
- 2009 Airport Master Record, FAA Form 5010-1[13]
- 2009-2013 General Aviation Regional System Plan, FAA Southwest Region[14]
- 2009-2013 National Plan of Integrated Airport Systems (NPIAS), FAA[15]
- 2010 Texas Airport System Plan (TASP) Update, TxDOT[16]
- 1992 Regional Airport/Airspace System Plan Update, H-GAC[17]

5.1 Airport Ownership and Service Levels

Figure 5 and Table 4 show whether the airport is in public or private ownership. Table 4 also shows the service levels of regional system airports if an airport is listed in the NPIAS or the TASP, their service levels in these plans, the airports' levels in the FAA's Southwest Region General Aviation Plan, and their Airport Reference Codes.

The Houston-Galveston region is unusual because four of the 10 airports designated by the FAA as reliever airports are privately owned. Privately-owned reliever airports that do not meet current reliever criteria, but have received FAA Airport Improvement Program (AIP) funds and are subject to grant obligations (the privately-owned reliever airport must remain open for 10 years after receiving AIP grant funds) will retain their reliever airport designation and remain eligible for AIP funds until grant obligations are met. At that time, these airports, and privately-

Figure 5: Ownership of Public-Use Airports



owned reliever airports that have not received AIP funds and do not meet current reliever criteria, may be re-designated as general aviation airports or deleted from the NPIAS.[18]

The region has 13 airports out of the 21 Texas airports designated by TxDOT in the TASP as transport airports, which are suitable for use by jet aircraft.

5.2 Airside Facilities

Airside facilities are the parts of the airport aircraft use to taxi, take off and land. These facilities include runways, taxiways, airfield lighting, and navigation and landing aids.

Table 4: System Airport Ownership and Roles

Airport	Ownership	Federal Role	State Role	Regional Level	Airport Reference Code
Air Carrier Airports					
George Bush Intercontinental	Public	Primary	Commercial (CMS)	-	D-V
William P. Hobby	Public	Primary	Commercial (CMS)	-	C-IV
Reliever Airports					
Texas Gulf Coast Regional	Public	Reliever	Reliever	I	C-III
D.W. Hooks Memorial	Private	Reliever	Reliever	I	C-II
Ellington	Public	Reliever	Reliever	I	D-IV
Houston Southwest	Private	Reliever	Reliever	I	B-II
La Porte Municipal	Public	Reliever	Reliever	I	B-II
Lone Star Executive	Public	Reliever	Reliever	I	C-III
Pearland Regional	Private	Reliever	Reliever	I	B-II
Scholes International	Public	Reliever	Reliever	I	C-III
Sugar Land Regional	Public	Reliever	Reliever	I	D-II
West Houston	Private	Reliever	Reliever	I	B-II
Other General Aviation Airports					
Bay City Municipal	Public	General Aviation	Business/ Corporate (BC)	III	B-II
Baytown	Private	-	-	-	B-II
Chambers County	Public	General Aviation	Community Service (CS)	III	B-II
Cleveland Municipal	Public	General Aviation	Community Service (CS)	III	B-II
Eagle Lake	Public	General Aviation	Community Service (CS)	III	B-I
Houston Executive	Private	-	Business/Corporate (BC)	-	C-II
Huntsville Municipal	Public	General Aviation	Business/Corporate (BC)	III	C-II
Liberty Municipal	Public	General Aviation	Community Service (CS)	III	B-II
Palacios Municipal	Public	General Aviation	Community Service (CS)	III	C-II
Robert R. Wells, Jr.	Public	-	Community Service (CS)	-	B-II
Weiser Airpark	Private	-	-	-	B-II
Wharton Regional	Public	General Aviation	Business/Corporate (BC)	III	B-II
North Houston Business	Private	-	-	-	B-II
Winnie-Stowell	Public	General Aviation	Basic Service (BS)	IV	B-II

5.2.1 Runways and Taxiways

Runways are named by their magnetic compass bearing, rounded to the closest 10 degrees and divided by 10. For example, a runway with a compass bearing of 174 degrees would be named Runway 17. The same runway in the other direction would have a bearing of 354 degrees and would be named Runway 35. Even though these two runways share the same pavement, they are distinct runways. The names indicate the direction in which aircraft take-off and land; an airplane taking off on Runway 17 would start on the north end and accelerate to the south. Where there are two parallel runways, a letter is added to the name to indicate it is the left or the right runway, as seen from the pilot's vantage point. Thus, Runway 8L is left of Runway 8R. The names, lengths, widths, surface types and lighting intensities of each runway at each airport are shown in Table 5. Taxiway configurations are also provided in Table 5.

The 26 system airports have 46 active runways. Their lengths range from 3,050 feet at Chambers County Airport in Anahuac to 12,001 feet at Houston Intercontinental Airport. Two runways have turf surfaces and one is water (for seaplanes). (Scholes International Airport can also accommodate seaplane operations on adjacent Offatts Bayou.) All but seven runways have runway lighting.

Runways and taxiways are in good condition at many system airports. However, there are several airports with pavement in fair condition. Table 5 presents an evaluation of the pavement condition of the main runways and associated taxiways at the system airports. Some of these

runways also have obstructions due to tall objects in the approach planes; these obstructed runways are presented in Table 10 in Section 5.6.

Table 5: Runways at System Airports

Airport	Runway	Runway Length	Runway Width	Runway Surface	Runway Condition	Runway Lighting	Taxiway	Taxiway Condition
Air Carrier Airports								
George Bush Intercontinental	8L/26R	9,000'	150'	Concrete	Good	High	Full	Good
	8R/26L	9,402'	150'	Concrete	Good	High	Full	Good
	9/27	10,000'	150'	Concrete	Good	High	Full	Good
	15L/33R	12,001'	150'	Concrete	Good	High	Full	Good
	15R/33L	9,999'	150'	Concrete	Good	High	Full	Good
William P. Hobby	4/22	7,602'	150'	Concrete	Good	High	Full	Good
	12L/30R	5,148'	100'	Concrete	Good	Medium	Partial	Good
	12R/30L	7,602'	150'	Concrete	Good	High	Full	Good
	17/35	6,000'	150'	Concrete	Good	Medium	Full	Good
Reliever Airports								
Texas Gulf Coast Regional	17/35	7,000'	100'	Concrete	Good	Medium	Full	Good
D.W. Hooks Memorial	17R/35L	7,000'	100'	Asphalt	Fair	Medium	Partial	Fair
	17L/35R	3,987'	35'	Asphalt	Fair	-	Full	Fair
	17W/35W	2,530'	100'	Water	-	-	-	-
Ellington	4/22	8,001'	150'	Concrete	Good	High	Partial	Good
	17L/35R	4,609'	75'	Concrete	Fair	-	Partial	Fair
	17R/35L	9,001'	150'	Concrete	Good	High	Full	Good
Houston Southwest	9/27	5,000'	100'	Asphalt	Good	Medium	Full	Good
La Porte Municipal	12/30	4,165'	75'	Asphalt	Good	Medium	Full	Good
	5/23	3,000'	75'	Asphalt	Good	Medium	Full	Good
Lone Star Executive	1/19	5,000'	100'	Concrete	Good	Medium	Full	Fair
	14/32	6,000'	150'	Concrete	Good	Medium	Partial	Fair
Pearland Regional	14/32	4,313'	75'	Concrete	Good	Medium	Full	Good
Scholes International	17/35	6,001'	150'	Concrete	Good	Medium	Partial	Good
	13/31	6,000'	150'	Asphalt, Concrete	Good	High	Partial	Good
Sugar Land Regional	17/35	8,000'	100'	Concrete	Good	High	Full	Good
West Houston	15/33	3,953	75'	Asphalt	Good	High	Full	Good
Other General Aviation Airports								
Bay City Municipal	13/31	5,107'	75'	Asphalt	Good	Medium	Full	Good
Baytown	14/32	4,334'	60'	Asphalt	Good	Medium	Partial	Good
Chambers County	12/30	3,005'	60'	Asphalt	Good	Medium	Full	Good
	17/35	1,900'	300'	Turf	Fair	-	-	-
Cleveland Municipal	16/34	4,998'	75'	Asphalt	Good	Medium	Full	Fair
Eagle Lake	17/35	3,801'	60'	Asphalt	Good	Medium	Partial	
Houston Executive	18/36	6,610'	100'	Asphalt	Good	Medium	Full	Good
Huntsville Municipal	18/36	5,005'	100'	Asphalt	Good	Medium	Full	Fair
Liberty Municipal	16/34	3,801'	75'	Asphalt	Good	Medium	Full	Good
Palacios Municipal	8/26	5,001'	150'	Concrete	Fair	-	Partial	Fair
	13/31	5,001'	150'	Concrete	Fair	Medium	Full	Fair
	17/35	5,001'	150'	Concrete	Fair	-	-	Fair
Robert R. Wells, Jr.	15/33	3,800'	60'	Asphalt	Fair	Medium	Partial	Fair
Weiser Airpark	9/27	3,455'	40'	Asphalt	Good	Non-Std	Partial	Fair
	16/34[a]	2,000'	33'	Turf	Fair	-	-	-
Wharton Regional	14/32	5,004'	75'	Asphalt	Good	Medium	Full	Good
North Houston Business	17/35	3,596'	46'	Asphalt	Fair	Low	Full	Fair
Winnie-Stowell	17/35	3,600'	75'	Asphalt	Fair	Medium	Full	Fair

[a] Weiser Airport Runway 16/34 for emergency use only.
Source: FAA; Quadrant Consultants; URS

Six system airports in the Houston-Galveston region have partial or no parallel taxiway on their main runways (Figure 6). At these airports, aircraft must taxi down the main runway after they have landed, and may have to taxi down the main runway to reach takeoff position. The main runway is not available for takeoffs or landings while aircraft are taxiing on it, thus lowering the capacity of the airport for aircraft operations and presenting a potential safety hazard.

5.2.2 Navigational and Visual Approach Aids

Navigational aids refer to various types of electronic equipment installed at airports to provide guidance and position information to aircraft while in flight and to assist with landings at night and during cloudy and foggy weather. Figure 7 shows the system airports with at least one runway with an instrument approach. Instrument runways (runways equipped with electronic approach aids) are classified as Precision or Non-Precision based on the type of instrument approach procedure and navigation equipment available to that runway. Precision instrument runways provide both horizontal and vertical position information, while non-precision instrument runways provide only horizontal position information. Airports with visual approaches require pilots to land their aircraft by sight, without any electronic guidance aid from the airport.

Figure 6: Partial or No Parallel Taxiway for Main Runway

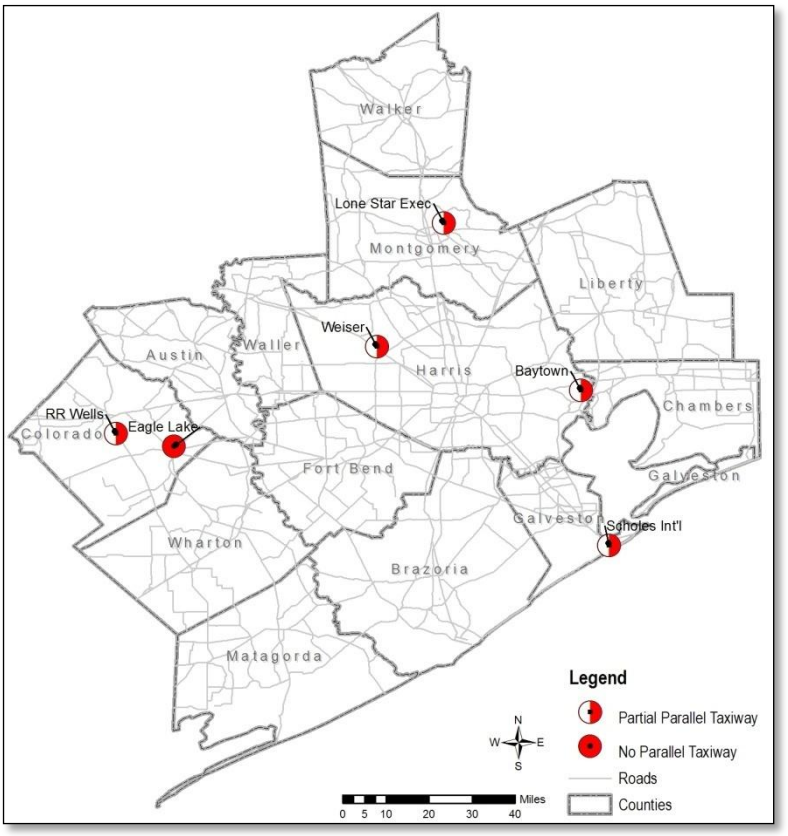


Figure 7: System Airports with At Least One Instrument Approach

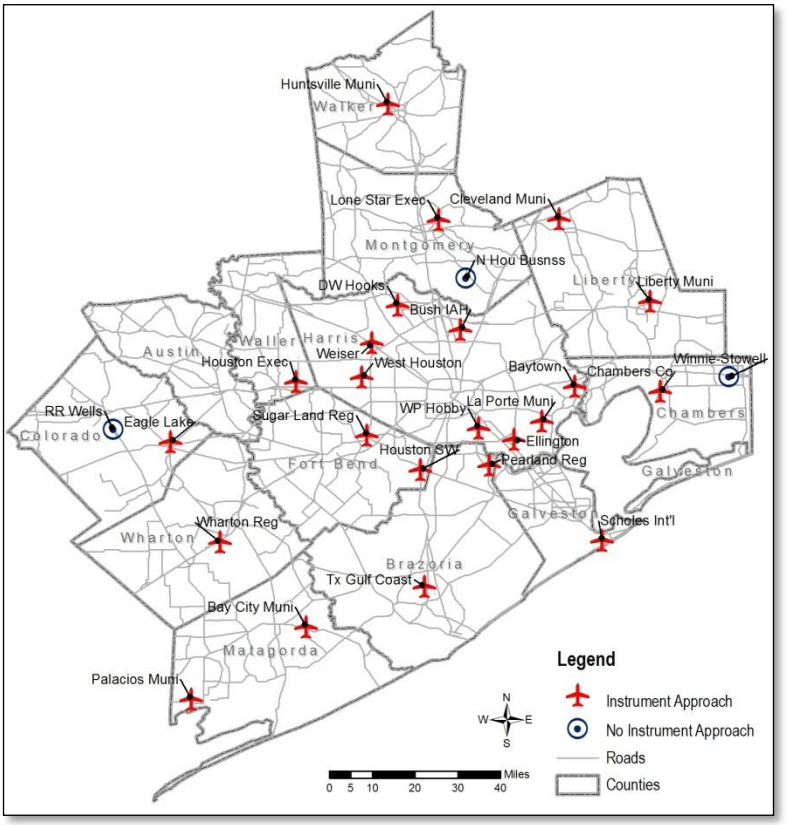


Table 6: Navigational Aids at System Airports

Airport	ILS	GPS/LPV	GPS/RNAV	DME	LOC	VOR	NDB	PAPI	VASI	REIL	Beacon	Wind Sock	Seg Circle	ASOS	AWOS	ATCT
Air Carrier Airports																
George Bush Intercontinental	✓	✓	✓	✓	✓			✓		✓	✓	✓		✓		✓
William P. Hobby	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓		✓
Reliever Airports																
Texas Gulf Coast Regional	✓	✓	✓		✓			✓	✓		✓	✓	✓	✓		
D.W. Hooks Memorial		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓		✓
Ellington	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓			✓
Houston Southwest		✓	✓	✓	✓			✓		✓	✓	✓			✓	
La Porte Municipal			✓			✓	✓	✓		✓	✓	✓	✓			
Lone Star Executive	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓
Pearland Regional			✓			✓				✓	✓	✓	✓	✓		
Scholes International	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓		✓
Sugar Land Regional	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
West Houston			✓	✓		✓		✓		✓	✓	✓	✓			
Other General Aviation Airports																
Bay City Municipal			✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	
Baytown			✓					✓		✓	✓	✓	✓			
Chambers County			✓					✓			✓	✓	✓			
Cleveland Municipal			✓			✓		✓			✓	✓	✓			
Eagle Lake			✓			✓		✓			✓	✓	✓			
Houston Executive		✓	✓					✓			✓	✓	✓		✓	
Huntsville Municipal		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		
Liberty Municipal			✓	✓		✓	✓	✓		✓	✓	✓	✓			
Palacios Municipal			✓			✓				✓	✓	✓	✓	✓		
Robert R. Wells, Jr.								✓		✓	✓	✓	✓			
Weiser Airpark			✓				✓				✓	✓				
Wharton Regional		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	
North Houston Business												✓				
Winnie-Stowell								✓			✓	✓	✓			

PAPI = Precision Approach Path Indicator; VASI = Visual Approach Slope Indicator; ILS = Instrument Landing System (published approach); LOC = Localizer; DME = Distance Measuring Equipment; VOR = VHF Omni-directional Range; RNAV = En-Route Area Navigation (published approach); GPS = Global Positioning System (published approach); NDB = Non-Directional Beacon; REIL = Runway End Identification Lights; ASOS = Automated Surface Observation System; AWOS = Automated Weather Observation System; Seg Circle = Segmented Circle; ATCT = Airport Traffic Control Tower

Table 6 lists the precision and non-precision navigational aids and other navigational facilities at each system airport. Air carrier airports and larger general aviation airports have precision runway approaches, while most small general aviation airports have non-precision runways or visual approaches only. Seven airports have ILS approaches, 12 have precision LPV GPS approaches, 23 have RNAV GPS approaches and three have only visual approaches. Figure 8 and Table 6 also show the seven airports with airport traffic control towers in the Houston-Galveston region.

5.2.3 Weather Stations

Weather is critically important to aviation. Well-equipped airports have weather stations and the means to transmit weather conditions to pilots. There are two automated systems for reporting weather conditions to pilots: the Automated Surface Observation System and the Automated Weather Observation System.

The Automated Surface Observation System, a joint effort between the National Weather Service, the FAA and the Department of Defense, is the main system for providing pilots with surface weather observations in the United States. The system takes continuous observations

of wind speed and direction, cloud cover and precipitation. The system has developed an extensive weather database that also supports meteorological research.

The Automated Weather Observation System automatically measures weather parameters and stores them in a computer database. The data are analyzed and then broadcast to aircraft up to 10,000 feet above ground level and within 25 nautical miles.

Ten of the 26 airports in the Houston-Galveston region have an Automated Surface Observation System station and three have an Automated Weather Observation System station. Table 6 lists the airports that have either type of weather station.

Figure 8: Airport Traffic Control Towers

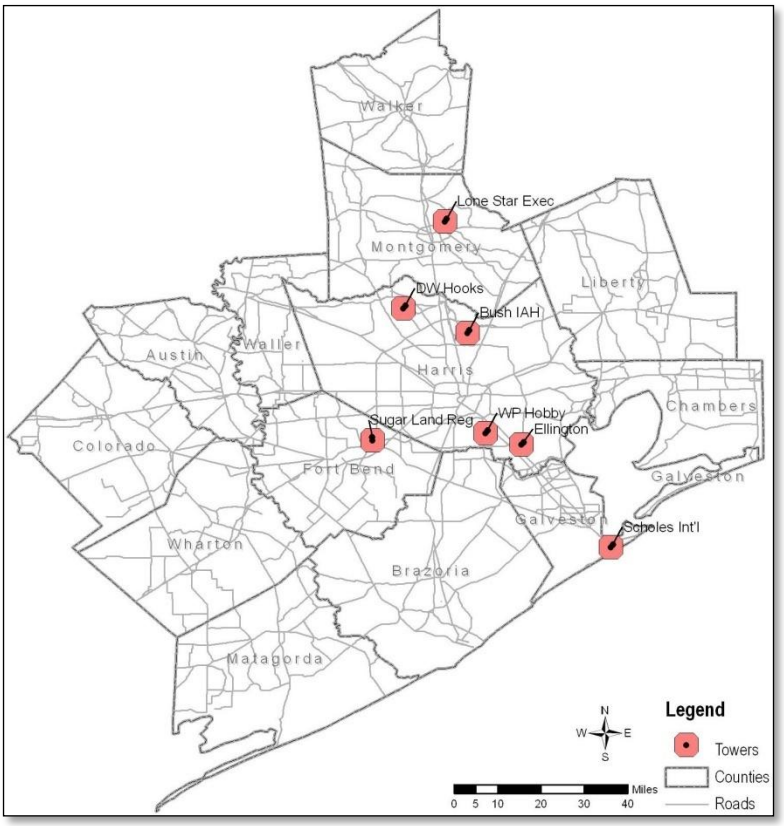
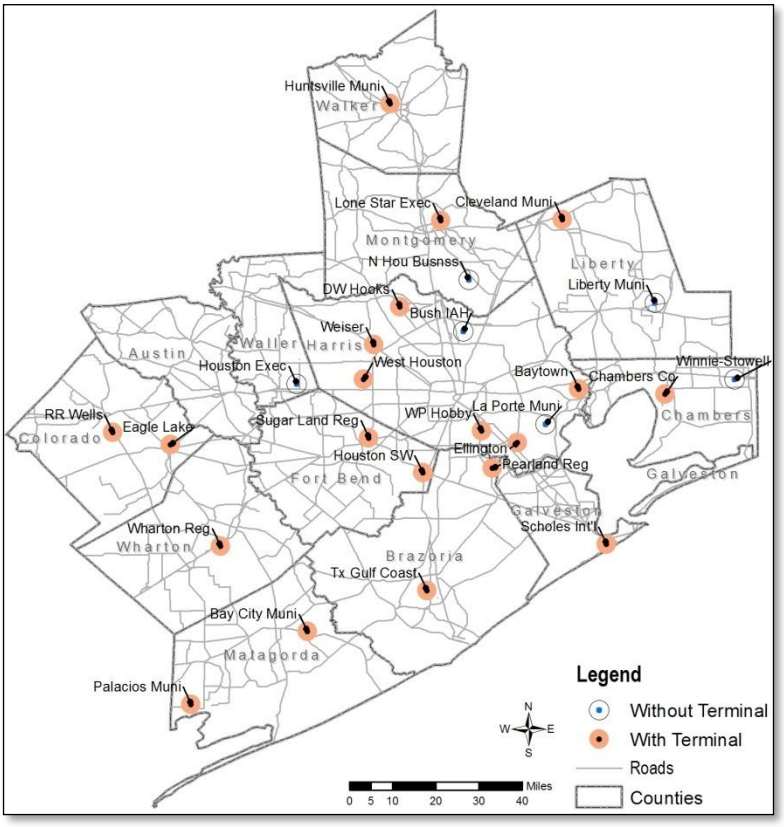


Figure 9: Airports with Terminal Buildings



5.3 Landside Facilities

Landside facilities at airports are the buildings, paved areas and all other facilities that are not airside facilities. The landside facilities at a typical general aviation airport are a terminal building, tenant buildings, hangars, storage and maintenance facilities, parking lots, and gates and fences. Table 7 shows the landside facilities at the system airports in the Houston-Galveston Region, and an explanation of the items in this table follows.

5.3.1 Terminals

Most system airports have some kind of terminal building. Figure 9 shows that 22 airports have a permanent terminal building and

Table 7: Landside Facilities and Services at System Airports

Airport	Attended	Pilot Room	Flt Plng Weather	Office	Aviation Training	Aircraft Rental	Aircraft Sales	Avgas	Jet-A	Mogas	Credit Card	Major Repair	Minor Repair	Avionics Repair
Air Carrier Airports														
George Bush Intercontinental	✓	✓	✓					✓AU	✓AU	✓AU		✓	✓	✓
William P. Hobby	✓	✓	✓		✓	✓		✓AU	✓AU	✓AU			✓	✓
Reliever Airports														
Texas Gulf Coast Regional	✓	✓	✓		✓	✓	✓	✓U	✓U	✓A		✓	✓	
D.W. Hooks Memorial	✓	✓	✓		✓	✓	✓	✓A	✓A		✓	✓	✓	✓
Ellington	✓	✓	✓		✓	✓		✓A	✓A			✓	✓	✓
Houston Southwest	✓	✓	✓		✓	✓		✓A	✓A			✓	✓	
La Porte Municipal	✓	✓	✓		✓	✓	✓	✓[a]	✓[a]		✓	✓	✓	✓
Lone Star Executive	✓	✓	✓		✓	✓	✓	✓A	✓A			✓	✓	✓
Pearland Regional	✓		✓	✓	✓	✓		✓A	✓A		✓	✓	✓	✓
Scholes International	✓	✓	✓		✓			✓A	✓A	✓A	✓	✓	✓	✓
Sugar Land Regional	✓	✓	✓		✓	✓		✓A	✓A	✓A		✓	✓	✓
West Houston	✓	✓	✓	✓	✓	✓	✓	✓A	✓A		✓	✓	✓	✓
Other General Aviation Airports														
Bay City Municipal	✓	✓	✓		✓	✓	✓	✓U	✓A		✓	✓	✓	
Baytown	✓	✓	✓	✓				✓A	✓A		✓		✓	
Chambers County	✓			✓	✓	✓		✓A	✓A		✓	✓		
Cleveland Municipal	✓	✓	✓		✓			✓U					✓	
Eagle Lake	✓			✓	✓	✓		✓A	✓A	✓A		✓	✓	
Houston Executive	✓	✓	✓					✓A	✓A	✓A				
Huntsville Municipal	✓	✓	✓		✓	✓		✓U	✓U			✓	✓	
Liberty Municipal	On call							✓A			✓			
Palacios Municipal	On call			✓				✓A	✓A		✓			
Robert R. Wells, Jr.	✓	✓		✓				✓A	✓A		✓			
Weiser Airpark	✓			✓	✓	✓		✓A			✓	✓	✓	
Wharton Regional	✓	✓	✓		✓	✓		✓A	✓A			✓	✓	
North Houston Business	✓							✓A						
Winnie-Stowell								✓A	✓A		✓	✓	✓	

FBO = Fixed Base Operator; Flt Plng Weather = Flight Planning and Weather Information; Avgas = Aviation gasoline; Jet-A = Jet-A fuel; Mogas = Automobile gasoline; A = Aboveground tank; U = Underground tank; Credit Card = Self-Serve Fueling by Credit Card

[a] Information not confirmed.

four do not. The simplest terminal is a building with a single room with a few chairs. Most airports have at least the airport manager's office in the terminal. More elaborate terminals have a lobby with comfortable seating, a pilot lounge room (sometimes with a kitchen and showers), a desk for pilots to prepare flight plans, find weather reports and use a telephone and computer, and a rental car agency.

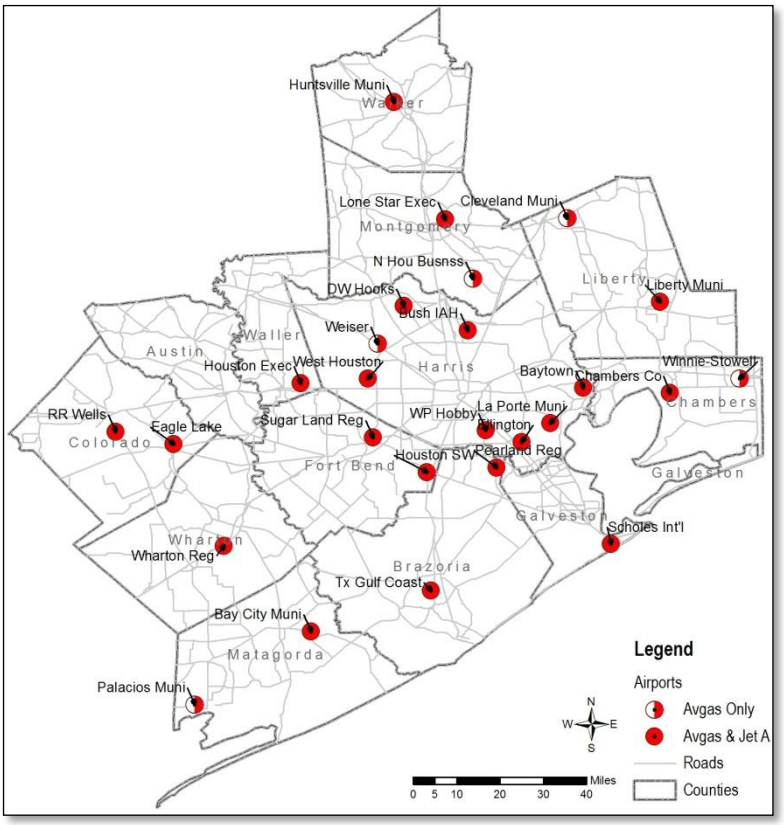
Most airports provide flight planning tools and access to weather data in their terminals, but some airports do not have weather stations and must rely on other airports for weather information. Pilots departing from these airports can obtain weather information from George Bush Intercontinental Airport, Hobby Airport, Sugar Land Regional Airport, Huntsville Municipal Airport, Texas Gulf Coast Regional Airport and Scholes International Airport on the Internet.

5.3.2 Fixed Base Operators

Fixed base operators, or FBOs, are generally private companies that lease space at airports to offer such aviation services as aircraft fueling (Jet-A and Avgas aviation fuels), bottled oxygen, aircraft tie-down parking, major and minor repairs to aircraft engines and airframes, avionics sales and repair, aircraft storage, flight training, aircraft rentals and sales, catering and charter

services. While some airports have no fixed base operators at all, others use the FBOs for all airport activities instead of maintaining a terminal building and staff at the airport. More typically, the airport terminal handles pilot-oriented services, and the FBOs handle aircraft-oriented services.

Figure 10: Availability of Fuel at System Airports



5.3.3 Fueling Services

All of the system airports have fuel for sale to pilots. Avgas, or aviation gasoline, is a high-octane fuel for smaller piston-engine airplanes and helicopters. It is available at all 26 system airports (Figure 10). Jet-A fuel is used by high-performance turbocharged piston-engine and jet-engine airplanes and helicop-ters. Jet-A fuel is available at 22 system airports. Seven airports also sell Mogas, or automobile gasoline.

Thirteen of the system airports offer self-service fueling, by which a pilot taxis his aircraft to the fueling location, swipes a credit card, and fuels the airplane without an operator to assist. Other airports have fueling done by the FBO, either from a fixed location or from a fuel truck driven to the aircraft.

5.3.4 Repair and Avionics Services

Most airports have an FBO that repairs aircraft engines, airframes or avionics. The inventory shows that 20 airports have facilities for at least minor aircraft repairs.

5.3.5 Flight Schools and Aircraft Rental and Sales

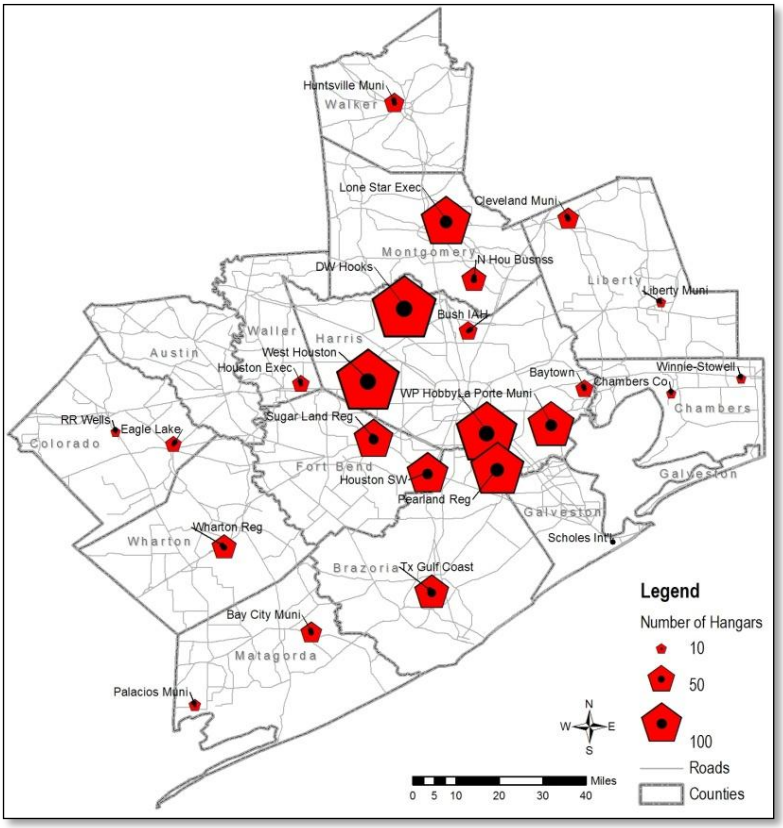
Eighteen system airports offer flight training, usually by an FBO and in connection with aircraft rental, so that customers can learn how to fly, gain supervised experience in flying, and even-tually fly solo in rented aircraft, all from the same airport. Some FBOs are also agents for sales of various makes and models of aircraft.

5.3.6 Hangars and Tie-Downs

All system airports have hangars in which to store aircraft out of the weather, and tie-down sites to park aircraft temporarily. Hangars can be conventional enclosed spaces with multiple-panel doors holding large jet aircraft or tens of smaller aircraft, T-hangars each holding one airplane, or open shade hangars providing a roof only. Figure 11 shows the number of hangars at each system airport, with the symbol sized in proportion to the number of hangars.

Almost every airport in the Houston-Galveston region has all its hangars filled with tenants and reports high demand for additional hangar space. The demand for hangar space increased substantially in September 2008, when Hurricane Ike damaged or destroyed many hangars at airports in the eastern part of the Houston-Galveston region. The airports most severely affected are Scholes International Airport, Liberty Municipal Airport, Baytown Airport, Chambers County Airport, Ellington Airport and William P. Hobby Airport. However, according to several airport managers, hangar space was very much in demand even before the hurricane.

Figure 11: Number of Aircraft Hangars at System Airports



Note: All numbers are 2009 counts except for West Houston Airport, which is estimated from based aircraft reported in 2006.

5.3.7 Automobile Parking

Most airports provide a small automobile parking area outside the terminal for visitors. If the airport has a car rental agent, there is a parking lot for cars available for rent.

5.3.8 Other Landside Facilities

David Wayne Hooks and Texas Gulf Coast Regional Airports have restaurants on the premises that are open to pilots, passengers and the public.

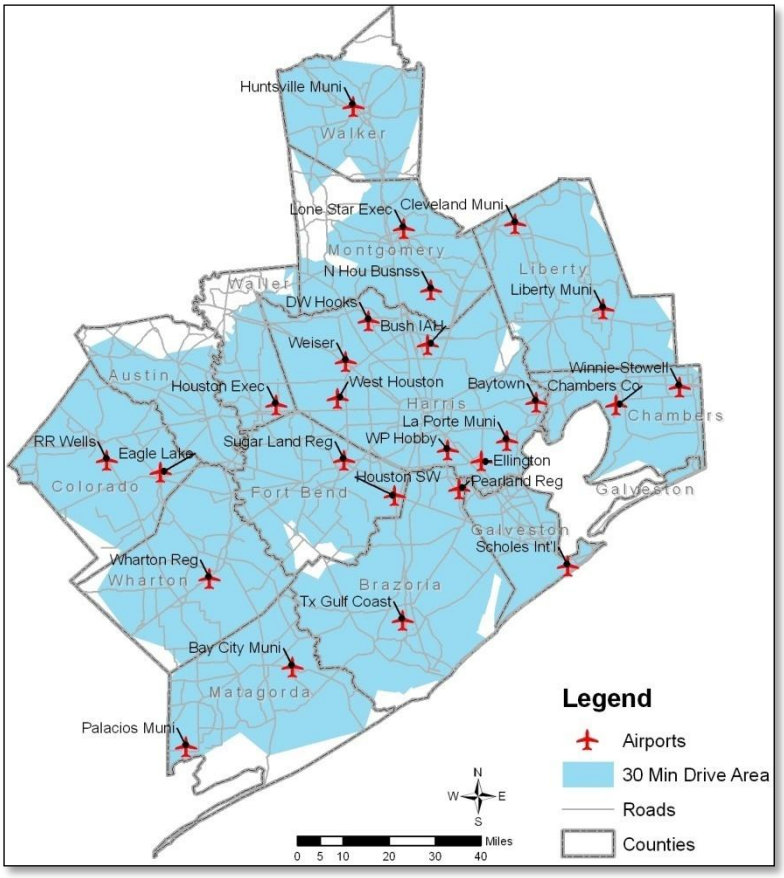
5.4 Roadway Network

Each airport is linked to its vicinity by a network of freeways, thoroughfares and local roads. The roadway infrastructure is important to an airport because it determines how many people who live and work nearby can conveniently get to the airport. In general, people prefer to drive no more than 30 minutes to get to an airport. If other factors (like hangar rent and fuel cost) are the same, airport users would tend to shift from an airport more than a 30-minute drive away to a closer airport, if one is available. To be viable, an airport must be linked by roads to areas with sufficient densities of population and employment centers so there is enough demand for aviation to keep the airport in business.

Airports in Harris County and suburban Houston generally have an adequate base of aviation users within a 30-minute drive (Figure 12). Airports in outlying counties often count on airport-based businesses such as crop dusters and pest control agencies to provide sufficient activity to maintain the airport.

Some airports benefit by easy access on a freeway or major thoroughfare, and others are located down country roads and are not easily accessible by people unfamiliar with the area. Signs can help people locate an airport off the beaten track, if they are large, clear and strategically positioned.

Figure 12: 30-Minute Drive Areas to System Airports



5.5 Based Aircraft

The system airports have about 3,032 based aircraft (Table 8, Table 9 and Figure 13). This is an increase of 16 percent over the based aircraft reported in 1992 (2,625),[19] despite the loss of Andrau Airpark and Houston Gulf Airport during that period. Within the overall total, however, there are a few trends: the proportions of based multi-engine propeller airplanes have declined sharply, while the proportions of jets and helicopters has remained the same, and the proportion of single-engine airplanes in the region has increased by 3 percent (about 350 aircraft).

As shown in Table 9 and Figure 13, the number of based aircraft varies widely among airports. Chambers County Airport, in Anahuac, has 11 based aircraft, while D.W. Hooks Memorial Airport in north Houston has 478. Ten airports have at least 100 based aircraft, while six have between 50 and 100, and ten have less than 50 aircraft.

Table 8: Based Aircraft, by Type

Aircraft Type	Based Aircraft	Percent of Total	1992 Percent
Single-engine propeller	2,181	72%	69%
Multi-engine propeller	403	13%	23%
Jet	249	8%	8%
Helicopter	112	4%	4%
Glider	11	0.4%	n/a
Ultralight	9	0.3%	n/a
Military	67	2%	n/a
Total Based Aircraft	**3,032**		

Table 9: Based Aircraft, by Airport and Type

Airport	Single Engine	Multi-Engine	Jet	Helicopter	Other	Total
Air Carrier Airports						
George Bush Intercontinental	3	33	32	4		72
William P. Hobby	72	63	122	16		273
Reliever Airports						
Texas Gulf Coast Regional	71	16	2	10		99
D.W. Hooks Memorial	364	60	27	27		478
Ellington	192	24	11	0	40 military fixed wing 3 military helicopters	270
Houston Southwest	114	24	0	2		140
La Porte Municipal	150	14	0	3		167
Lone Star Executive	174	21	12	0	24 military helicopters	231
Pearland Regional	195	15	0	6		216
Scholes International	91	21	2	24	1 glider, 2 ultralights	141
Sugar Land Regional	65	35	25	2		127
West Houston	277	27	6	6		316
Other General Aviation Airports						
Bay City Municipal	31	6	2	0	4 ultralights	43
Baytown	49	6	1	2		58
Chambers County	10	1	0	0		11
Cleveland Municipal	40	3	0	0		43
Eagle Lake	24	4	0	0		28
Houston Executive	25	6	6	0		37
Huntsville Municipal	34	3	0	1		38
Liberty Municipal	10	2	0	0	1 ultralight	13
Palacios Municipal	11	0	0	5		16
Robert R. Wells, Jr.	12	0	0	0		12
Weiser Airpark	70	5	0	3		78
Wharton Regional	37	9	0	0	10 gliders, 2 ultralights	58
North Houston Business	52	4	0	0		56
Winnie-Stowell	8	1	1	1		11
Total Based Aircraft	**2,181**	**403**	**249**	**112**	**87**	**3,032**

Source: FAA, Quadrant Consultants, URS

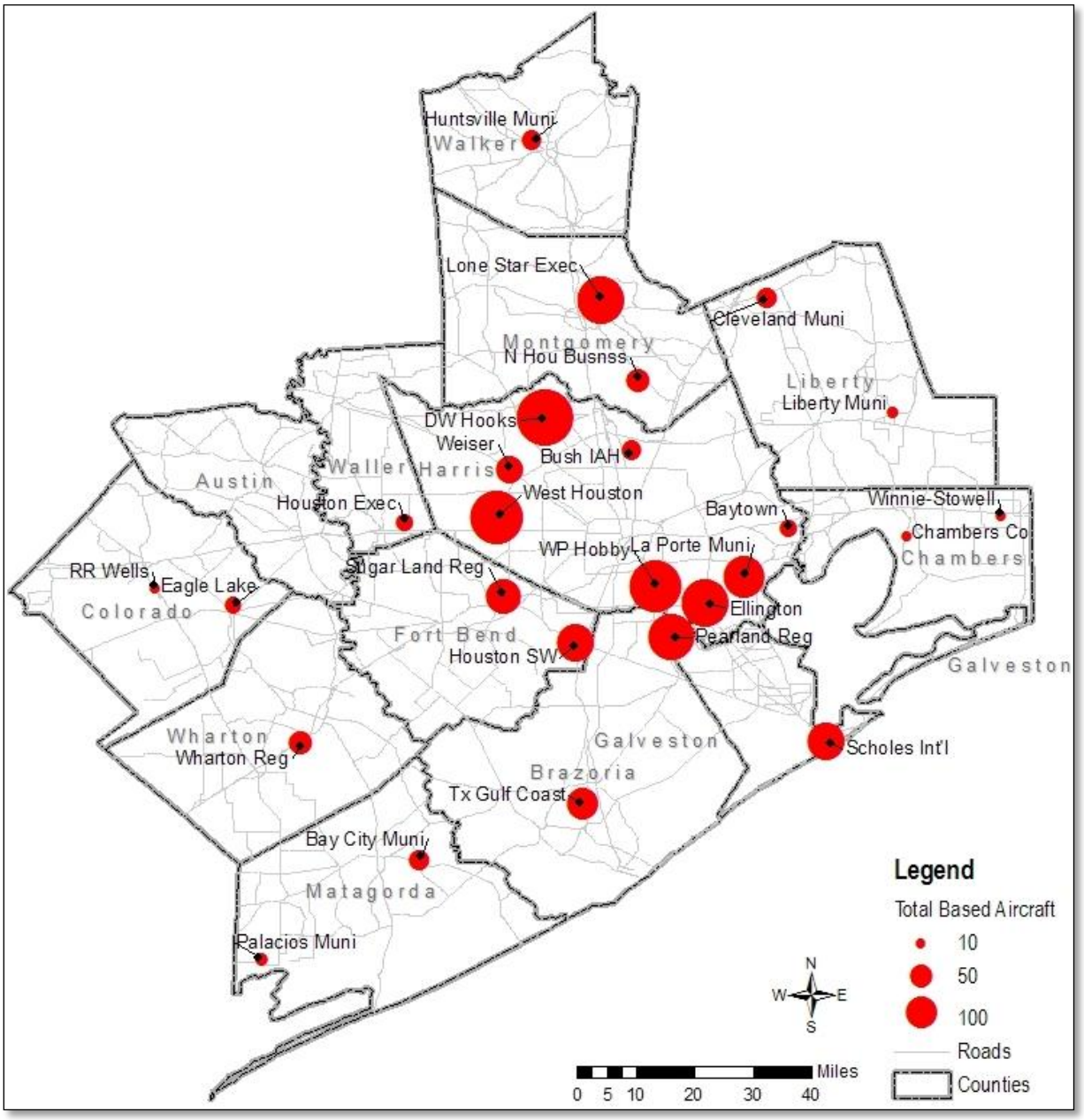
5.6 Airspace Obstructions and Nearby Incompatible Land Use

Twenty-five of the 26 system airports have obstructions in their airspace (Table 10 and Figure 14). These obstructions are preventing the full potential use of the airport, by displacing the runway threshold or raising the approach minima to avoid the obstruction, or preventing some approaches from being conducted safely. An airport's airspace obstructions would need to be remedied before the airport may receive federal funds for new facilities.

In contrast to a 1995 study,[20] most public airports now report that they have a height hazard ordinance to protect the airspace around their airports. La Porte Municipal Airport and Sugar Land Regional Airport are notable exceptions. Private airports rarely have height hazard zoning around them.

Incompatible land uses around general aviation airports include homes, schools, parks, hospitals and day care centers for which aircraft noise can disrupt normal activities. Sixteen of the 26 system airports have noise-sensitive land uses near their runways. In addition, landfills and harbors attract birds and could interfere with aviation.

Figure 13: Based Aircraft at System Airports



Sponsors of publicly-owned airports can avoid incompatible land uses by enacting land use ordinances to control incompatible land uses near airports. Airport owners, whether public or private, can also control land use around their airports by purchasing land around the airport or acquiring land use easements through negotiation with landowners. Most of the publicly-owned airports in the Houston-Galveston region have protective land use ordinances for land near the airport. Bay City Municipal, Huntsville Municipal and Wharton Regional Airports do not have land use ordinances to protect their airports.

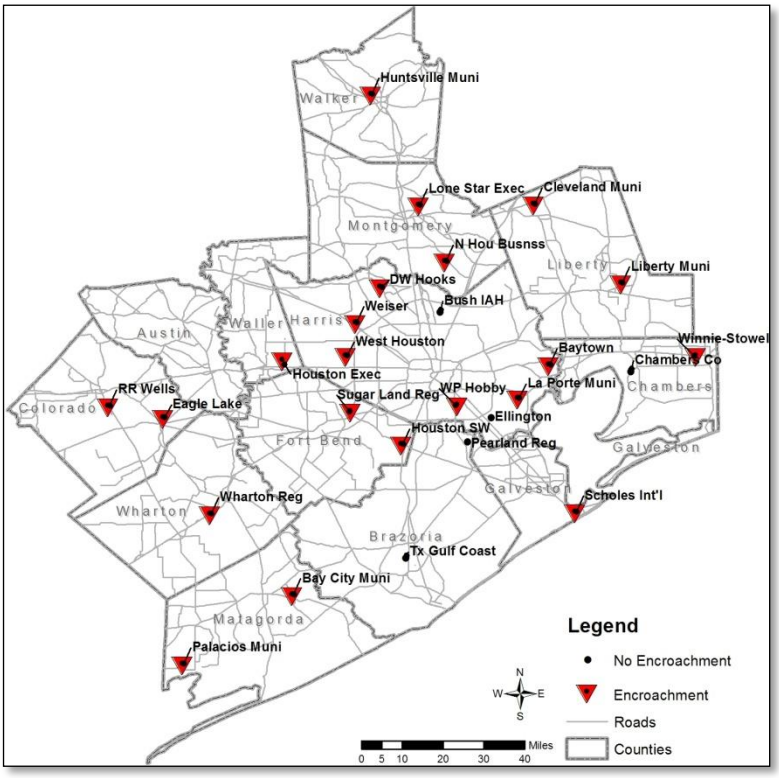
Table 10: Obstructions and Noise-Sensitive Land Uses near Runways at System Airports

Airport	Obstructions	Noise-Sensitive Land Uses	Height Hazard Zoning	Land Use Zoning
Air Carrier Airports				
George Bush Intercontinental	None	✓	✓	✓
William P. Hobby	Power line poles off the ends of Runways 22, 12R and 30L; an antenna tower off the end of Runway 17; a tall building off the end of Runway 35	✓	✓	✓
Reliever Airports				
Texas Gulf Coast Regional	None		✓	✓
D.W. Hooks Memorial	Tall trees off the ends of Runways 35L and 35R; traffic on a road off the end of Runway 17R; berms at both ends of Runway 17W-35W	✓		
Ellington	None	✓	✓	✓
Houston Southwest	Tall trees off the end of Runway 9; traffic on road off the end of Runway 27	✓	✓	
La Porte Municipal	Tall trees off the ends of Runways 12 and 23; power line pole off the end of Runway 5; fence at end of Runway 30	✓		✓
Lone Star Executive	Tall trees off the ends of Runways 1, 19 and 32; a hill off Runway 14		✓	
Pearland Regional	None	✓		
Scholes International	A crane off the end of Runway 13; a pole off the end of Runway 31; a tall building off the end of Runway 35		✓	✓
Sugar Land Regional	Tall trees off the end of Runway 17; traffic on a road at the end of Runway 35	✓		✓
West Houston	Tall trees off the end of Runway 15; traffic on road off the end of Runway 33			
Other General Aviation Airports				
Bay City Municipal	Tall bushes off the end of Runway 13	✓	✓	
Baytown	Tall trees off the end of Runway 14; a power line off the end of Runway 32	✓		
Chambers County	Tall trees off the ends of Runways 12 and 17; traffic on roads off the ends of Runways 30 and 35	✓	✓	
Cleveland Municipal	Tall trees off the ends of Runways 16 and 34		✓	✓
Eagle Lake	Tall trees at both ends of Runway 17/35		✓	✓
Houston Executive	Power line pole off the end of Runway 18	✓		
Huntsville Municipal	Tall trees off the end of Runway 18; pole off the end of Runway 36		✓	
Liberty Municipal	Tall trees off both ends of Runway 16/34		✓	
Palacios Municipal	Tall trees off the ends of Runways 8 and 31; tower off the end of Runway 26	✓	✓	✓
Robert R. Wells, Jr.	A fence off the end of Runway 13; tall bushes off the end of Runway 33			
Weiser Airpark	Tall trees off the ends of Runways 9, 16 and 34; a power line pole off the end of Runway 27	✓		
Wharton Regional	A power line pole off the end of Runway 14	✓	✓	
North Houston Business	Tall trees off both ends of Runway 17/35	✓		
Winnie-Stowell	Tall trees off both ends of Runway 17/35		✓	

5.7 Airport Security

Since 2001, security is an important component of the infrastructure of every airport. General aviation airports are not currently subject to the same security checkpoints and passenger screening measures as commercial airports, although the Transportation Security Administration of the U.S. Department of Homeland Security (TSA) has recently proposed a new regulation bringing the same level of security to airports serving aircraft weighing more than 12,500 pounds, which includes most business aviation and many charter services. The outcome of this proposed regulation is unclear, as many airport operators and the major aircraft owners' associations oppose it. If it becomes mandatory, many general aviation airports will need to either retrofit or rebuild their terminals to provide security checkpoints and add screening procedures.

Figure 14: Airports with Encroachments on Main Runway Approach



A basic element of airport security is access control. Nine airports have no perimeter fence or an incomplete perimeter fence (Cleveland Municipal, Liberty Municipal, Scholes International, Eagle Lake, La Porte Municipal, D.W. Hooks, Baytown, Huntsville Municipal and North Houston Business). These airports are vulnerable to vandalism and aircraft tampering. Furthermore, without a sturdy perimeter fence, large animals such as deer can wander onto the airport and pose a threat to aircraft. Some of these airports report that vandalism has occurred, or wildlife has been found on their runways.

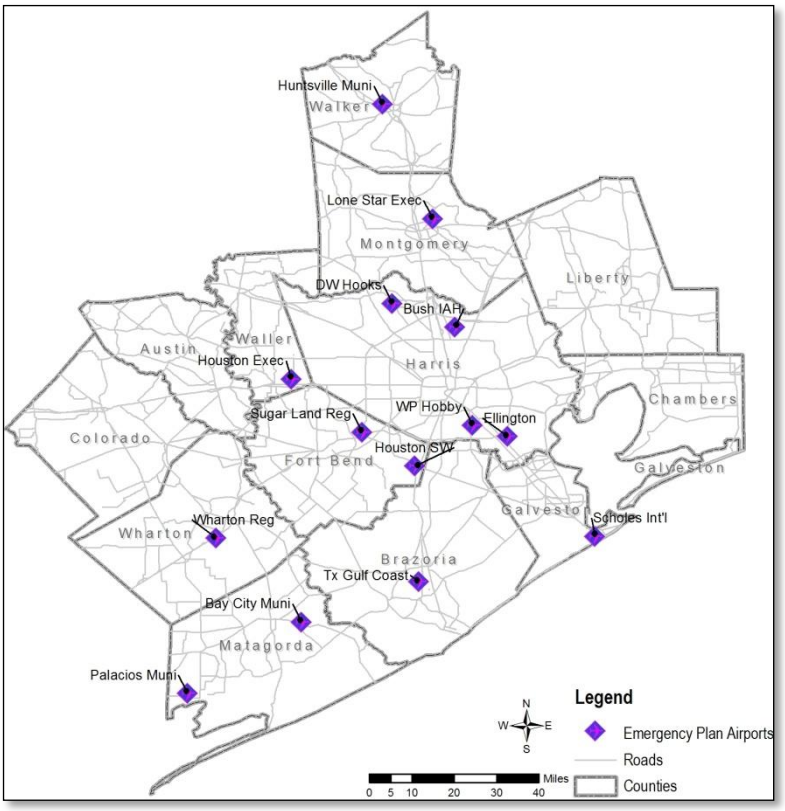
5.8 Emergency Management

The Houston-Galveston region is on the Texas Gulf Coast and is susceptible to hurricanes. As demonstrated recently after Hurricanes Katrina and Rita in 2005 and Hurricane Ike in 2008, it is sometimes necessary to evacuate large numbers of people, especially people with medical conditions, and to bring rescue workers, emergency equipment and supplies in and out of the region. All airports can play important roles in supporting emergency evacuations and moving people, equipment and supplies, although larger airports are critical because they can handle the larger cargo aircraft needed for emergencies.

The FAA has designated 14 airports in the Houston-Galveston region suitable for emergency use. These airports have at least one runway 5,000 feet long, the minimum length required for the military aircraft that typically respond to emergencies. Figure 15 shows the system airports the FAA has listed for emergency use.

In addition, the U.S. Air Force provides emergency response with moving equipment, supplies and personnel on large C-130 cargo aircraft. In the Houston-Galveston region, Ellington, George Bush Intercontinental, Hobby, Brazoria County, Sugar Land Regional, David Wayne Hooks and Lone Star Executive are the airports certified by the Air Force for C-130 cargo aircraft operations.

Figure 15: Airports for Emergency Response



5.9 Non-Aviation Facilities on Airports

Airports with non-aviation-related land uses on their property may have to contend with conflicting interests that interfere with effective management. Some private airports have leased or sold land to people who build a house over or alongside their hangar, or operate a business, or otherwise use the land for non-aviation purposes. This has occurred at Pearland Regional and David Wayne Hooks Airports (residences on airport property) and Scholes International and Texas Gulf Coast Regional Airports (non-aviation-related businesses operating on airport property).

6 Aviation System Issues and Goals

The inventory of the Regional Aviation System of 26 airports and interviews with community and economic leaders identified 11 issues affecting the quality and efficiency of general aviation in the Houston-Galveston region. These issues are grouped into four categories and are discussed below.

6.1 Airport Preservation

Airport preservation is a major issue for the RASP. Once an airport is taken out of aviation use and converted into another use, it is virtually impossible to bring it back into use as an airport. The configuration of open land for an airport runway and its clear zones is invariably lost. Replacing a closed airport – finding a large amount of available undeveloped land in a convenient location, obtaining air rights from the FAA, ensuring minimum impacts to nearby residents and other sensitive land uses, clearing height hazards and attracting based aircraft – is a very difficult proposition, and few have succeeded in doing this in recent years.

A closed airport means reduced opportunities for airplanes to operate in the region, reduced economic benefits in the area of the airport, and perhaps hundreds of displaced aircraft that must relocate to other airports in the region. Many airports have little room for more based aircraft. While no one can predict if or when a specific airport may close, Andrau Airpark and Houston Gulf Airport closed since the last Regional Aviation System Plan update in 1992. A detailed contingency analysis of what happens to the aviation system if one airport closes is described in Chapter 10.

Owner or Sponsor Interest. All privately-owned non-reliever airports in the Houston-Galveston region, and all privately-owned reliever airports that have not recently accepted FAA or TxDOT grants (which have a 10-year required airport use clause) are vulnerable to closure, because their owners are under no mandate to keep them open as airports. Baytown, David Wayne Hooks, Houston Executive, Houston Southwest, Pearland Regional, West Houston and North Houston Business Airports operate at the discretion of their private owners. The owners must be interested in continuing to operate their airports if they are to remain open. This is not to say that any of these airports is likely to close soon; the owners of these airports have many reasons to keep their airports open, including love of aviation, ease of personal or corporate aviation use, potential profit and investment potential. Profit is a major incentive to keep a private airport open, although profits can be elusive in the current market situation.

Publicly-owned general aviation airports in the region are also susceptible to lagging interest by their public sponsors, potentially leading to poor maintenance and ultimately the loss of major parts of the airport facilities. Cities or counties with limited budgets may have to choose between rehabilitating the pavement of a decaying runway or a major arterial highway. If the airport's economic benefits to the community are not widely perceived, needed repairs to the airport may be placed on indefinite hold and the airport may decline.

Funding. Funding of capital projects for private airports is subject to the financial capabilities and interests of their owners. Funding for public airports depends on a combination of political success in obtaining grants, local capability to provide matching funds, and many intangible factors related to local support for the airport and keeping it high on the priority list of local issues.

Funding is the first issue most stakeholders mention when discussing the problems with their airports. While many airports have sufficient funding to survive, capital investments may still be needed to bring the airports to full use.

Funding is subject to the economic conditions of airport sponsors, which must provide substantial matching funds for federal and state grants. For example, sponsors must provide 50 percent of funds for Texas Routine Airport Maintenance Program grants and 10 percent of funds for federal Airport Improvement Program grants. In the current economic downturn, some sponsors may not be able to build enough funds to match the grants, and their airports must put off needed repairs or expansions.

Furthermore, public airports (and private reliever airports) must compete with each other for federal grants, where success may depend on how well a sponsor can show that their community is behind the project and the requested grant will really benefit the community. Grant selection also reflects the policy decisions of the regional office of the granting agency, and successful grant recipients are skilled in working with policymakers and making their airport's needs known.

Some publicly-owned airports in the region (Scholes International, Liberty Municipal, Chambers County and Winnie-Stowell) were substantially damaged by Hurricane Ike and are in various stages of recovery from the storm. These airports' abilities to rebuild damaged buildings and facilities vary according to the amount of public support they receive.

Private versus Public Airport Ownership. Some of the most heavily used airports in the region are privately owned. The FAA considers private ownership of reliever airports to be undesirable in the long term because their existence and maintenance depend on the personal interests of their owners, rather than the communities benefitting from the airports. Acquisition of these airports by public entities is encouraged. A few airports in the Houston-Galveston region were acquired by public entities from private owners (Sugar Land Regional in 1990, and Robert R. Wells Airport in 1993).

There are pros and cons of private airport ownership in a regional aviation system. While private ownership allows more flexibility and rapidity in developing new airports, public ownership provides almost guaranteed continuity for essential system airports such as relievers.

6.2 Airport Capacity Maintenance

Airports must not only survive, but also maintain themselves and even grow to meet demand for aviation activity. Some airports need additional maintenance and capital improvements, both of which depend on consistent sponsor interest. Some public airports would benefit from a greater focus by their owners, as well as more resources allocated to manage the airport. Some airports need full-time managers to supervise and maintain their facilities and plan for short-term needs and long-term development. Some elected officials question the value of their airports, which may be perceived as luxuries. Community interest, which would provide the political capital for supporting airports, is often absent. As a result, airport maintenance and planning are often postponed for other community needs.

Pavement Maintenance. Some airports have pavement in less than good condition and in need of repair. Some airports need runway extensions and additional paved taxiways to function better.

The amount of needed pavement maintenance is a function of the airport's age, original pavement strength and quality, as discussed in Section 5.2.1. Some airports were former military

bases and their runways were made to withstand many years of hard use. Other airports, especially those that started as private facilities with turf runways, have runways and taxiways with lower bearing strength and poorer endurance. Some managers have had to put off normal pavement maintenance to meet budget constraints, resulting in pavement damage and more expensive repair bills in a few years.

TxDOT offers annual grants up to $100,000 to each publicly-owned airport under its Routine Airport Maintenance Program (RAMP). The grants require the airport to provide 50 percent matching funds, and the money can be used for any reasonable airside or landside maintenance program, with preference given to airside maintenance. Examples of programs that can be funded with RAMP funds are repaving runways and taxiways, building airport entrance roads, building public parking lots, installing security fences and replacing the rotating beacon. In general, airports must participate in RAMP if they wish to receive airport improvement grants from TxDOT.

Hangar Space. Almost every airport manager indicates there is strong demand for additional hangar space for more based aircraft. They report waiting lists for available hangars, and frequent calls from people looking to rent hangars. Although it is difficult to estimate true demand, the shortage of hangar space in the region appears to be real.

Most of the airports have space to build additional hangars when demand is present. Building hangars requires long-term financing because the initial costs of construction are recovered from tenants leasing hangar space over many years. Houston Southwest Airport is trying a possible alternative, allowing a developer to sell hangar condominiums to aircraft owners who are willing to purchase units before construction.

Many hangars in the Houston-Galveston area damaged or destroyed by Hurricane Ike in 2008 are currently being rebuilt. However, national trends in aircraft sales are dropping, reflecting the current economic downturn, so the demand for hangar space may abate somewhat over the next few years.

Airport Services. Few airports have all the facilities to allow them to operate optimally. Most need one or more facilities to expand their capabilities. Examples of services lacking at some airports include fuel sales (some have just Avgas and no jet fuel), terminal buildings, hangar space, precision approaches and aircraft maintenance.

The services available at system airports are listed in Table 6 and Table 7. Few airports have all needed services for optimum aviation use. Most of these services are expensive to acquire and maintain; however, some pay for themselves (*e.g.*, fuel, hangar space) and others add value to the airport (*e.g.*, terminals, navigational aids).

Privately-owned airports are often better at providing the fee-based services airport users want than publicly-owned airports because the profits from these services provide the incentive to make them available. However, services such as navigational aids and terminals, which do not provide direct profits and may require federal assistance, are more likely to be available in publicly-owned airports or airports with reliever status.

The Economy. The current economic recession is affecting the region's airports in many ways. Global economic problems have caused increasing fuel costs (although these have declined recently), tighter municipal budgets and declining business jet use. Recreational aviation activity has not been affected as much, but may also decline as personal budgets feel the pinch. The general uneasiness about the future, and the tighter money supply, are leading airports to

postpone expensive improvements. However, the $18 million in federal stimulus funding to Texas airports, added to the expected $46.6 million in federal block grants for Texas aviation in 2009, may lead to some capital projects sooner rather than later. This year, Galveston has received $2 million in federal stimulus funds to rehabilitate its electrical and lighting systems damaged by Hurricane Ike.

The future for business travel is probably less robust than it has been recently, but business travel will not go away. The current trend in business is to use corporate airplanes less and use technology (Web meetings, remote login, database downloads) to replace business travel. However, not all business activities can be done remotely, and there will always be a need for face-to-face meetings and on-site inspections. Airports throughout the region will continue to be needed for commerce.

Land for Expansion. Many airports have land constraints and cannot make needed expansions unless they acquire more land, which is often not available or too expensive. Land expansion plans can also lead airport neighbors to fear displacement and may trigger public opposition.

As mentioned previously, some airports are surrounded by developed land and cannot expand, while others do not control the land use around them. This limits the potential of the airports to grow and handle larger aircraft. In general, airports in urban areas (such as La Porte Municipal and Weiser Airpark) find themselves hemmed in by developments and cannot expand without major community impacts. Other airports (such as Sugar Land Regional and Pearland Regional) have roads or railroads at the ends of their runways, and it is at least costly and sometimes infeasible to relocate adjacent infrastructure to make room for a longer runway. Unlike privately-owned airports, publicly-owned airports can use eminent domain powers to take adjacent land; however, this is often not an acceptable option to the community. The position of each airport in its land use context is unique for each airport and will be considered as appropriate expansion options are studied in the next phase of this study.

6.3 Airport–Community Relations

Airports do not exist only for their owners or for the aircraft owners, pilots and passengers using them. They are also substantial enterprises that contribute to the wealth of their communities, bringing commerce to and from the world over. Airports occupy large tracts of land and make their presence felt in many ways. A community may choose to promote the benefits of having the airport in its midst, or it may ignore it. Either way, the airport will affect its community.

The RASP considers the beneficial aspects of airport-community relations, including economic growth, community prestige, business attraction, and the less tangible recreational and network-related benefits. The RASP also considers the adverse aspects, including the cost of operation for publicly-owned airports, aircraft noise and air pollution emissions, traffic on access roads and environmental quality. This section discusses the attitudes of community leaders toward their airports and factors affecting airport-community relations in the Houston-Galveston region.

A major task in the RASP has been to interview leaders of the communities in which the 26 system airports are located. These stakeholders are chairs and presidents of local chambers of commerce and economic development committees, elected officials and leaders of major businesses in the communities. A structured questionnaire was the basis of discussion, but the meetings often covered a wide range of related topics.

Setting the Airport's Purpose. Few policymakers have figured out how their airport can benefit their communities, and chambers of commerce and economic development organizations have not always conveyed the airport's purposes and capabilities effectively. Setting a clear direction for the airport that meets the community's goals is essential to establishing local support and political will.

One goal of the RASP is to define roles for the system airports in the Houston-Galveston region. This is presented in Chapter 12.

Community Awareness of Airports. A surprising result of the stakeholder meetings is that some residents in many of the communities are unaware there is an airport nearby. Managers of some publicly-owned airports reported that when airport funding has come up before City Council or the County Court, an elected official would ask where the airport is and why it needs to be funded.

In other communities, citizens know about the airport and do not perceive it as an essential element of the community's transportation infrastructure. Many may believe the airport exists for the benefit of rich people who use it for their private jets, rather than for local and national commerce, recreation and tourism, transport of time-sensitive goods and emergency response. This misperception can lead elected officials to fund other infrastructure projects and not provide the appropriate allocation of public funds for maintaining the airport or matching funds for state or federal grants. It also prevents the airport from being used well as an incentive for business or development.

Raising the profile of an airport can help citizens realize the airport is an essential element of the community, which in turn could make it easier for the airport to obtain local funding for maintenance and matching funds for grants.

Perceived Importance of Airports in their Communities. The interviews with community leaders reveal the community leaders' attitudes toward the airports in their communities, and show that airports have varied levels of perceived importance, ranging from a major economic engine to a drain on the local economy. Most stakeholders see the airports in their communities playing a role in attracting businesses to the area or growing current businesses. A few community leaders do not see any role their airports can play in economic development. This is not surprising where an airport serves mostly recreational pilots in a dense urban setting, but other airports could support business development if expanded and improved.

Several airports have taken steps to interact with their communities to boost public relations. Four sponsor annual events at the airport (Fourth of July, a festival and an air show). Three airports (Scholes International, Sugar Land Regional and William P. Hobby) have museums in or near their terminals.

Chamber of commerce and economic development leaders generally agree that a robust general aviation airport can stimulate economic development in their communities. They believe some businesses will want to locate to communities in which they can take advantage of the airport for business personnel transportation and air cargo. Stakeholders described several situations involving a major corporation headquartered elsewhere in the United States that built a regional office in their community (invariably at the stakeholder's suggestion, and sometimes with tax incentives), so the corporation's president or senior managers could fly into the airport and conveniently visit the office.

The Texas Department of Transportation commissioned studies in 2006, using 2005 data, of beneficial economic impacts for most of the airports in the TASP, including 21 airports in the Houston-Galveston region.[21] The direct annual economic impact of an airport is the airport's direct annual expenditures on salaries, maintenance and operations, added to the estimated expenditures by airport users. The study adds to this direct annual economic impact the estimated indirect impact of businesses supported by airport users, calculated by applying a multiplier factor, to estimate the total economic benefit of the airport to the community. Table 11 shows the estimated economic impact of the study airports for which analyses were done. Aside from air carrier airports, whose airlines produce enormously more economic impact than general aviation, the estimates show economic impacts averaging $55 million for reliever airports and $2.7 million for other general aviation airports.

Two airports in the region demonstrate how economic initiatives can be good investments. Texas Gulf Coast Regional Airport is developing a duty-free international business zone on land adjacent to the airport to attract air cargo businesses importing and exporting goods. Sugar Land Regional Airport has arranged with the Department of Homeland Security to place a federal Customs Office at the airport, encouraging international passenger service and air cargo trade through the airport.

Most community leaders are aware of the maintenance costs of publicly-owned airports, and most consider these costs worthwhile, as long as the money is spent on facilities benefitting business-related general aviation (longer runways, larger terminals, jet fuel services, large hangars), which are perceived as investments achieving the best returns. Conversely, few stakeholders are interested in encouraging recreational use of their airports, which is perceived as providing little return on investment. The exceptions are communities with strong tourism

Table 11: Economic Benefits of Study Airports (millions of $)

Airport	Airport Jobs (direct & indirect)	Direct Airport Spending	Direct Visitor Spending	Total Direct Impact	Indirect Impact	Total Economic Impact
Air Carrier Airports						
George Bush Intercontinental	200,000	$1,600	$4,400	$6,000	$4,900	$10,900
William P. Hobby	45,000	$500	$900	$1,400	$1,100	$2,500
Reliever Airports						
Texas Gulf Coast Regional	240	$14	$2	$16	$15	$30
D.W. Hooks Memorial	650	$37	$7	$44	$40	$84
Ellington	2,700	$175	$5	$180	$165	$345
Houston Southwest	170	$5	$2	$7	$6	$13
La Porte Municipal	180	$7	$2	$9	$8	$17
Lone Star Executive	1,100	$77	$2	$79	$72	$152
Pearland Regional	200	$15	$2	$17	$16	$33
Scholes International	800	$54	$5	$59	$54	$113
Sugar Land Regional	430	$46	$4	$50	$45	$95
West Houston	190	$6	$3	$9	$8	$17
Other General Aviation Airports						
Bay City Municipal	24	$3.3	$0.1	$3.4	$3.2	$6.6
Chambers County	18	$3.0	$0.1	$3.1	$2.9	$6.0
Cleveland Municipal	11	$0.3	$0.2	$0.5	$0.4	$0.9
Huntsville Municipal	62	$4.0	$0.4	$4.4	$4.0	$8.4
Liberty Municipal	3	$0.07	$0.05	$0.1	$0.1	$0.2
Palacios Municipal	3	$0.07	$0.05	$0.1	$0.1	$0.2
Robert R. Wells, Jr.	2	$0.02	$0.02	$0.04	$0.04	$0.08
Wharton Regional	22	$0.9	$0.2	$1.1	$1.1	$2.2
Winnie-Stowell	5	$0.25	$0.05	$0.3	$0.2	$0.5

Source: Texas Department of Transportation, Aviation Division, based on 2005 data

industries, such as Galveston.

Community leaders perceive privately-owned airports differently than publicly-owned airports. The leaders generally appreciate the value of these resources but are concerned about private airports closing and converting to other land uses. The larger the private airport, the more the community leaders want to convert it to public ownership. Sugar Land Regional Airport, which was purchased from Dr. Don Hull about 20 years ago, is a success story.

6.4 Airport Security and Environmental Quality

Security. Many airport managers were concerned about a proposed regulation by the TSA. The proposed rule (the Large Aircraft Security Program) would require security measures by all United States operators of aircraft exceeding 12,500 pounds, including verifying that passengers are not on the federal "No Fly" watch list. Most general aviation organizations oppose the proposed regulation because it would place an economic burden on most airport operators. The TSA received more than 7,000 comments opposing the proposed regulations and is currently revising them. Regardless of the outcome of the proposed rule, security requirements at general aviation airports will likely increase. In addition, adding security fencing and maintaining security surveillance to prevent vandalism and theft would be a major expense for many airports.

Security is a complex issue, dealing with many aspects of airport operation ranging from airport access control to passenger screening and cargo inspection. While airport security will always be of more concern than it was before September 11, 2001, the best balance between strict security measures and ease of airport use has not yet been found.

The Aircraft Owners and Pilots Association has a program named "Airport Watch" to keep aircraft owners vigilant about potential security issues at the airports they use. The association is offering printed materials and a free security video to its members to educate them about airport security and to encourage them to keep their aircraft locked, watch for suspicious behavior and call a toll-free association phone number to report a potential security issue. Most of the region's airports participate in the program.

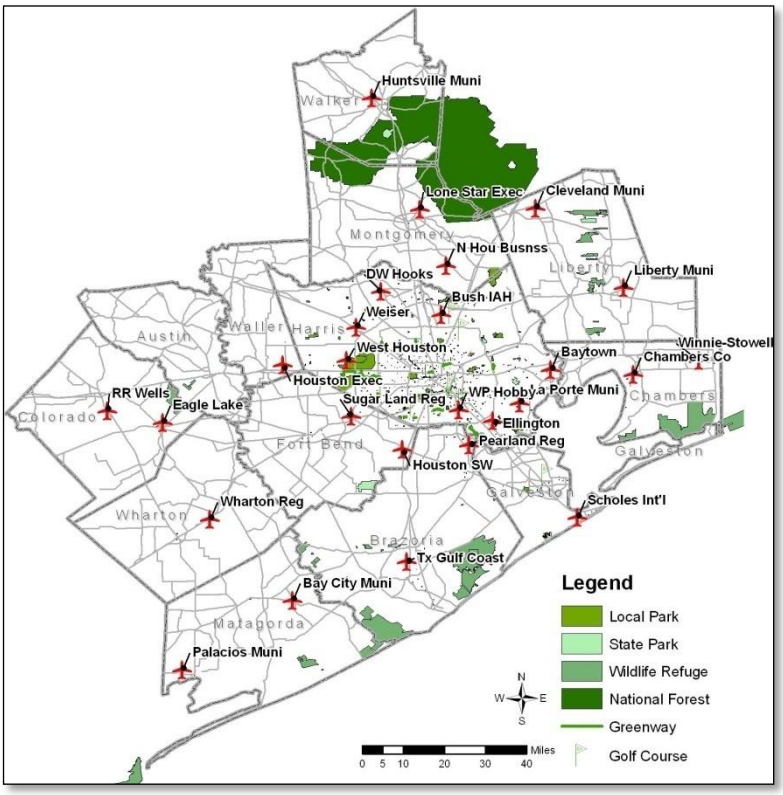
Land Use around Airports. Land use and its control is a major problem for many of the system airports in the Houston-Galveston region. Eleven of the 24 general-aviation airports already have incompatible land uses (generally homes) near their runways. In some cases, the airport has expanded toward these homes. In other cases, the homes were built close to the existing airport. Regardless of who moved where when, the presence of residences at the ends of airport runways makes it very difficult for airports to obtain state or federal grant funds to expand. The noise analysis required for these grants may require the airport owner to add noise insulation to homes with noise impacts, or to buy them out.

Three public airports (Bay City Municipal, Huntsville Municipal and Wharton Regional) are susceptible to future incompatible development of adjacent land (such as residential development) because they do not have land use zoning or other ordinances or regulations to control land use. The remaining 15 public airports have land use zoning around their airports to prevent adjacent lands from being developed for incompatible uses. Privately-owned airports have no recourse against adjacent land being developed for incompatible uses, except to purchase the land or an easement on the land, which is often prohibitively expensive for the airport owner.

Environmental Impact of Airports. Several system airports are on or adjacent to protected ecosystems, wildlife habitat or parks (Figure 16 and Appendix A). Several have protected environmental resources on or near them. Two airports (Sugar Land Regional and West Houston) are near public parks or golf courses, and two (Sugar Land Regional and George Bush Intercontinental) have wetlands on airport land. These protected habitats limit the extent of development on these airports because additional airport facilities, such as longer runways or additional hangars, may be limited in their development on these areas.

The impact of airports on wildlife (especially birds) is an enduring topic in the Houston-Galveston region. This began with the proposed West Side Airport in the Katy Prairie in Waller County, which had the potential to affect migratory geese, other waterfowl and migratory songbirds wintering there in large numbers. Similar concerns have been expressed by the environmental community for Houston Executive Airport, which is less than one mile from the West Side Airport site (which has since been developed as a mitigation wetland that attracts birds). Other habitats especially rich in wildlife include coastal marshes and bays, old-growth forests, riparian forests and freshwater wetlands. Brazoria County, Chambers County, Ellington, Houston Executive, Houston Southwest, Huntsville Municipal, Liberty Municipal, Palacios Municipal, Scholes International, Sugar Land Regional, West Houston and North Houston Business Airports are all near substantial wildlife populations or habitat.

Figure 16: Parks, Wildlife and Forest Preserves, Golf Courses and Greenways



Noise impacts to nearby incompatible land uses have already been discussed in Section 5.6. Most general aviation airports do not generate enough noise to exceed FAA thresholds. However, occasional distinct noise events such as a business jet taking off over a residential community can be bothersome.

Air quality is a problem in the central eight counties of the Houston-Galveston region, as this area is not in attainment of the national air quality standard for ozone, and violations occur about 40 days per year. However, even a substantial increase in operations at a general aviation airport in these eight counties (Harris, Liberty, Montgomery, Waller, Fort Bend, Brazoria, Galveston and Chambers) would be unlikely to trigger a conformity evaluation under the Texas State Implementation Plan.

6.5 Regional Aviation Goals

From the eleven regional aviation issues in the previous section, one can logically determine what needs to be done to improve the regional aviation system. The plan's objectives presented in Section 1.1.2 state what the RASP is to accomplish. The goals in this section give these objectives more specificity, relating them to the regional issues and other findings of the airport inventory and stakeholder interviews. The eleven goals in four categories are presented below.

6.5.1 Preserve existing airports

Public ownership or public/private partnership for all airports in the NPIAS. While all airports in the region are important and should be preserved, airports serving the population centers of the Houston-Galveston region and are included in the NPIAS are specifically identified by the FAA as infrastructure assets for which continued public use must be assured. Public ownership of these airports, whether by cities, counties, intergovernmental airport boards or authorities, or by innovative public-private partnerships with public guarantees on their continued use, should be realized to meet this goal.

Regional partnerships for small publicly-owned airports where appropriate. Airports owned by public entities that do not currently provide adequate facility management may benefit from restructuring as regional facilities. Joint sponsorship arrangements by several public entities (including public/private partnerships where appropriate) would spread the management responsibility for such airports among more users and communities. It would also give these airports a greater funding base for their maintenance and future development.

6.5.2 Improve safety and security

Bring airports to standards. Several airports in the region have runways with encroachments by structures too tall or too close to the runway. Establishment of height hazard zoning and removal of the encroaching structures would protect instrument approaches and allow full use of the runway. Other airports require full parallel taxiways, adequate apron space, wider runways and taxiways, or smoother pavement to meet federal aviation standards. Airport runways currently without published instrument approaches may be able to gain them for satellite navigation such as GPS and LPV. The RASP will recommend changes to airports to meet current federal aviation standards for safety and design.

Establish emergency airport system. Strategically located airports with good landside access would be classified in the RASP as emergency airports and planned for sufficient runway width and strength, fuel capacity and emergency power generation to handle air evacuation and cargo flights in emergencies.

Improve airport security. Security measures that are cost-effective and appropriate to each airport's role should be done at all airports. All airports need security fencing around their perimeters (unless other barriers exist) to control access to one or a few supervised main gates.

6.5.3 Improve efficiency

Build on each airport's strengths for better system integration. The RASP will propose roles for each airport in the system and recommend measures to improve those roles. These measures would increase efficiency, add capacity where it is needed, and increase airport usefulness for all aviation users living in or visiting the Houston-Galveston region.

Add hangars at airports with pent-up demand and sufficient aviation services. Hangar space is almost fully occupied at every airport, and most airport managers cited many unmet

requests for hangar rentals. The RASP will identify opportunities to add hangar space where it is most needed to fill geographic and functional gaps at airports that can handle the additional based aircraft and operations.

Eliminate capacity constraints and provide essential services at poorly performing airports. The airport inventory has identified airports for which adding or improving just one feature would increase its capacity and efficiency. Examples are airports with partial or no parallel taxiways and a poorly equipped terminal. Measures to provide these features would not only improve system efficiency but also raise the competitiveness of Houston-Galveston area airports relative to other regions, and they will receive high priority in the RASP.

6.5.4 Benefit communities

Establish protective land use restrictions around airports. The continued existence of airports often depends on the degree to which the community protects the ends of the runways from incompatible land uses such as noise-sensitive receptors. Communities with zoning ordinances can set land use restrictions directly, while communities without such ordinances can make strategic land purchases to accomplish the same end.

Add signs, gateway entrances and landscaping at airports. Many airports are virtually invisible to the community and users. As part of an overall airport marketing program, a landmark gateway at the main entrance and attractive landscaping around the terminal building could be used to beautify the airport, instill community pride and build community support.

Encourage community events at airports. Bringing the community to the airport for annual events (such as fly-ins, Fourth of July celebrations or folk art fairs) is a wonderful way to introduce the community to its airport and build community support.

6.6 Performance Measures

Performance measures are quantitative indices that show how intensively or effectively an airport is used. For example, the number of aircraft operations per year is a widely used performance measure of airports. Other such measures are how large an aircraft the airport can safely accommodate and how poor the visibility can be at the airport and still allow safe instrument landings.

The purpose of performance measures is to provide a means to compare airport activity among airports and for individual airports at different times. Thus, as airports get busier, their annual operations increase, and as airports expand, the maximum size of aircraft accommodated increases. Some performance measures are used in the analysis of airport capacity (Chapter 9) and planning scenarios (Chapter 10). Others are used to select recommended projects (Chapter 13) and assign their priorities (Chapter 14).

Performance measures should not be expected to indicate everything about an airport, just those aspects of the airport that are measurable and are important to an airport's function. For example, availability of a terminal building is important to many airport users and it affects the airport's usefulness, although it is not a measure of the airport's function.

The performance measures for the RASP for the Houston-Galveston region are listed and defined below.

Annual Aircraft Operations. This measure is the total annual operations in the most recent reported year, grouped by general aviation propeller, general aviation jet, commercial fixed-wing, commercial helicopter, military fixed-wing and military helicopter, and by local and itinerant

operation type. This measure, compared to the capacity of the airport by aircraft type, indicates how close an airport is to its capacity for aircraft operations.

Based Aircraft. This measure is the total number of based aircraft in the most recent reported year, grouped by single engine, multi-engine, jet, helicopter, glider, military and ultralight. By comparing this measure to the forecast demand to base aircraft at that airport, this measure indicates how close an airport is to its potential to base aircraft. Furthermore, if the number of based aircraft reaches at least 100, the airport has met one eligibility criterion for a reliever airport.

Design Aircraft. This measure is the largest aircraft type (by approach speed, wingspan or weight) that can be reasonably accommodated at the existing airport, based on length of primary runway, design runway strength rating, actual condition of primary runway, separation of runway and taxiway and size of apron. This measure is also known as the design aircraft. It is used in the assessment of airport capacity in Chapter 9. The currently accommodated aircraft types may not be the same types as would need to be accommodated under the airport's optimal role in the regional aviation system, and to that extent, the airport has not attained the capability to take its optimal role.

Landing Minima under Instrument Flight Rules. This measure is the published minimum altitude and visibility distance for aircraft approaching the airport, for currently installed navigational aids at the airport or for airplanes equipped with for LPV GPS receivers. This measure is used in the assessment of airport capacity in Chapter 9. It depends on the electronic equipment installed on the airport grounds that provides pilots with additional guidance on where the aircraft is and where the runway is, allowing landings in poor visibility. It also depends on the steepness of the unobstructed glide slopes around the airport. The smaller the minimum allowable altitude and visibility distance, the more the airport can be used during inclement weather, and the more likely pilots will be to use the airport in general.

Population and Employment within 30 Minutes Driving Distance. This measure is the number of residents and employees living or working within the census blocks (or tracts, if block-level population data are not available) within 30 minutes' driving time of the airport, using the current roadway network. (This criterion applies to general aviation use of airports; commercial passengers on the air carrier airports, George Bush Intercontinental and William P. Hobby Airports, have a 60-minute drive time service area.) This number measures the size of the pool of potential users of the airport from the surrounding communities and highlights airports near major employment centers. It is used in the scenario assessments in Chapter 10 to allocate aircraft operations and based aircraft from one airport to another.

Compatibility of Adjacent Land Uses. This measure has three parts: the proportion of land within one mile of the

airport currently in agricultural use, undeveloped, or already owned by the airport's owner; the proportion of land within one-half mile of the primary runway ends in residential or park use; and the number of height hazard obstructions reported for the airport and the existence of a height hazard zoning ordinance. These three parts indicate different facets of the same issue: whether the airport can use its land effectively and expand as its needs grow. Adjacent land use compatibility is used in Chapter 13 to develop recommended projects for noise studies and land acquisition, and to determine if airport expansion projects are feasible.

Pavement Condition. This measure is the current condition of the runway, taxiway and apron operating surfaces, taking into account any currently programmed and funded projects to rehabilitate these surfaces. Poor pavement condition may mean that the pavement is at the end of its working lifetime, previous paving work or material is of poor quality, or the pavement surface is not maintained adequately. This measure, along with the operating budget, shows whether the airport is receiving sufficient maintenance. In addition, changes in pavement condition over time indicate how well the airport maintenance program is working. This measure is used in Chapter 13 to develop recommended projects for pavement rehabilitation at airports.

7 System Airports

There are 154 airports in the Houston-Galveston region (Table 12). Not all of them are available to the public; most (108) are private runways available only to a small group of members or landowners. A smaller set of airports (46), including both publicly- and privately-owned airports, is open for public use. This plan considers a subset of these public-use airports in the region contributing significantly to public mobility for the region.

The RASP defines system airports as significant public-use facilities that help meet the aviation needs of the region. “Significant” airport facilities are defined as a paved runway at least 3,000 feet long, hangars or tie-downs to store aircraft, aviation fuel and a building with basic passenger accommodations. (A 3,000-foot runway accommodates 95 percent of aircraft weighing less than 12,500 lbs.) System airports are available, provide needed aviation facilities and services to all and help to make the region a destination for aircraft nationwide. Just as a traveler coming to a new city needs to find suitable hotels near where he wants to visit that provide safe and comfortable accommodations, a pilot coming to the Houston-Galveston region needs to find a suitable airport near his or her destination that provides a safe facility to land the aircraft and convenient services for aircraft refueling, protection and repair. Similarly, just as a family relocating to the region needs to find a comfortable home in a convenient and safe neighborhood with nearby stores and services, an aircraft owner in the region needs to base his or her aircraft in a convenient and safe airport with aviation services available. The regional aviation system should have airports with varying locations, facilities and services to provide a range of options for the needs and desires of the aviation community.

This phase of the RASP begins with the 27 system airports listed in the 1992 Regional Airport/Airspace System Plan, removes two that have closed (Houston Gulf and Andrau Airports) and two that were never built (West Side and East Grand Parkway Airports), and adds one new airport built since the previous plan (Houston Executive Airport). It also adds three public-use airports now listed in the 2010 TASP that have sufficient facilities and activity to be potential system airports (Palacios Municipal, Robert R. Wells and Winnie-Stowell Airports) and removes one that does not have an active paved runway or sufficient facilities (Skydive Houston). Some of the former airports had been included in plans before 1992 but were not included in the 1992 plan. These system airports typically have a paved or well-compacted turf runway, are owned by one person, entity or partnership, and have at least one of the following: covered aircraft storage, aircraft fuel for sale, terminal facilities or repair services.

System airports do not include private-use airports, airports without basic facilities or airports jointly owned by many landowners (“aviation communities”). While there are many such airports in the region, they are not likely to become system airports.

The 26 airports in the Houston-Galveston region studied in this Regional Plan are presented in Table 13 and Figure 17. The Houston-Galveston region has two air carrier airports (George Bush Intercontinental and William P. Hobby). Although these airports are system airports, they are dedicated primarily to scheduled passenger air service, which is not the subject of this plan. However, air carrier airports are also used for general aviation, and they are considered in this plan along with other airports as appropriate. Ellington Airport is also a special case, as it is both a military airport and a general aviation airport.

Table 12: Airports in the Houston-Galveston Region

Airport	Code	Nearest City	Owner-ship	Use
Austin County				
Brandes Air Field	05TA	Sealy	Private	Private
Clark Sky Ranch	3TA2	Sealy	Private	Private
Eberly Ranch	TX70	Chappell Hill	Private	Private
GHSA-Wallis Glideport	TE71	Wallis	Private	Private
Gloster Aerodrome	1XA7	Sealy	Private	Private
Grawunder Field	06R	Bellville	Private	Public
Hinson	32TX	Kenney	Private	Private
Longbird	93TS	Sealy	Private	Private
Mario's Flying Pizza	2TA4	Sealy	Private	Private
P-K Ranch	60TX	Bellville	Private	Private
Rabb and Nobra	6TS8	Industry	Private	Private
Traylor Tick Farm	61TX	Bellville	Private	Private
Brazoria County				
A&A Flying Service	XS39	Pearland	Private	Private
Alvin Airpark	6R5	Alvin	Private	Public
Bailes	7R9	Angleton	Private	Public
Bayless	TS90	Rosharon	Private	Private
Texas Gulf Coast Regional	LBX	Angleton/ Lake Jackson	Public	Public
Clover Lake Farms	TE77	Angleton	Private	Private
Eagle Air Park	2TE0	Brazoria	Private	Private
Flyin' B	39R	Houston	Private	Public
Flyin Tiger	81D	Angleton	Private	Public
Garrett Ranch	77XS	Danbury	Private	Private
Houston Airpark	21XS	Houston	Private	Private
J-D Ranch	3TS3	Alvin	Private	Private
Joseph Ross Scherdin	93XS	Richwood	Private	Private
Knape	2XA2	Danbury	Private	Private
Minard Pegasus	TE09	Alvin	Private	Private
Pearland Regional	LVJ	Houston	Private	Public
Peterson	08XS	Old Ocean	Private	Private
Phillips Corporation	46TX	Angleton	Private	Private
Salaika Aviation	07TA	Danbury	Private	Private
Skyway Manor	T79	Pearland	Private	Public
Songbird Ranch	91TS	Rosharon	Private	Private
Toy Airpark	15XS	Liverpool	Private	Private
Wolfe Air Park	3T2	Manvel	Private	Public
Chambers County				
Chambers County	T00	Anahuac	Public	Public
Winnie-Stowell	T90	Winnie/ Stowell	Public	Public
Eagle Air	1TS0	Oak Island	Private	Private
RWJ Airpark	54T	Baytown	Private	Public
Slack	4TX0	Mont Belvieu	Private	Private
Colorado County				
Circle M Ranch	6TX2	Frelsburg	Private	Private
Eagle Lake	ELA	Eagle Lake	Public	Public
Renz Ranch	5TE7	Eagle Lake	Private	Private
River Field	TS27	Columbus	Private	Private
Robert R. Wells, Jr.	66R	Columbus	Public	Public
Fort Bend County				
Aviasud Airpark	TS95	Beasley	Private	Private
Cardiff Brothers	56TE	Katy	Private	Private
Covey Trails	X09	Fulshear	Public	Public
Flying C Ranch	XS25	Needville	Private	Private
H & S Airfield	XS21	Damon	Private	Private
Happy Landings	2H5	Houston	Private	Public
Heritage Ranch	94XS	Richmond	Private	Private
Houston Southwest	AXH	Houston	Private	Public
Lane Airpark	T54	Rosenberg	Private	Public
Massimiliano Memorial Field	4TA0	Damon	Private	Private
Meyer Field	TA33	Rosharon	Private	Private
Purdy-Nielsen Memorial Airpark	3TS5	Beasley	Private	Private
Rose Field	87TE	Needville	Private	Private
Sugar Land Regional	SGR	Houston	Public	Public
Ward Airpark	5T0	Beasley	Private	Public
Westheimer Air Park	007	Houston	Private	Public
White Wing Ranch	TA97	Orchard	Private	Private
Galveston County				
Austinia	TS50	Texas City	Private	Private
B & S	1TS3	San Leon	Private	Private
Creasy	5TA5	Santa Fe	Private	Private
Johnnie Volk Field	37TE	Hitchcock	Private	Private
Kami-Kazi	5TA7	Santa Fe	Private	Private
Laseair	8TA4	Texas City	Private	Private
Old Forker	TA30	Sante Fe	Private	Private
Polly Ranch	7XS0	Friendswood	Private	Private
Rebel Field	TX66	Alta Loma	Private	Private
Scholes International at Galveston	GLS	Galveston	Public	Public
Seafood Warehouse Park	XS77	Crystal Beach	Private	Private
Harris County				
Baytown	HPY	Baytown	Private	Public
Dan Jones International	T51	Houston	Private	Public
David Wayne Hooks Memorial	DWH	Houston	Private	Public
Diamond N Ranch	06TX	Hockley	Private	Private
Dry Creek	TS07	Cypress	Private	Private
Dunham Field	1XS1	Crosby	Private	Private

Airport	Code	Nearest City	Owner-ship	Use
Harris County				
Ellington Airport	EFD	Houston	Public	Public
Ferris	25TA	Baytown	Private	Private
Field's Field	7TA0	Tomball	Private	Private
Flying F Ranch	1TE2	Crosby	Private	Private
George Bush Intercontinental	IAH	Houston	Public	Public
Green Acres	TA90	Hockley	Private	Private
Hoffpauir	59TE	Katy	Private	Private
La Porte Municipal	T41	La Porte	Public	Public
Roeder	49TA	Crosby	Private	Private
Rogers	9TA3	Crosby	Private	Private
Sack-O-Grande Acroport	9X9	Katy	Private	Public
Weiser Airpark	EYQ	Houston	Private	Public
West Houston	IWS	Houston	Private	Public
William P. Hobby	HOU	Houston	Public	Public
Liberty County				
Ainsworth	06TE	Cleveland	Private	Private
Cleveland Municipal	6R3	Cleveland	Public	Public
F. R. Duke Farm	XS72	Romayor	Private	Private
Gum Island	3TE1	Dayton	Private	Private
Jet Ag Inc.	TA07	Dayton	Private	Private
Liberty Municipal	T78	Liberty	Public	Public
North Willis	XS28	Nome	Private	Private
Pavlat	3TS7	Dayton	Private	Private
Pinoak	3TE9	Dayton	Private	Private
Seaberg Ranch	21TE	Dayton	Private	Private
Tri-County Air Service	XS58	Raywood	Private	Private
West Liberty	TS35	Dayton	Private	Private
Matagorda County				
Ag Aviation	7TS9	Bay City	Private	Private
Bay City Municipal	BYY	Bay City	Public	Public
Fehmel Dusting Service	T84	Bay City	Private	Public
Kubecka Aviation	3XS1	Palacios	Private	Private
Palacios Municipal	PSX	Palacios	Public	Public
Pierce Field	72TA	Port O'Connor	Private	Private
Trull	XS35	Palacios	Private	Private
W. D. Cornelius Ranch	XS07	Markham	Private	Private
Montgomery County				
Cut and Shoot	19TE	Conroe	Private	Private
Flying Hare	34XS	Conroe	Private	Private
GDAP Air Ranch	97TS	Willis	Private	Private
Lake Bonanza	33TA	Montgomery	Private	Private
Montgomery County				
Lone Star Executive	CXO	Houston	Public	Public
Marmack	TE85	Montgomery	Private	Private
North Houston Business	9X1	Houston	Private	Public
Outlaw Flyers	16XS	Conroe	Private	Private
Walker County				
Estates Airpark	XS09	New Waverly	Private	Private
Huntsville Municipal	UTS	Huntsville	Public	Public
Jordan Ranch	90TS	Bedias	Private	Private
Waller County				
Biggin Hill	TX49	Hockley	Private	Private
Dry Branch Ranch	TS44	Pattison	Private	Private
Fair Weather Field	TX42	Monaville	Private	Private
Hempstead	35TS	Hempstead	Private	Private
Houston Executive	TME	Houston	Private	Public
Jo Na Acres	TA03	Brookshire	Private	Private
Ken Ada Ranch	3XS8	Waller	Private	Private
Laas Farm	1TS1	Pattison	Private	Private
Mikeska Field	1XA4	Brookshire	Private	Private
Pea Patch	4TA4	Hempstead	Private	Private
Pfeffer & Son Farms	4XS0	Waller	Private	Private
Simaron Ranch	9TS3	Waller	Private	Private
Skydive Houston	37X	Waller	Private	Public
Soaring Club of Houston	89TA	Waller	Private	Private
Sport Flyers	27XS	Brookshire	Private	Private
Woods	77TX	Brookshire	Private	Private
Woods No. 2	TA28	Brookshire	Private	Private
Zadow Air	6XA4	Waller	Private	Private
Wharton County				
El Campo Airpark	TS96	El Campo	Private	Private
Flying V Ranch	T26	Louise	Private	Public
Frels	2TE4	El Campo	Private	Private
Lackey Aviation	94R	Wharton	Private	Public
New Gulf	T17	New Gulf	Private	Public
Norris Raun Ranch	68TE	El Campo	Private	Private
Rodgers Roost	0XS1	El Campo	Private	Private
Shanks Ag Strip	61XS	Wharton	Private	Private
Smith Aviation Inc	78XS	Danevang	Private	Private
Stovall Ranch No. 1	7TE6	El Campo	Private	Private
Tradewind Ag	8TE8	El Campo	Private	Private
Wharton Regional	ARM	Wharton	Public	Public

Source: FAA

Table 13: System Airports in the Houston-Galveston Region

Airport	Type	Cities Served	Owned By	Code	In NPIAS*	In TASP*
Air Carrier Airports						
George Bush Intercontinental	Carrier	Houston (north)	City of Houston	IAH	✓	✓
William P. Hobby	Carrier	Houston (southeast)	City of Houston	HOU	✓	✓
Reliever Airports						
Texas Gulf Coast Regional	General	Angleton, Lake Jackson	Brazoria County	LBX	✓	✓
David Wayne Hooks Memorial	General	Houston (north)	Jag Gill	DWH	✓	✓
Ellington	General Military	Houston (southeast)	City of Houston	EFD	✓	✓
Houston Southwest	General	Arcola	James Griffith, Jr.	AXH	✓	✓
La Porte Municipal	General	La Porte	City of La Porte	T41	✓	✓
Lone Star Executive	General	Conroe	Montgomery County	CXO	✓	✓
Pearland Regional	General	Pearland	Clover Acquisition Corporation	LVJ	✓	✓
Scholes International	General	Galveston	City of Galveston	GLS	✓	✓
Sugar Land Regional	General	Sugar Land	City of Sugar Land	SGR	✓	✓
West Houston	General	Houston (west)	Woody Lesikar, West Houston Airport Corp.	IWS	✓	✓
General Aviation Airports						
Bay City Municipal	General	Bay City	City of Bay City	BYY	✓	✓
Baytown	General	Baytown	Raceco, Inc.	HPY		
Chambers County	General	Anahuac	Chambers County	T00	✓	✓
Cleveland Municipal	General	Cleveland	City of Cleveland	6R3	✓	✓
Eagle Lake	General	Eagle Lake	City of Eagle Lake	ELA	✓	✓
Houston Executive	General	Brookshire, Katy	Ron Henriksen, WCF, LLP	TME		✓
Huntsville Municipal	General	Huntsville	City of Huntsville	UTS	✓	✓
Liberty Municipal	General	Liberty	City of Liberty	T78	✓	✓
Palacios Municipal	General	Palacios	City of Palacios	PSX	✓	✓
Robert R. Wells, Jr.	General	Columbus	Colorado County	66R		✓
Weiser Airpark	General	Cypress	Cecil & Robert Weiser	EYQ		
Wharton Regional	General	Wharton	City of Wharton	ARM	✓	✓
North Houston Business	General	Porter	Herbert Jeffries	9X1		
Winnie-Stowell	General	Winnie, Stowell	Chambers County	T90	✓	✓

* NPIAS = National Plan of Integrated Airport Systems; TASP = Texas Airport System Plan

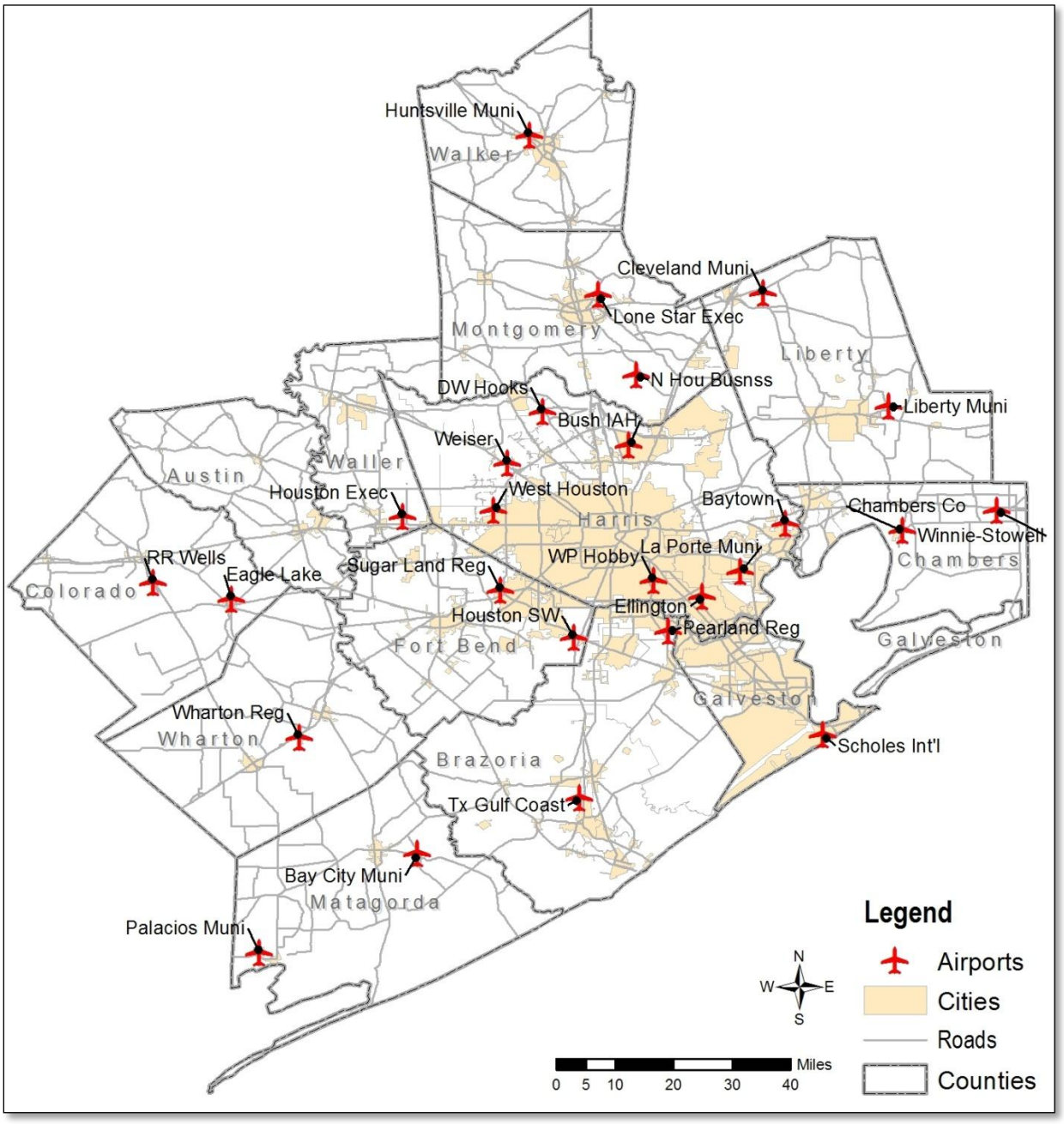
System airports are present in every county in the 13-county region except Austin County, which has no NPIAS or TASP airport. Residents and visitors to Austin County have access to Business/Corporate airports in adjacent Colorado, Fayette, Waller and Washington Counties.

The FAA's criteria for eligibility for inclusion in the NPIAS,[22] which were presented above, are more restrictive than the RASP criteria for selecting system airports. Unlike the NPIAS, system airports may include:

- Privately-owned, public-use airports not designated relievers
- Airports closer than 20 miles to airports in the NPIAS

Table 13 shows that the Houston-Galveston region has 18 system airports owned by public entities such as city or county governments, and eight owned privately by people or corporations and are open to the public. Twenty-one of these airports are in the NPIAS and 22 are in the TASP.

Figure 17: System Airports in the Houston-Galveston Region



8 AVIATION FORECASTS

The RASP projects aviation activity for the 26 system airports in the Houston-Galveston region to 2015, 2020 and 2030. The forecasts cover general aviation (GA) operations, based aircraft numbers and fleet mix.

8.1 Aviation Trends

Aviation in the United States has experienced a decline in activity since 2008, reflecting the national economic recession, and this decline has occurred in Texas and in the Houston-Galveston region. The recession has strained the aviation industry as business travel declined, pilots cut back flying hours and corporations downsized their business jet fleets. The General Aviation Manufacturers Association recently announced that worldwide shipments and billings of general aviation airplanes were down in all categories.

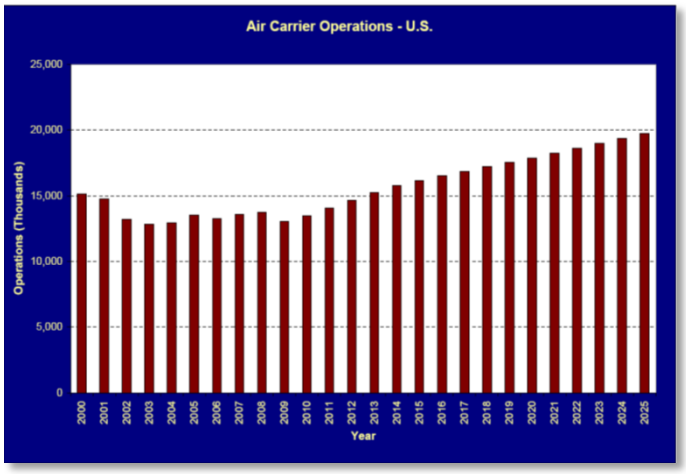
8.1.1 National Aviation Trends

The FAA publishes its national Terminal Area Forecast (TAF)[23] of national aviation annually. This forecast is used by state and local authorities to project future budget and planning requirements. The TAF bases future aviation activity on the forecasted economic performance of the United States. The TAF indicates that commercial aviation activity will decline in the near term (one percent loss from 2008 to 2010) with a return to a positive trend over the long term (Figure 18).

General aviation, which includes all civil aviation except commercial and military operations, is also forecast to decline in the short term. Nationwide, the annual number of hours flown by general aviation pilots is estimated to have decreased by 0.2 percent from 2007 to 2008 (Figure 19). Furthermore, FAA air traffic control towers have recorded that nationwide general aviation activity fell sharply in 2008.

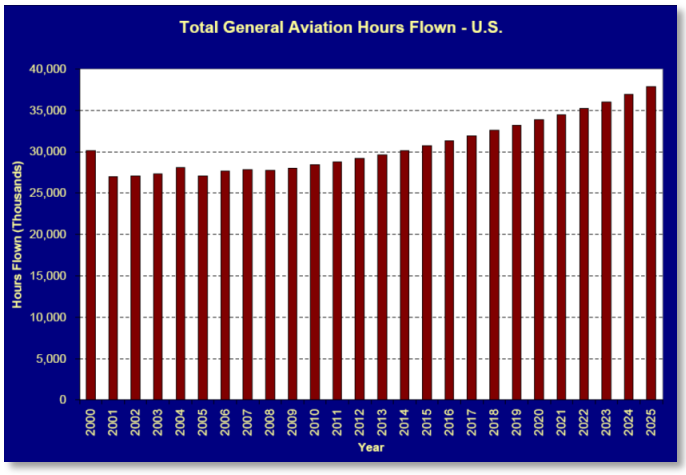
Demand for business jets had grown in the past several years, and the FAA forecasts that general aviation for business purposes will continue to grow at a more rapid pace than for personal

Figure 18: National Air Carrier Operations, 2000-2025



Source: FAA

Figure 19: General Aviation Hours Flown, 2000-2025



Source: FAA

reasons. The active general aviation fleet, estimated at 234,000 aircraft in 2008, will increase at an average rate of one percent per year to 275,200 in 2025 (Figure 20). The turbine-powered fleet is expected to grow by 3.2 percent annually through 2025. Very light jets, a new market segment once widely considered to be the future of business aviation, has performed below expectations as deliveries fell short and several key production companies have gone bankrupt. The current national forecast assumes about 200 very light jets will enter the fleet over the next two years, and then grow by 300 airplanes each year for the rest of the forecast period, reaching almost 5,000 aircraft by 2025.

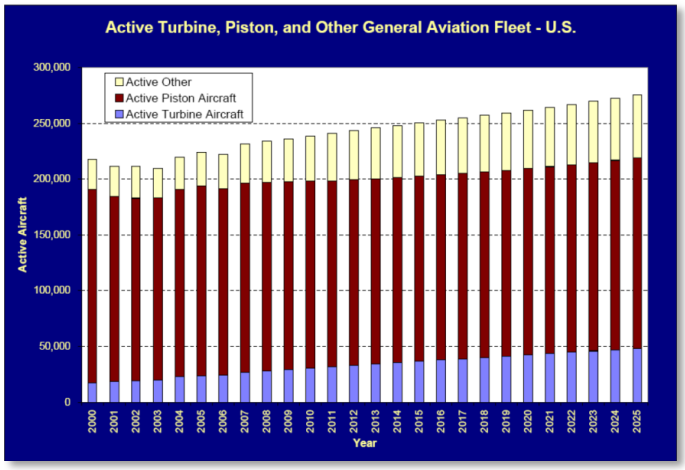
Both single-engine and multi-engine aircraft are expected to decline through 2013. After 2013, piston-powered aircraft will increase gradually and will exceed 170,000 by 2025.

The number of active general aviation pilots (excluding air transport pilots) is projected to decline through 2014, and then rebound through 2025. An expected increase of 42,000 active pilots over the forecast period will yield 509,900 pilots in 2025, an annual growth rate of 0.5 percent (Figure 21).

8.1.2 General Aviation Trends in Texas

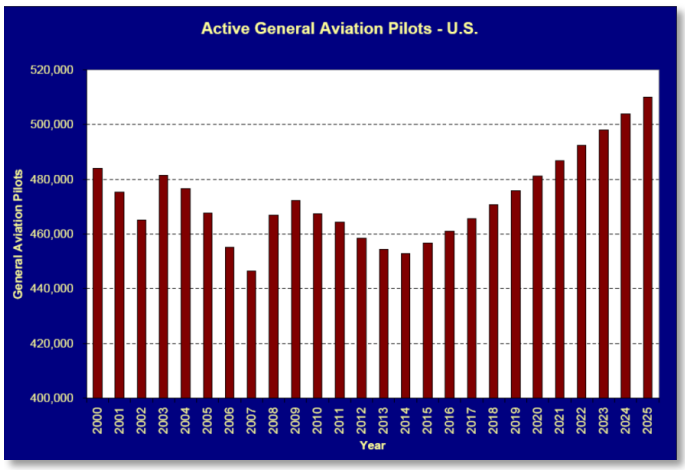
The forecasts for Texas general aviation are developed by TxDOT, which recently released its 2010 update of the TASP. Texas general aviation is forecast to mirror the predicted growth rates in the TAF published by the FAA. The TASP predicts (Figure 22) that general aviation activity will grow at an average annual rate of one percent from 2008 to 2025, and the fleet of general aviation aircraft will remain at about eight percent

Figure 20: National General Aviation Aircraft, 2000-2025



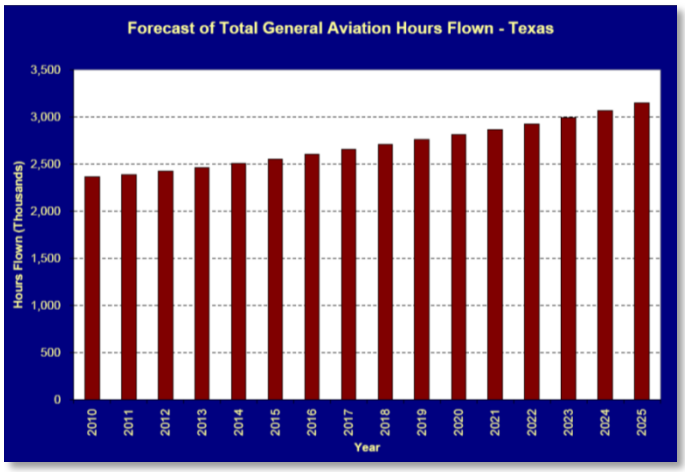
Source: FAA

Figure 21: General Aviation Pilots in US, 2000-2025



Source: FAA

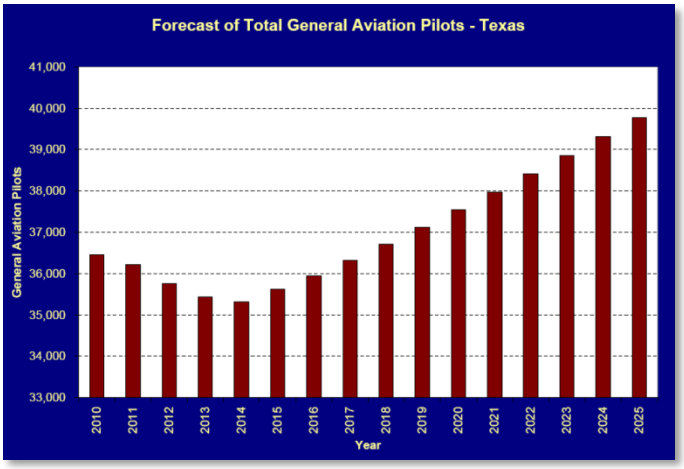
Figure 22: General Aviation Hours Flown in Texas, 2010-2025



Source: TxDOT

through 2025. The largest increase will be in the number of sport aircraft, which is expected to grow five percent per year from 2008 to 2025. This is closely followed by turbine-powered aircraft at 4.8 percent annually. Slow growth is expected in the single-engine, piston-powered aircraft market at 0.1 percent annually and the multi-engine, piston-powered aircraft market is expected to decrease annually at an average rate of one percent.

Figure 23: General Aviation Pilots in Texas, 2010-2025



Source: TxDOT

The flight hours for single engine aircraft are expected to increase 0.5 percent per year. Turbojet aircraft are expected to increase at a higher rate, growing at 5.2 percent annually by 2025. New models of business jets are expected to drive the increase in this category.

Texas is expected to have almost eight percent of the nation's general aviation pilots through 2025. The number of private pilots is expected to continue decreasing until the middle of the forecast period, at which time growth will commence (Figure 23). Similarly, the number of student pilots is expected to grow at an average rate of 0.4 percent per year through 2025.

8.1.3 General Aviation Trends in the Houston-Galveston Region

One can think of the Houston-Galveston region as a geographical aviation market within the United States, with customers attracted to the region for many reasons, and competing regions providing reasons for them to go elsewhere. In this context, the ratio of regional aviation activity to national aviation activity is like the market share of the region, and changes in this market share indicate how well or how poorly the region can complete with other regions for national aviation activity. The steps by which the regional market share is forecast are presented in Section 8.2 below.

The FAA reports that in 2008 there were 5,707 aircraft in its registry based in the 13-county Houston-Galveston region (Table 14). This total includes aircraft based at non-system airports not included in Section 5 above. The FAA Airmen Certification System reports 11,767 registered airmen certificates in the Houston-Galveston region, including student pilots, sport pilots, recreational pilots, commercial pilots, and airline transport pilots with United States certificates.

A comparison of regional based aircraft in the FAA TAF to national based aircraft in the FAA Aerospace Forecast shows that the Houston-Galveston region has about 1.125 percent of

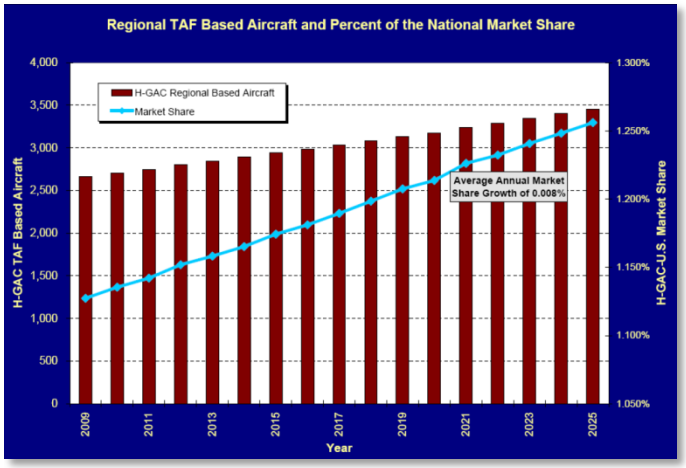
Table 14: Registered Aircraft and Airmen Certificates by County, 2010

County	Aircraft	Airmen
Austin	46	48
Brazoria	445	623
Chambers	58	59
Colorado	54	45
Fort Bend	353	883
Galveston	435	945
Harris	3,337	6,402
Liberty	48	71
Matagorda	55	56
Montgomery	483	2,359
Waller	119	107
Walker	71	78
Wharton	203	91
Total	**5,707**	**11,767**

Source: FAA Registry, May 2010; FAA Airmen Certification System, Active Pilots Detail, July 2010

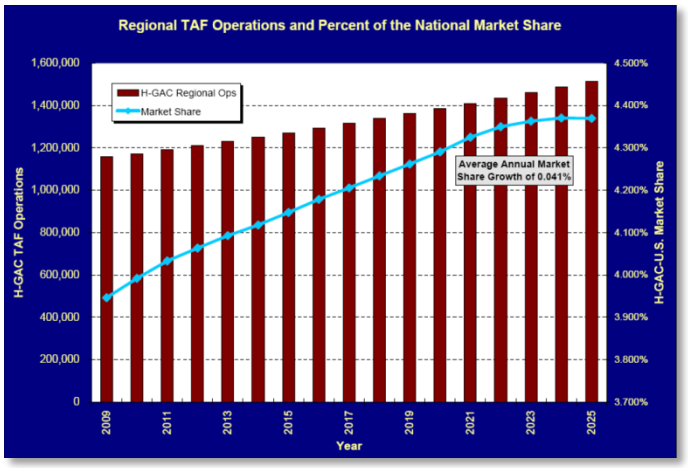
national based aircraft as of 2009, and that the region's market share will grow to over 1.25 percent by 2025 (Figure 24). For aviation operations, the region has about 3.95 percent of the national total in 2009, growing to almost 4.4 percent and leveling off by 2025 (Figure 25).

Figure 24: Based Aircraft in the Houston-Galveston Region, 2000-2025



Sources: FAA and URS

Figure 25: Aviation Operations in the Houston-Galveston Region, 2009-2025



Sources: FAA and URS

8.2 Methods

Aviation activity forecasts can be done in several ways, and planners often use more than one forecasting method to provide several assessments of future directions. The RASP forecasts aviation activity (operations and based aircraft) by simultaneously considering forecasts published by the FAA and TxDOT and two different forecasts developed in this study. The latter two forecasts are a multiple regression analysis of aviation activity at each airport on socioeconomic factors in the service area of the airport, and a market share analysis that considers factors that could change each airport's share of regional aviation. The analyses are completely independent because regression analysis uses local conditions to forecast activity ("bottom-up") and the market share analysis uses regional comparisons between airports to forecast changes in proportional distribution of activity ("top-down"). The result is a set of forecasts for each airport, some showing convergence and some not, with the recommended forecast selected by consensus of the participants in the planning process.

Different forecasting methods vary in how much they objectively apply data and subjectively use professional judgment. The multiple linear regression analysis begins with a set of assumptions and a database of relevant factors, and develops statistical models that best fit the data under the assumptions; few subjective judgments are needed, although the model may not capture all the appropriate factors. The market share analysis begins with a set of relationships between high-level airport statistics (proportions of based aircraft and operations) and the analysts apply their collective subjective judgments about how these proportions are expected to change over time, using their knowledge of a great many factors. Although regression analysis is inherently the more objective method, it is also inherently more limited in scope than market share analysis. By employing both methods independently, planners can more closely approach the goal of a balanced, unbiased forecast for each airport.

8.2.1 Data Sources

Socioeconomic data at the local, regional and national levels are provided by Woods and Poole Economics. The socioeconomic factors include population, employment, per capita personal income (PCPI, defined by the Bureau of Economic Analysis as the total personal income of the residents of an area divided by the population of the area), gross regional product (GRP, defined as the market value of all the goods and services produced in a metropolitan area within a given period of time) and retail sales.

The FAA TAF presents aviation data by airport from 2000 to 2008, then forecasts aviation activity to 2025. The multiple regression analysis for this study uses the 2000 to 2008 TAF data as the basis for developing regression relationships with socioeconomic factors. Typically, forecasts use historical information provided by the airport as a base for forecasting. However, many of the system's airports do not have historical information on aviation activity. For this reason, and for better uniformity, the historical values from the TAF are used. The TAF generates its historical data from information provided by the airport, usually in the FAA 5010 Airport Master Record form.

Five of the system's airports (Baytown Airport, Houston Executive Airport, Robert R. Wells Jr. Airport, Weiser Airpark, and North Houston Business Airport) are not included in the FAA's NPIAS and have no TAF data. The only forecast possible for these airports is the market share analysis, so multiple regression analysis is not conducted for these airports.

The base year for the forecast is 2008. The 2010 TAF contains historical information to this year only. Forecasts in the TAF begin with the 2009 data year. The based aircraft forecasts use the counts reported by the airports from November 2008 to February 2009 and reported in Section 5.5 above. For aviation operations, control tower data are used to estimate the number of operations in 2008 where available; otherwise, data reported on each airport's FAA Form 5010 for 2008 are used.

The Houston Airport System develops its own forecasts of operations and based aircraft for George Bush Intercontinental, William P. Hobby and Ellington Airports. These forecasts are used without further analysis in this report. Since George Bush Intercontinental Airport does not have a forecast of based aircraft, the regression analysis uses the TAF values.

8.2.2 Trend-Line Analysis

A simple trend-line analysis of the historical TAF data was also developed for most airports. Trend-line projections use historical data to produce linear extrapolations of past activity into the future. This method is very limited in its forecasting ability due to its sensitivity to the accuracy of the historical data and to variations in factors affecting the use of the airport. Many of the system's airports have experienced a recent decline in operations and based aircraft counts, so trend lines for these airports may point downward when all other forecasts point level or upward. Nonetheless, the trend line is provided for reference in the presentation of the forecasts.

8.2.3 Socioeconomic Regression Analysis

Once the linear trend was calculated, a multiple regression analysis was performed using TAF data for each system airport. In a multiple regression analysis, one determines the mix of independent variables (X) that explains the observed variation in each dependent variable (Y). The purpose of a regression analysis is to determine whether known dependent variables are

related strongly to known independent variables. This infers a causal relationship in which the dependent variables rely on the combination of independent variables. If the relationship is strong, then it is recommended the known future independent variables be used to forecast unknown future dependent variables.

Statistically, the multiple linear regression equation for any number of independent variables (k) is expressed as:

$$\boldsymbol{Y = a + b_1X_1 + b_2X_2 + \cdots + b_kX_k}$$

where Y is the calculated dependent variable, a is the Y-intercept, b is the regression coefficient for each independent variable 1 through k, and each X (1 through k) is an independent variable.

Many regression equations can be developed using different combinations of the independent variables, and for technical reasons, using all available variables will not give the strongest relationships in all circumstances. To determine the strongest relationship with the dependent variable, the analysis begins by stepwise testing of all possible correlations between five socioeconomic variables (population, employment, PCPI, GRP and retail sales and each of the two dependent variables (based aircraft and aviation operations) for the time period 2000 to 2008. The results were grouped by airport category (reliever or non-reliever) to determine the strongest regression equation for each group. For based aircraft at reliever airports, the combined independent variables of population, employment, PCPI and GRP yielded the strongest relationship. For based aircraft at non-reliever airports, population, employment and retail sales produced the best relationship. The strongest relationship for operations at reliever airports includes the independent variables of population, employment and PCPI, and for operations at non-reliever airports, population, employment, and GRP gave the best relationship.

The strength of a regression analysis is indicated by several statistics: the coefficient of correlation (r^2), the F-statistic, the critical F-statistic at 95 percent confidence and the Durbin-Watson (DW) statistic of autocorrelation. The coefficient of correlation measures the association between the changes in a dependent variable and an independent variable. If a socioeconomic factor is completely dependent on the value of an independent variable, then r^2 is 1 and the dependent variable is a reliable predictor of the independent variable. If r^2 is 0, then there is no discernable correlation between the two variables and the dependent variable cannot be used to predict the independent variable.

The F-statistic is a ratio of the sample variances or mean squares from a least-squares line that best fits the relationship between the independent variable and the dependent variables. If the F-statistic is large, then the regression explains most of the variability in the dependent variable. The critical F-statistic at 95 percent confidence is the value of the F-statistic at the threshold probability of 95 percent, dividing the results into areas where a relationship is statistically likely from where it is statistically unlikely.

The DW statistic indicates whether sequential residuals (the difference between the actual value of the dependent variable and the estimated value of the dependent variable) are correlated. Regression analysis assumes the residuals are independent of each other; although sometimes the data set may contain autocorrelation, in which a previous measurement affects the outcome of successive measurements. If the residuals are not autocorrelated, the DW statistic will be close to 2. If the DW statistic is closer to 0, then positive autocorrelation is present, and positive values tend to be followed by positive values and negative values by negative values. If the DW

statistic is closer to 4, then negative autocorrelation is present, and positive values tend to be followed by negative values and negative values by positive values.

Socioeconomic data for the multiple regression analysis (population, employment, PCPI and GRP) were provided for each year from 2000 to 2008 as county estimates. These data were disaggregated to the areas within a 30-minute drive time of each airport, using 2000 Census data from the U.S. Department of Commerce. The analysis assumes residents within a 30-minute drive from each airport are most likely to use that airport. The census tracts inside or touching the 30-minute drive time for each airport were used to calculate the ratio of population in the 30-minute drive-time polygon to the population of the counties within or partly within the 30-minute drive-time polygon for each airport. Table 15 shows the estimated 2008 population and employment in the 30-minute drive time area of each system airport. The population ratio was calculated for each airport and used to determine the population, PCPI, GRP, and retail sales independent variables within the 30-minute drive time for that airport. The ratio for employment used Census Transportation Planning Package 2000 tract counts by place of work to determine the employment values within the 30-minute drive time polygon.

Table 15: Population and Employment in 30-Minute Drive Time Areas of System Airports

Airport	Population	Employment
Air Carrier Airports		
George Bush Intercontinental	4,469,200	1,873,100
William P. Hobby	4,581,700	1,936,000
Reliever Airports		
Texas Gulf Coast Regional	331,100	102,200
D.W. Hooks Memorial	3,217,300	1,612,100
Ellington	3,411,000	1,733,600
Houston Southwest	3,462,500	1,693,000
La Porte Municipal	3,614,500	1,854,200
Lone Star Executive	993,400	358,700
Pearland Regional	3,481,300	1,707,100
Scholes International	537,300	194,700
Sugar Land Regional	4,002,700	1,853,990
West Houston	4,180,800	1,928,800
Other General Aviation Airports		
Bay City Municipal	218,800	67,700
Baytown	2,191,800	1,105,400
Chambers County	315,600	67,800
Cleveland Municipal	431,900	142,900
Eagle Lake	132,400	33,200
Houston Executive	2,164,300	932,700
Huntsville Municipal	146,100	39,800
Liberty Municipal	316,000	75,100
Palacios Municipal	53,400	10,700
Robert R. Wells	82,400	17,100
Weiser Airpark	4,175,000	1,913,300
Wharton Regional	150,600	36,300
North Houston Business	2,506,600	1,375,100
Winnie-Stowell	55,700	4,600

Sources: Woods & Poole Economics, U.S. Bureau of the Census, URS

Two additional forecast lines—the upper and lower 95 percent confidence limits—are included in the analysis. These lines indicate the degree of uncertainty in the regression model due to variability in the yearly data. The confidence interval equation is:

$$Y = \pm t(s_e)\sqrt{\frac{1}{n} + \frac{(X - \bar{X})^2}{\sum X^2 - (\frac{(\sum X)^2}{n})}}$$

where Y is the predicted value of the dependent variable; X is each independent variable; $\bar{X}$ is the mean value of each independent variable; n is the number of observations; S_e is the standard error of estimate; and t is the t-distribution at n – 2 degrees of freedom.

Eighteen out of the 26 airports in the Houston-Galveston system were forecast using multiple linear regression analysis. Three of the 26 airports are included in the Houston Airport System

and already have detailed forecast data. Five of the 26 airports are not included in the FAA's NPIAS and do not have TAF data on which to base a regression model.

Appendix B includes the results of each regression analysis for each airport. It shows the regression model for each dependent variable at that airport (based aircraft and aviation operations) as both equations and as regression lines with their 95 percent confidence limits on a graph for comparison to other forecasts. It also shows the statistics indicating whether that regression model is strong or weak.

8.2.4 Market Share Analysis

The market share analysis is another forecasting method commonly used in aviation. These projections are developed by planners who start with the current calculated share of aviation activity at each airport, then estimate what that share is likely to be at each forecast year. The change in market share of each airport is typically based on national and regional trends, changes in the airport facility, in the facilities of nearby airports, in the community and in the business environment.

Two market share forecasts were conducted for each airport. The static market share method simply holds the current market shares for each airport constant throughout the forecast period, allowing aviation activity to grow or shrink proportionally at each airport as the region grows or shrinks. The dynamic market share allows planners to change market shares of different airports relative to each other, based on information the planners have about national and regional trends, airports' plans for improvement and expected changes in the communities and businesses near the airports.

The static market share of based aircraft at each airport is determined by calculating the ratio of based aircraft at each airport in the region to the total number of based aircraft in the region in 2009, as published in the FAA TAF. The 2009 market share is then multiplied by the projected number of based aircraft in the region (Figure 24) for the forecast years to produce the projected number of based aircraft at that airport in that year. The calculation of the static market share for operations follows the same process as for based aircraft, using aircraft operation data instead (Figure 25).

The dynamic market share approach involves both statistical analysis and judgment. The dynamic market share for each airport in the base year 2008 is the same market share as the static market share. For other forecast years, the dynamic market share was adjusted to reflect known and expected changes in the relative proportions among the airports, with the total market share always fixed at 100 percent.

8.2.5 Fleet Mix Projections

Like the market share analysis, the forecast of fleet mix is based on national and regional trends in general aviation. The 2009-2025 FAA Aerospace Forecast predicts that numbers of single- and multi-engine piston aircraft are expected to remain relatively constant over the next 15 years, with a slight decrease in the near term followed by a slight increase. Meanwhile, turbine-powered aircraft are expected to increase gradually over the next 15 years.

The RASP forecasts fleet mix from the recommended forecast of based aircraft for each airport. The current proportions of single-engine propeller, multi-engine propeller, jet, rotorcraft, military and ultralight aircraft are obtained from airport operator surveys and interviews. The fleet mix for

each airport was then adjusted for 2015, 2020 and 2030 based on planners' knowledge of trends in the national and regional markets. However, since the fleet mix is developed from based aircraft and not itinerant aircraft, applying the proportions of aircraft types to operations is only accurate if one assumes itinerant aircraft have the same approximate mix as based aircraft. Of course, the mix of aircraft for operations at an airport is not always equal to that of the based aircraft fleet mix. Therefore, the fleet mix for operations is valid only if this assumption is valid.

8.3 Results and Recommendations

Each airport has up to six forecasts displayed on the graphs in Appendix B: FAA TAF, TxDOT TASP, trend line, multiple linear regression model (with confidence limits) and static and dynamic market share. Each airport's forecasts are presented in mathematical and graphical form in Appendix B, along with the recommendation for the forecast (or combination of forecasts) to use in the RASP. Planners selected a recommended forecast, or combination of forecasts, as their consensus of which forecast best matches expectations for future based aircraft or aviation operations for that airport. In general, the recommendation for airports for which FAA TAF data exist (and therefore a regression analysis is possible) is the average of the multiple regression, the static market share and the dynamic market share forecasts. The recommendation for airports without TAF data, or for which the regression model is not sufficiently reliable, is the dynamic market share forecast alone.

The static and dynamic market share proportions assigned to each airport for the forecast period are shown in Table 16. A summary of the recommended forecasts of based aircraft and operations for all system airports are presented in Table 17 and Table 18. A summary of the existing and forecast fleet mix is shown in Table 19 and Table 20. A summary of the factors considered for each airport in developing its forecast and selecting a recommended forecast is presented in the next section.

Table 16: Static and Dynamic Market Share Forecasts of Based GA Aircraft and Operations

	Based Aircraft				Aircraft Operations			
	Static	Dynamic			Static	Dynamic		
Airport	2008	2015	2020	2030	2008	2015	2020	2030
Air Carrier Airports								
George Bush Intercontinental	2.5%	2.4%	2.4%	2.3%	1.1%	1.2%	1.2%	1.2%
William P. Hobby	9.3%	9.0%	8.5%	7.4%	7.3%	7.3%	6.8%	6.1%
Reliever Airports								
Texas Gulf Coast Regional	3.4%	3.5%	3.6%	3.9%	5.4%	5.6%	5.7%	6.0%
David Wayne Hooks	16.3%	15.8%	15.6%	15.2%	20.3%	20.1%	20.0%	19.7%
Ellington	7.7%	7.5%	7.2%	6.6%	8.6%	9.4%	9.3%	9.2%
Houston Southwest	4.8%	4.9%	5.1%	5.3%	4.2%	3.8%	3.7%	3.5%
La Porte Municipal	5.7%	5.5%	5.2%	4.6%	7.4%	6.6%	6.3%	5.3%
Lone Star Executive	7.0%	6.9%	7.1%	7.6%	6.9%	6.8%	7.0%	8.0%
Pearland Regional	7.4%	7.3%	7.1%	6.9%	8.1%	7.7%	7.7%	7.5%
Scholes International	4.8%	4.7%	5.0%	5.5%	1.4%	1.4%	1.5%	1.7%
Sugar Land Regional	4.3%	4.4%	4.6%	4.9%	6.0%	6.3%	6.6%	6.9%
West Houston	10.8%	10.4%	10.4%	10.8%	9.5%	9.2%	9.4%	9.3%
Other General Aviation Airports								
Bay City Municipal	1.5%	1.4%	1.4%	1.6%	0.8%	0.8%	0.8%	0.9%
Baytown	1.1%	1.2%	1.3%	1.3%	0.9%	0.8%	0.9%	0.9%
Chambers County	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%
Cleveland Municipal	1.5%	1.5%	1.7%	1.7%	1.3%	1.3%	1.3%	1.4%
Eagle Lake	1.0%	1.1%	1.1%	1.1%	1.2%	1.2%	1.3%	1.4%
Houston Executive	1.3%	2.0%	2.1%	2.0%	0.8%	1.2%	1.3%	1.3%
Huntsville Municipal	1.3%	1.7%	1.7%	1.6%	1.7%	2.1%	2.1%	2.0%
Liberty Municipal	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%
Palacios Municipal	0.5%	0.6%	0.6%	0.7%	0.1%	0.1%	0.1%	0.2%
R.R. Wells	0.4%	0.4%	0.5%	0.5%	0.3%	0.3%	0.3%	0.3%
Weiser Airpark	2.7%	2.6%	2.5%	2.4%	3.5%	3.3%	3.3%	3.2%
Wharton Regional	2.0%	1.9%	2.0%	2.1%	1.1%	1.1%	1.2%	1.4%
North Houston Business	1.9%	2.0%	2.2%	2.6%	0.9%	1.0%	1.1%	1.2%
Winnie-Stowell	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%

Sources: FAA, URS

Table 17: Recommended Forecasts for Based Aircraft at System Airports, 2008-2030

		2015			2020			2030		
Airport	2008 Based Aircraft	Based Aircraft	Annual Growth Rate	Change from TAF	Based Aircraft	Annual Growth Rate	Change from TAF	Based Aircraft	Annual Growth Rate	Change from TAF
Air Carrier Airports										
George Bush Intercontinental	72	74	0.4%	95%	77	0.8%	103%	83	0.8%	118%
William P. Hobby	273	281	0.4%	-12%	286	0.4%	-19%	298	0.4%	-32%
Reliever Airports										
Texas Gulf Coast Regional	99	103	0.6%	3%	110	1.3%	-2%	128	1.5%	-11%
D.W. Hooks Memorial	478	497	0.6%	159%	526	1.1%	149%	595	1.2%	132%
Ellington	227	237	0.6%	5%	244	0.6%	8%	259	0.6%	16%
Houston Southwest	140	150	1.0%	-9%	165	1.9%	-13%	200	1.9%	-20%
La Porte Municipal	167	170	0.3%	43%	177	0.8%	34%	194	0.9%	14%
Lone Star Executive	207	231	1.6%	14%	258	2.2%	17%	317	2.1%	20%
Pearland Regional	216	227	0.7%	5%	240	1.1%	2%	273	1.3%	-4%
Scholes International	141	151	1.0%	-1%	165	1.8%	2%	200	1.9%	8%
Sugar Land Regional	127	135	0.9%	-12%	147	1.7%	-15%	173	1.6%	-19%
West Houston	316	334	0.8%	3%	358	1.4%	4%	419	1.6%	
Other General Aviation Airports										
Bay City Municipal	43	44	0.3%	33%	47	1.3%	42%	61	2.6%	85%
Baytown	31	35	1.7%		41	3.2%		50	2.0%	
Chambers County	11	12	0.0%	0%	13	1.6%	8%	15	1.4%	25%

Airport	2008 Based Aircraft	2015 Based Aircraft	2015 Annual Growth Rate	2015 Change from TAF	2020 Based Aircraft	2020 Annual Growth Rate	2020 Change from TAF	2030 Based Aircraft	2030 Annual Growth Rate	2030 Change from TAF
Cleveland Municipal	43	47	1.3%	-10%	53	2.4%	-9%	62	1.6%	-18%
Eagle Lake	28	31	1.5%	29%	34	1.9%	42%	39	1.4%	63%
Houston Executive	37	62	7.7%		67	1.6%		75	1.1%	
Huntsville Municipal	38	52	4.6%	49%	56	1.5%	60%	60	0.7%	
Liberty Municipal	13	13	0.0%	-7%	14	1.5%	0%	15	0.7%	7%
Palacios Municipal	16	18	1.7%	39%	20	2.1%	54%	25	2.3%	92%
R.R. Wells, Jr.	12	13	1.2%		15	2.9%		19	2.4%	
Weiser Airpark	78	78	0.0%		81	0.8%		91	1.2%	
Wharton Regional	58	61	0.7%	56%	65	1.3%	67%	76	1.6%	95%
North Houston Business	56	62	1.5%		72	3.0%		99	3.2%	
Winnie-Stowell	11	11	0.0%	10%	12	1.8%	20%	13	0.8%	30%
All Airports	**2,938**	**3,129**	**0.9%**		**3,343**	**1.3%**		**3,839**	**1.4%**	

Source: URS, Quadrant Consultants

Table 18: Recommended Forecasts of GA Operations at System Airports, 2008-2030

Airport	2008 Operations	2015 Operations	2015 Annual Growth Rate	2015 Change from TAF	2020 Operations	2020 Annual Growth Rate	2020 Change from TAF	2030 Operations	2030 Annual Growth Rate	2030 Change from TAF
Air Carrier Airports										
George Bush Intercontinental*	591,700	558,988	-4.6%	-11%	578,296	0.1%	-20%	629,615	0.1%	-34%
William P. Hobby	219,000	216,800	-0.1%	5%	224,700	0.7%	3%	242,800	0.8%	-1%
Reliever Airports										
Texas Gulf Coast Regional	60,000	68,400	1.9%	-3%	74,100	1.6%	-6%	86,500	1.6%	-12%
D.W. Hooks Memorial	247,800	274,800	1.5%	17%	292,200	1.2%	17%	326,300	1.1%	16%
Ellington	153,200	165,400	1.1%	-6%	172,500	0.8%	-2%	191,700	1.1%	9%
Houston Southwest	46,400	55,600	2.6%	1%	62,000	2.2%	-1%	75,500	2.0%	-6%
La Porte Municipal	79,400	85,300	1.0%	-7%	89,500	1.0%	-15%	96,800	0.8%	-27%
Lone Star Executive	83,900	95,900	1.9%	4%	102,600	1.4%	2%	131,500	2.5%	8%
Pearland Regional	87,400	100,200	2.0%	1%	109,700	1.8%	0%	128,200	1.6%	-3%
Scholes International	35,500	38,500	1.2%	22%	41,400	1.5%	25%	48,700	1.6%	34%
Sugar Land Regional	75,600	83,900	1.5%	20%	90,100	1.4%	21%	101,600	1.2%	19%
West Houston	103,000	115,100	1.6%	1%	124,800	1.6%	2%	142,500	1.3%	1%
Other General Aviation Airports										
Bay City Municipal	8,800	10,200	2.2%	17%	11,400	2.2%	30%	13,800	1.9%	58%
Baytown	9,600	10,600	1.4%		11,700	2.0%		13,900	1.7%	
Chambers County	3,000	3,400	1.8%	13%	3,900	2.8%	30%	5,000	2.5%	67%
Cleveland Municipal	14,200	16,400	2.1%	16%	18,300	2.2%	29%	21,800	1.8%	54%
Eagle Lake	13,200	16,200	3.0%	23%	18,500	2.7%	40%	23,300	2.3%	77%
Houston Executive	9,000	15,500	8.1%		17,000	1.9%		20,000	1.6%	
Huntsville Municipal	21,400	28,700	4.2%	123%	31,700	2.0%	147%	34,700	0.9%	170%
Liberty Municipal	5,700	6,500	1.8%	14%	7,200	2.1%	26%	8,400	1.6%	47%
Palacios Municipal	3,000	3,200	1.1%	8%	3,500	1.8%	18%	4,100	1.6%	39%
R.R. Wells, Jr.	2,800	3,400	2.8%		3,600	1.1%		4,100	1.3%	
Weiser Airpark	38,000	41,600	1.3%		44,900	1.5%		51,200	1.3%	
Wharton Regional	11,800	13,900	2.4%	18%	15,400	2.1%	31%	18,900	2.1%	60%
North Houston Business	10,000	12,600	3.4%		14,800	3.3%		19,000	2.5%	
Winnie-Stowell	3,000	3,400	1.8%	13%	3,600	1.1%	20%	4,200	1.6%	40%
All Airports	**1,936,400**	**2,044,488**	**0.1%**		**2,167,396**	**1.2%**		**2,444,115**	**1.2%**	

Source: URS, Quadrant Consultants.
*New forecasts for George Bush Intercontinental were completed in February 2011.

Table 19: Based General Aviation Aircraft Fleet Mix, 2008-2015

Airport		2008 Single Engine	2008 Multi-Engine	2008 Jet	2008 Rotor	2008 Other	2008 Total	2015 Single Engine	2015 Multi-Engine	2015 Jet	2015 Rotor	2015 Other	2015 Total
Air Carrier Airports													
	Percentage	4%	46%	44%	6%	0%		4%	39%	51%	6%	0%	
George Bush Intercontinental*	Operations (000)	24.7	271.2	263.0	32.9	0.0	591.7	22.3	217.9	285.0	33.5	0.0	558.9
	Based Aircraft	3	33	32	4	0	72	3	29	37	5	0	74
	Percentage	26%	23%	45%	6%	0%		19%	17%	61%	4%	0%	
William P. Hobby	Operations (000)	57.4	50.4	98.6	12.7	0.0	219.0	41.2	35.8	132.3	7.6	0.0	216.8
	Based Aircraft	72	63	122	16	0	273	53	46	172	10	0	281
Reliever Airports													
	Percentage	72%	16%	2%	10%	0%		70%	15%	3%	13%	0%	
Texas Gulf Coast Regional	Operations (000)	43.0	9.7	1.2	6.1	0.0	60.0	47.8	10.3	1.7	8.6	0.0	68.4
	Based Aircraft	71	16	2	10	0	99	71	16	3	13	0	103
	Percentage	76%	13%	6%	6%	0%		74%	12%	7%	7%	0%	
D.W. Hooks Memorial	Operations (000)	188.4	31.0	14.2	14.2	0.0	247.8	203.5	32.1	19.6	19.6	0.0	274.8
	Based Aircraft	364	60	27	27	0	478	369	58	35	35	0	497
	Percentage	85%	11%	5%	0%	0%		81%	10%	9%	0%	0%	
Ellington	Operations (000)	129.4	16.1	7.7	0.0	0.0	153.2	134.3	16.7	14.4	0.0	0.0	165.4
	Based Aircraft	192	24	11	0	0	227	192	24	21	0	0	237
	Percentage	81%	17%	0%	1%	0%		82%	16%	0%	2%	0%	
Houston Southwest	Operations (000)	37.8	8.0	0.0	0.7	0.0	46.4	45.4	9.2	0.0	1.0	0.0	55.6
	Based Aircraft	114	24	0	2	0	140	122	25	0	3	0	150
	Percentage	90%	8%	0%	2%	0%		90%	8%	0%	2%	0%	
La Porte Municipal	Operations (000)	71.3	6.7	0.0	1.4	0.0	79.4	76.5	6.8	0.0	2.0	0.0	85.3
	Based Aircraft	150	14	0	3	0	167	152	14	0	4	0	170
	Percentage	84%	10%	6%	0%	0%		83%	10%	7%	0%	0%	
Lone Star Executive	Operations (000)	70.6	8.5	4.9	0.0	0.0	83.9	79.7	9.2	7.0	0.0	0.0	95.9
	Based Aircraft	174	21	12	0	0	207	192	22	17	0	0	231
	Percentage	90%	7%	0%	3%	0%		90%	7%	0%	4%	0%	
Pearland Regional	Operations (000)	78.9	6.1	0.0	2.4	0.0	87.4	90.0	6.6	0.0	3.5	0.0	100.2
	Based Aircraft	195	15	0	6	0	216	204	15	0	8	0	227
	Percentage	65%	15%	1%	17%	2%		61%	14%	2%	21%	3%	
Scholes International	Operations (000)	22.9	5.3	0.5	6.0	0.8	35.5	23.6	5.2	0.7	8.0	1.0	38.5
	Based Aircraft	91	21	2	24	3	141	92	21	3	31	4	151
	Percentage	51%	28%	20%	2%	0%		49%	25%	24%	2%	0%	
Sugar Land Regional	Operations (000)	38.7	20.8	14.9	1.2	0.0	75.6	41.0	21.2	20.1	1.6	0.0	83.9
	Based Aircraft	65	35	25	2	0	127	66	34	32	3	0	135
	Percentage	87%	9%	2%	2%	0%		87%	8%	3%	3%	0%	
West Houston	Operations (000)	89.9	8.8	2.1	2.1	0.0	103.0	99.7	9.4	3.0	3.0	0.0	115.1
	Based Aircraft	277	27	6	6	0	316	289	27	9	9	0	334
Other General Aviation Airports													
	Percentage	72%	14%	5%	0%	9%		70%	13%	6%	0%	11%	
Bay City Municipal	Operations (000)	6.3	1.2	0.4	0.0	0.8	8.8	7.2	1.3	0.6	0.0	1.2	10.2
	Based Aircraft	31	6	2	0	4	43	30	6	3	0	5	44
	Percentage	84%	10%	3%	3%	0%		83%	9%	4%	4%	0%	
Baytown	Operations (000)	8.1	0.9	0.3	0.3	0.0	9.6	8.8	1.0	0.4	0.4	0.0	10.6
	Based Aircraft	26	3	1	1	0	31	29	3	2	1	0	35
	Percentage	91%	9%	0%	0%	0%		91%	9%	0%	0%	0%	
Chambers County	Operations (000)	2.7	0.3	0.0	0.0	0.0	3.0	3.1	0.3	0.0	0.0	0.0	3.4
	Based Aircraft	10	1	0	0	0	11	11	1	0	0	0	12
	Percentage	93%	7%	0%	0%	0%		93%	7%	0%	0%	0%	
Cleveland Municipal	Operations (000)	13.2	1.0	0.0	0.0	0.0	14.2	15.3	1.1	0.0	0.0	0.0	16.4
	Based Aircraft	40	3	0	0	0	43	44	3	0	0	0	47
	Percentage	86%	14%	0%	0%	0%		86%	14%	0%	0%	0%	
Eagle Lake	Operations (000)	11.3	1.9	0.0	0.0	0.0	13.2	14.0	2.2	0.0	0.0	0.0	16.2
	Based Aircraft	24	4	0	0	0	28	27	4	0	0	0	31
	Percentage	68%	16%	16%	0%	0%		37%	37%	23%	2%	2%	
Houston Executive	Operations (000)	6.1	1.5	1.5	0.0	0.0	9.0	5.8	5.8	3.5	0.3	0.3	15.5
	Based Aircraft	25	6	6	0	0	37	23	23	14	1	1	62
	Percentage	88%	8%	1%	3%	0%		88%	7%	2%	3%	0%	
Huntsville Municipal	Operations (000)	18.9	1.7	0.3	0.6	0.0	21.5	25.1	2.1	0.5	0.9	0.0	28.7
	Based Aircraft	34	3	0	1	0	38	46	3	1	2	0	52
	Percentage	77%	15%	0%	0%	8%		76%	15%	0%	0%	10%	
Liberty Municipal	Operations (000)	4.4	0.9	0.0	0.0	0.4	5.7	4.9	0.9	0.0	0.0	0.6	6.5
	Based Aircraft	10	2	0	0	1	13	10	2	0	0	1	13

Airport		2008 Single Engine	2008 Multi-Engine	2008 Jet	2008 Rotor	2008 Other	2008 Total	2015 Single Engine	2015 Multi-Engine	2015 Jet	2015 Rotor	2015 Other	2015 Total
	Percentage	69%	0%	0%	31%	0%		63%	0%	0%	37%	0%	
Palacios Municipal	Operations (000)	2.0	0.0	0.0	0.9	0.0	3.0	2.0	0.0	0.0	1.2	0.0	3.2
	Based Aircraft	11	0	0	5	0	16	11	0	0	7	0	18
	Percentage	100%	0%	0%	0%	0%		100%	0%	0%	0%	0%	
Robert R. Wells	Operations (000)	2.8	0.0	0.0	0.0	0.0	2.8	3.4	0.0	0.0	0.0	0.0	3.4
	Based Aircraft	12	0	0	0	0	12	13	0	0	0	0	13
	Percentage	90%	6%	0%	4%	0%		89%	6%	0%	5%	0%	
Weiser Airpark	Operations (000)	34.1	2.4	0.0	1.5	0.0	38.0	37.0	2.5	0.0	2.0	0.0	41.6
	Based Aircraft	70	5	0	3	0	78	69	5	0	4	0	78
	Percentage	64%	16%	0%	0%	21%		59%	14%	3%	0%	24%	
Wharton Regional	Operations (000)	7.5	1.8	0.0	0.0	2.4	11.8	8.2	1.9	0.4	0.0	3.3	13.9
	Based Aircraft	37	9	0	0	12	58	36	8	2	0	15	61
	Percentage	93%	7%	0%	0%	0%		93%	7%	0%	0%	0%	
North Houston Business	Operations (000)	9.3	0.7	0.0	0.0	0.0	10.0	11.8	0.9	0.0	0.0	0.0	12.6
	Based Aircraft	52	4	0	0	0	56	58	4	0	0	0	62
	Percentage	73%	27%	0%	0%	0%		74%	26%	0%	0%	0%	
Winnie-Stowell	Operations (000)	2.2	0.8	0.0	0.0	0.0	3.0	2.5	0.9	0.0	0.0	0.0	3.4
	Based Aircraft	8	3	0	0	0	11	8	3	0	0	0	11

Source: URS, Quadrant Consultants. *New forecasts for George Bush Intercontinental were completed in February 2011.

Table 20: Based General Aviation Aircraft Fleet Mix, 2020-2030

Airport		2020 Single Engine	2020 Multi-Engine	2020 Jet	2020 Rotor	2020 Other	2020 Total	2030 Single Engine	2030 Multi-Engine	2030 Jet	2030 Rotor	2030 Other	2030 Total
Air Carrier Airports													
	Percentage	3%	35%	46%	7%	0%		3%	27%	63%	7%	0%	
George Bush Intercontinental*	Operations (000)	17.3	202.4	266.0	40.4	0.0	578.3	18.8	169.9	396.6	44.0	0.0	629.6
	Based Aircraft	3	26	43	5	0	77	3	22	53	5	0	83
	Percentage	14%	13%	71%	3%	0%		12%	11%	75%	3%	0%	
William P. Hobby	Operations (000)	31.5	28.1	158.4	6.7	0.0	224.7	27.9	25.5	182.1	7.3	0.0	242.8
	Based Aircraft	40	36	201	9	0	286	34	31	224	9	0	298
Reliever Airports													
	Percentage	69%	14%	3%	14%	1%		68%	12%	4%	16%	1%	
Texas Gulf Coast Regional	Operations (000)	50.8	10.3	2.1	10.2	0.7	74.1	58.7	10.1	3.1	13.7	0.9	86.5
	Based Aircraft	76	15	3	15	1	110	87	15	5	20	1	128
	Percentage	73%	11%	8%	8%	0%		72%	9%	10%	9%	0%	
D.W. Hooks Memorial	Operations (000)	213.0	31.5	23.9	22.8	1.0	292.2	233.6	29.3	33.1	29.2	1.2	326.3
	Based Aircraft	383	57	43	41	2	526	427	53	60	53	2	595
	Percentage	78%	11%	11%	0%	0%		78%	11%	11%	0%	0%	
Ellington	Operations (000)	134.6	19.0	19.0	0.0	0.0	172.5	149.5	21.1	21.1	0.0	0.0	191.7
	Based Aircraft	190	27	27	0	0	244	203	28	28	0	0	259
	Percentage	80%	15%	2%	2%	1%		81%	13%	3%	2%	1%	
Houston Southwest	Operations (000)	49.6	9.4	1.3	1.2	0.4	62.0	61.3	9.8	2.1	1.8	0.6	75.5
	Based Aircraft	133	25	3	3	1	165	162	26	5	5	2	200
	Percentage	89%	8%	0%	3%	1%		90%	6%	0%	3%	1%	
La Porte Municipal	Operations (000)	80.0	6.7	0.0	2.3	0.5	89.5	87.1	6.2	0.0	2.9	0.6	96.8
	Based Aircraft	159	13	0	4	1	177	175	12	0	6	1	194
	Percentage	82%	9%	8%	0%	0%		81%	7%	11%	0%	1%	
Lone Star Executive	Operations (000)	84.3	9.2	8.6	0.0	0.5	102.6	107.1	9.8	13.9	0.0	0.7	131.5
	Based Aircraft	212	23	22	0	1	258	258	24	33	0	2	317
	Percentage	89%	6%	1%	4%	0%		89%	5%	1%	5%	1%	
Pearland Regional	Operations (000)	97.2	6.7	1.0	4.2	0.5	109.7	113.6	6.7	1.5	5.8	0.6	128.2
	Based Aircraft	213	15	2	9	1	240	243	14	3	12	1	273
	Percentage	60%	13%	2%	23%	3%		59%	10%	2%	26%	3%	
Scholes International	Operations (000)	25.0	5.2	0.8	9.3	1.1	41.4	28.6	5.0	1.2	12.5	1.4	48.7
	Based Aircraft	100	21	3	37	4	165	117	21	5	51	6	200
	Percentage	47%	23%	27%	2%	1%		45%	19%	33%	2%	1%	
Sugar Land Regional	Operations (000)	42.6	20.7	24.3	1.9	0.7	90.1	46.2	18.9	33.3	2.3	0.8	101.6
	Based Aircraft	69	34	40	3	1	147	79	32	57	4	1	173
	Percentage	86%	8%	3%	3%	0%		86%	6%	4%	3%	0%	
West Houston	Operations (000)	107.9	9.5	3.8	3.6	0.0	124.8	123.0	9.2	5.4	4.8	0.0	142.5
	Based Aircraft	310	27	11	10	0	358	362	27	16	14	0	419

Airport		2020 Single Engine	2020 Multi-Engine	2020 Jet	2020 Rotor	2020 Other	2020 Total	2030 Single Engine	2030 Multi-Engine	2030 Jet	2030 Rotor	2030 Other	2030 Total
Other General Aviation Airports													
	Percentage	69%	12%	7%	0%	12%		68%	10%	8%	0%	13%	
Bay City Municipal	Operations (000)	7.9	1.4	0.8	0.0	1.4	11.4	9.4	1.4	1.1	0.0	1.8	13.8
	Based Aircraft	32	6	3	0	6	47	42	6	5	0	8	61
	Percentage	80%	8%	5%	4%	3%		79%	7%	6%	5%	3%	
Baytown	Operations (000)	9.3	1.0	0.5	0.5	0.4	11.7	11.0	1.0	0.8	0.7	0.5	13.9
	Based Aircraft	33	3	2	2	1	41	39	3	3	3	2	50
	Percentage	84%	8%	0%	0%	8%		78%	6%	7%	0%	9%	
Chambers County	Operations (000)	3.2	0.3	0.0	0.0	0.3	3.9	3.9	0.3	0.4	0.0	0.4	5.0
	Based Aircraft	11	1	0	0	1	13	12	1	1	0	1	15
	Percentage	89%	6%	2%	0%	2%		90%	5%	3%	0%	2%	
Cleveland Municipal	Operations (000)	16.3	1.1	0.4	0.0	0.4	18.3	19.6	1.1	0.6	0.0	0.5	21.8
	Based Aircraft	48	3	1	0	1	53	55	3	2	0	2	62
	Percentage	81%	12%	3%	0%	3%		82%	10%	4%	0%	4%	
Eagle Lake	Operations (000)	15.0	2.3	0.6	0.0	0.6	18.5	19.0	2.4	1.0	0.0	0.9	23.3
	Based Aircraft	28	4	1	0	1	34	32	4	2	0	1	39
	Percentage	37%	34%	26%	2%	2%		36%	28%	32%	2%	2%	
Houston Executive	Operations (000)	6.2	5.8	4.4	0.3	0.3	17.0	7.2	5.7	6.4	0.4	0.3	20.0
	Based Aircraft	24	23	18	1	1	67	27	21	24	2	1	75
	Percentage	83%	7%	5%	3%	2%		78%	5%	11%	4%	3%	
Huntsville Municipal	Operations (000)	26.2	2.1	1.5	1.1	0.8	31.7	26.9	1.8	3.8	1.3	0.9	34.7
	Based Aircraft	46	4	3	2	1	56	46	3	7	2	2	60
	Percentage	76%	14%	0%	0%	10%		72%	11%	7%	0%	11%	
Liberty Municipal	Operations (000)	5.5	1.0	0.0	0.0	0.7	7.2	6.0	0.9	0.6	0.0	0.9	8.4
	Based Aircraft	11	2	0	0	1	14	10	2	1	0	2	15
	Percentage	55%	0%	5%	35%	5%		51%	0%	6%	38%	5%	
Palacios Municipal	Operations (000)	1.9	0.0	0.2	1.2	0.2	3.5	2.1	0.0	0.2	1.6	0.2	4.1
	Based Aircraft	11	0	1	7	1	20	13	0	1	10	1	25
	Percentage	75%	13%	6%	0%	6%		75%	11%	8%	0%	7%	
Robert R. Wells	Operations (000)	2.7	0.5	0.2	0.0	0.2	3.6	3.1	0.4	0.3	0.0	0.3	4.1
	Based Aircraft	11	2	1	0	1	15	14	2	2	0	1	19
	Percentage	88%	6%	0%	5%	1%		88%	5%	0%	6%	1%	
Weiser Airpark	Operations (000)	39.4	2.5	0.0	2.4	0.6	44.9	44.9	2.4	0.0	3.2	0.7	51.2
	Based Aircraft	71	5	0	4	1	81	80	4	0	6	1	91
	Percentage	55%	12%	9%	0%	24%		53%	10%	11%	0%	26%	
Wharton Regional	Operations (000)	8.5	1.9	1.4	0.0	3.7	15.4	10.1	1.9	2.1	0.0	4.9	18.9
	Based Aircraft	35	8	6	0	16	65	40	8	8	0	20	76
	Percentage	89%	6%	3%	0%	2%		85%	5%	8%	0%	2%	
North Houston Business	Operations (000)	13.1	0.9	0.5	0.0	0.3	14.8	16.2	1.0	1.5	0.0	0.3	19.0
	Based Aircraft	65	4	2	0	1	72	84	5	8	0	2	99
	Percentage	68%	23%	0%	0%	9%		70%	20%	0%	0%	10%	
Winnie-Stowell	Operations (000)	2.5	0.8	0.0	0.0	0.3	3.6	2.9	0.8	0.0	0.0	0.4	4.2
	Based Aircraft	8	3	0	0	1	12	9	3	0	0	1	13

Source: URS, Quadrant Consultants.
*New forecasts for George Bush Intercontinental were completed in February 2011.

8.3.1 George Bush Intercontinental Airport

George Bush Intercontinental Airport (IAH) is a large hub commercial service airport that supports a small amount of general aviation. The airport's owner, the Houston Airport System (HAS), is not actively seeking to increase general aviation at this busy air carrier airport. HAS keeps detailed records and has a master plan for IAH and its other two airports. Because the IAH master plan does not forecast based aircraft, this study forecasts based aircraft, derived from the airport interview and Form 5010. In early 2011, HAS produced new forecasts as part of the IAH master plan update that project much flatter growth than the previous master plan and the TAF.[24]

The new IAH forecasts show air carrier and commuter passenger enplanements growing at an average rate of 2.4 percent per year, and aircraft operations growing by 0.7 percent per year

through 2030. The recommended forecast for based aircraft follows the dynamic market share forecast. The static and dynamic market share methods both forecast a positive trend over the planning period.

8.3.2 William P. Hobby Airport

William P. Hobby Airport (HOU) is the second air carrier airport in the Houston Airport System. Unlike IAH, HOU has substantial general aviation activity and aviation training facilities. The HOU master plan's base forecast of enplanements shows an average growth rate of 1.9 percent per year through 2022. Like IAH, HOU has experienced a decline in enplanements for 2008 and 2009. HAS now forecasts enplanements will increase at 1.4 percent per year, and the FAA TAF forecasts growth resuming in 2011.

HAS forecasts modest growth of both based aircraft and general aviation operations at HOU at a rate of 0.4 percent per year throughout the forecast period. Jet aircraft dominate the projected 2030 general aviation fleet mix for HOU: 12 percent single-engine propeller, 11 percent multi-engine propeller, 75 percent jet and 3 percent rotorcraft.

8.3.3 Texas Gulf Coast Regional Airport

Texas Gulf Coast Regional Airport (LBX) has substantial growth potential, according to the airport manager and members of the Angleton/Lake Jackson Chamber of Commerce. The airport has one of the longest runways in the Houston-Galveston region, and it has plans to build a business/industrial park adjacent to the airport including a federal free trade zone. The airport manager understands that the airport would capture more aviation traffic with a new terminal building, as the airport currently cannot provide flight planning or restrooms after hours.

Large population growth is expected in Angleton. The airport is the aviation operation hub for Dow Chemical, which enplanes about 20,000 passengers each year. The airport reported 99 based aircraft during the interview, which is 15 more aircraft than reported in the TAF. The number of aircraft operations reported in the form 5010 matches the TAF and the interview results. A Master Plan was recently prepared for LBX with slightly higher forecasts for based aircraft and aviation operations than the forecast developed here.

The recommended forecast for based aircraft and aviation operations is an average of the multiple regression forecast, the static market share and the dynamic market share. This results in an average growth rate of based aircraft by 0.6 percent each year through 2015, 1.3 percent from 2015 through 2020 and 1.5 percent from 2020 to 2030. The average growth rate for operations is somewhat higher, at 1.9 percent through 2015, 1.6 percent from 2015 through 2020 and 1.6 percent 2020 through 2030.

8.3.4 David Wayne Hooks Memorial Airport

David Wayne Hooks Memorial Airport (DWH) is privately owned and operated by Jag Gill. The airport is very active with recreational, corporate and military aircraft. Flight training also has a significant presence at the airport. The Tomball Chamber of Commerce expects growth at DWH once the economy recovers. Infrastructure surrounding the airport has been improved, offering easier access to the area.

The airport manager reported 296 based aircraft at DWH during the interview, but further investigation concludes that the actual value is about 478, 182 aircraft more than the manager

reported and 312 more than reported in the TAF. The FAA and TxDOT concur with this higher estimate of based aircraft. Aircraft operations reported by the airport's air traffic control tower are close to the numbers reported in the Form 5010 and shown in the TAF.

The recommended forecasts for based aircraft and operations are averages of the multiple regression forecast, the static market share and the dynamic market share. These forecasts show robust annual growth rates between 1.1 and 1.5 percent over most of the forecast period.

8.3.5 Ellington Airport

Ellington Airport (EFD) is owned and operated by the Houston Airport System and fills a special niche in the regional aviation system. EFD is being positioned for growth of general aviation, with runway improvement projects and flight training facilities.

The EFD master plan predicts based aircraft growth at the modest rate of 0.6 percent per year. This forecast is higher than the zero growth rate projected by the TAF. The EFD master plan predicts a more aggressive 1.8 percent annual growth rate for general aviation operations.

The EFD master plan also presents a fleet mix for aircraft operations, which should be more accurate than calculating the fleet mix from based aircraft. The master plan shows the 2022 percentage of single-engine aircraft is 78 percent, multi-engine aircraft is 11 percent, and jet aircraft is 11 percent.

8.3.6 Houston Southwest Airport

Houston Southwest Airport (AXH) is privately owned and operated by James Griffith, Jr. Major improvements costing over $5 million have been made to both the airside and the landside at AXH since 2003, and $2.5 million is planned for two new hangars and apron and taxiway improvements in 2010. Population and demographic projections for the area are promising and AXH's geographic location between Sugar Land and Hobby Airport bode well for its future growth. AXH also has flight training facilities.

The number of based aircraft in recent years has decreased, resulting in a negative trend in the regression and trend-line forecasts. However, the regression model is rejected due to the weak relationship between the independent and dependent variables. The recommended forecast for based aircraft follows the dynamic market share forecast since the regression follows a negative trend through the forecast period. Annual growth rates from 1 to 2 percent are forecast.

For aviation operations, the regression model provides a better fit to the socioeconomic factors. The recommended forecast for GA operations is an average of the multiple regression forecast, the static market share and the dynamic market share. This forecast shows relatively robust growth rates ranging from 2.0 to 2.6 percent per year. Houston Southwest Airport has indicated that about 75 to 100 jet operations have occurred so far in 2010, indicating the airport is attracting itinerant jet operations.

8.3.7 La Porte Municipal Airport

La Porte Municipal Airport (T41) indicates that most of its operations are touch-and-go for flight instruction. Future growth of the airport is limited due to the proximity of surrounding residential and commercial development.

The airport interview indicates 67 more based aircraft at T41 than are in the TAF. The forecasting results are mixed, with the trend line and regression analysis predicting losses of based aircraft and the static and dynamic market share predicting positive trends. Because a negative trend in aircraft at T41 is not reasonable, the recommended forecast for based aircraft is an average of the static and dynamic market share forecasts, resulting in low annual growth rates ranging from 0.3 to 0.9 percent.

The recommended forecast of GA operations is an average of the multiple regression forecast, the static market share and the dynamic market share. These combine to produce a forecast of 1.0 percent growth per year through 2020, then slowing to 0.8 percent from 2020 through 2030.

8.3.8 Lone Star Executive Airport

Lone Star Executive Airport (CXO) has recently added an air traffic control tower and plans to extend its main Runway 14/32. In addition, the airport's Army Reserve base has plans to expand. The Conroe Chamber of Commerce reports that growth in the surrounding community is very high, and the airport is positioning itself to attract corporate aviation. CXO also has flight training facilities.

The forecast of based aircraft is uniformly positive for all forecast methods. The recommended forecast for based aircraft is an average of the multiple regression forecast, the static market share and the dynamic market share, yielding high growth rates ranging from 1.6 to 2.1 percent per year.

The recommended forecast of aircraft operations is also an average of the multiple regression forecast, the static market share and the dynamic market share. This combination produces growth rates ranging from 1.4 to 2.5 percent per year. Military operations are a significant part of the forecast.

8.3.9 Pearland Regional Airport

Pearland Regional Airport (LVJ) is privately owned and operated by Clover Acquisition Corporation. The airport management is considering additional hangar development, extending and adding instrument approach procedures to its main runway, adding an Airport Traffic Control Tower and a new terminal building. However, Pearland Economic Development interviewees have indicated it is unlikely the LVJ will change from a general aviation airport, with very few light jets conveying passengers.

The forecasting results for based aircraft all predict growth. The recommended forecast for based aircraft is an average of the multiple regression forecast, the static market share and the dynamic market share. The recommended forecast predicts modest growth of based aircraft between 0.7 percent and 1.3 percent per year. The recommended forecast of GA operations is also an average of the multiple regression forecast, the static market share and the dynamic market share. Operations growth is estimated from 1.6 to 2.0 percent per year.

8.3.10 Scholes International Airport

Scholes International Airport (GLS) was severely damaged by Hurricane Ike in 2008; 25 based aircraft were damaged by the storm, and many based aircraft relocated during the hurricane have not returned. The major focus for airport management is hurricane recovery, for which federal stimulus funds have been granted. GLS also has other revenue streams, especially rent

from two major tourist attractions on its property. The airport desires to have scheduled air service and charter operations within the next ten years.

Due to the recent decline in based aircraft and aviation activity, both the forecasts of based aircraft and aircraft operations show flat or declining numbers. Air traffic control tower data confirm operations declined in 2009. The recommended forecast for based aircraft is an average of the multiple regression forecast, the static market share and the dynamic market share, which indicates that based aircraft will increase as the airport recovers at healthy rates between 1.0 and 1.9 percent per year. The recommended forecast of general aviation operations is the dynamic market share forecast since the regression model is an unlikely negative trend. Growth rates for aviation operations range from 1.2 to 1.6 percent per year.

8.3.11 Sugar Land Regional Airport

Sugar Land Regional Airport (SGR) has positioned itself well for future growth. It has recently built a large new terminal building and has plans to acquire property to the west and build a new taxiway, offices and hangars. The Chamber of Commerce expects SGR to continue to grow with corporate business. The city is fully built to the west and north and continues to grow south.

The recommended forecasts for based aircraft and general aviation operations are both averages of the multiple regression forecast, the static market share and the dynamic market share. Both recommended forecasts show growth rates at SGR from about 1 percent per year to 1.7 percent per year.

8.3.12 West Houston Airport

West Houston Airport (IWS) is privately owned and operated by Woody Lesikar on behalf of the West Houston Airport Corporation. Much of the information for IWS was not made available for this study; other sources have provided some information. The number of based aircraft was not reported by IWS; however, a recent survey by the FAA and TxDOT indicates that 316 aircraft are based at the airport. The number of GA operations reported in the Form 5010 and the TAF is 102,000. Constraints from surrounding neighborhood encroachment and limited available land restrict the expansion of the airport.

The recommended forecasts for based aircraft and general aviation operations are both averages of the multiple regression forecast, the static market share and the dynamic market share. The models predict growth rates ranging from 0.8 to 1.6 percent per year.

8.3.13 Bay City Municipal Airport

Bay City Municipal Airport (BYY) is owned and operated by the City of Bay City. The hangar space at BYY is currently at capacity, showing a strong demand for airport facilities. The city plans to build a new runway in the next 20 years. The Bay City Chamber of Commerce has recognized the need to expand the airport to attract business to the community and is currently engaged in developing a vision for the airport and conveying that vision to the community.

The trend line and regression forecasts both indicate negative growth trends through the planning period, with a strong relationship between the factors and a high goodness of fit. This trend is due to recent declining population and the national recession. Therefore, the recommended forecast for based aircraft is the dynamic market share. Growth rates in this forecast

are much stronger, ranging from 0.3 to 2.6 percent per year. Similarly, the dynamic market share best predicts general aviation operations with similarly strong growth rates.

8.3.14 Baytown Airport

Baytown Airport (HPY) is privately owned and operated by Raceco, Inc. HPY has potential for steady growth in the mid- to long term, due to its proximity to the City of Houston and the Port of Houston. After several hangars were damaged by Hurricane Ike, the airport has built new T-hangars, a large conventional hangar and a corporate terminal. In the near-term, the airport's strategic location to Houston is expected to bring instrument approach procedures, landside and airside improvements. However, land at the north and south ends of the runway and very close to the west side of the runway is developed as residences, and obtaining this land for expansion may be difficult.

Historical TAF data are unavailable for this airport. Growth projections are based on the FAA Airport Master Record Form 5010, and the dynamic market share analysis is used to predict based aircraft and general aviation operations.

The airport manager for HPY recently provided an update of improvements at the airport, indicating substantial potential growth in based aircraft beyond the forecasted amount. The number of based aircraft has grown from 31 in the base year 2008 to 58 in 2010, already exceeding the 2030 forecast. A new 16-unit T-hangar is scheduled to start construction in October 2010. In addition, negotiations are ongoing with a fixed-base operator to relocate operations to HPY.

8.3.15 Chambers County Airport

Chambers County Airport (T00) is a small, active airport, with aviation operations drawn to the airport by competitive fuel prices and flight training. Airport management has expressed the need for a new terminal building. The airport was damaged by Hurricane Ike in 2008, and reconstruction is currently in progress.

The number of based aircraft has declined in recent years, and both the trend line and regression models for based aircraft and general aviation operations forecast negative growth. However, completion of repairs and national and regional trends indicate otherwise, and so the recommended forecasts for based aircraft and aviation operations are the dynamic market share. This forecast indicates up to 1.4 percent growth per year of based aircraft and up to 2.8 percent growth per year of operations.

8.3.16 Cleveland Municipal Airport

Cleveland Municipal Airport (6R3) recently built a new terminal and anticipates substantial growth through the forecast period. The City of Cleveland recently purchased adjacent land for runway expansion and a future industrial park. The airport plans to build a self-service fuel farm, additional tie-down and hangar space, and a security gate and fence. The airport is used for recreational, business and flight training operations, as well as helicopter training by the Army Reserve, and the city is actively encouraging air taxi and corporate use.

The recommended forecasts for both based aircraft and aviation operations are averages of the multiple regression forecast, the static market share and the dynamic market share. The result-

ing forecast is for growth in based aircraft from 1.3 to 2.4 percent, and growth in operations from 1.8 to 2.2 percent.

8.3.17 Eagle Lake Airport

Eagle Lake Airport (ELA) has the advantage of being the only public-use airport in its part of the region. The airport manager has reached out to the City of Sealy, which has tried unsuccessfully to create a regional airport in Sealy, to help make Eagle Lake Airport the regional airport. The city has also discussed acquiring land for a runway extension to attract more corporate aircraft. The airport manager has also indicated the desire to build a new terminal building. Overall, ELA appears to be well positioned for substantial growth.

The recommended forecasts for both based aircraft and general aviation operations are averages of the multiple regression forecast, the static market share and the dynamic market share. The recommended forecast for based aircraft shows 1.4 to 1.9 percent growth per year, and the recommended forecast for operations shows a more robust 2.3 to 3.0 percent growth per year.

8.3.18 Houston Executive Airport

Houston Executive Airport (TME), in Waller County, is privately owned by Ron Henriksen through WCF, LLC. TME is a new airport, with plenty of land for future expansion. The airport was built primarily for business use, and flight training and touch-and-go operations are prohibited. The airport management envisions more corporate development, and plans for a new first-class terminal are being discussed. The airport is completing several new hangars that will attract new based aircraft to the airport by 2015.

Historical data needed to do regression analysis are unavailable for this airport, so the recommended forecast is the dynamic market share analysis, using FAA Airport Master Record Form 5010 information. Taking into account the new hangars and the initial growth of a new airport, substantial growth (about 8 percent per year) is forecast in the near term, followed by more moderate growth (around 1 to 2 percent) in the long term.

8.3.19 Huntsville Municipal Airport

Huntsville Municipal Airport (UTS) is planning several lines of expansion: apron rehabilitation, fencing, terminal renovation and a 700-foot runway extension. The demand for hangars at UTS is high and there is currently a waiting list. Currently, UTS has a contract with the Department of Defense to provide refueling to government aircraft. Land acquisition options around the airport are limited, with government holdings and an interstate highway adjacent to the airport. A new T-hangar unit will be built shortly, and the manager anticipates rapid growth in based aircraft.

Although 10,200 annual general aviation operations are reported in the Form 5010, the airport manager has recently performed operations counts and found that 18,800 operations per year is a more accurate estimate.

The recommended forecasts for both based aircraft and general aviation operations are the dynamic market share. The new hangar unit will cause rapid growth of based aircraft in the short term (4.6 percent per year), followed by more moderate growth in the mid- and long term (1.5 and 0.7 percent per year). Similar growth rates are expected for aviation operations.

8.3.20 Liberty Municipal Airport

Liberty Municipal Airport (T78) suffered substantial damage from Hurricane Ike in 2008 and is in need of extensive repair. Airport management is challenged in rehabilitating the airport while meeting its other needs in the City of Liberty. Damaged and removed aircraft have not all been replaced. The airport manager has recently embarked on an extensive program to add new runway lighting, rehabilitate the runway and taxiway, and ultimately build a new terminal building, apron, parking lot and gateway for the airport. He has also indicated a desire to increase the pavement strength of the runway to accommodate heavier loads. Land acquisition is unlikely due to adjacent residences.

The forecasting results for T78 are also split like those of UTS with the market share analyses predicting growth and the linear trend and regression analyses predicting negative growth. The regression forecasts are not recommended due to a poor relationship of the factors to based aircraft and operations, and because a negative trend is not realistic in this case. The recommended forecasts for based aircraft and general aviation operations are the dynamic market share. They forecast moderate growth rates of up to 1.5 percent per year for based aircraft and up to 2.1 percent for operations.

8.3.21 Palacios Municipal Airport

Palacios Municipal Airport (PSX) is a former military facility with three runways and plenty of room for expansion. The airport's main business is a helicopter service transporting offshore drilling crews to rigs, and there is a growing tourism business. The growth of the airport in the next 10 years depends on rehabilitating the aging runways, terminal, parking and landside facilities. A new beachside development along the Intra-Coastal Waterway may attract new owners also using aircraft.

The regression forecast shows poor relationships between the socioeconomic factors and based aircraft and general aviation operations, and it forecasts declines in aviation activity. It is unlikely activity will decline in the recovering economy, although without needed rehabilitation, the airport will not experience its potential level of growth. The recommended forecasts for based aircraft and operations are the dynamic market share. The forecasts anticipate growth rates from 1.7 to 2.3 percent per year for based aircraft and 1.1 to 1.8 percent per year for operations.

8.3.22 Robert R. Wells Jr. Airport

Robert R. Wells Jr. Airport (66R) is relatively small, and its owner, Colorado County, has a strong desire to expand it with instrument approaches, a new terminal and runway expansion. Within the next 10 years, stakeholders would like to see the airport operate as a for-profit business.

Without TAF data, the dynamic market share is the recommended forecast for based aircraft and general aviation operations. Growth rates of 1.1 to 2.9 percent per year are anticipated.

8.3.23 Weiser Airpark

Weiser Airpark (EYQ) is privately owned by Cecil and Robert Weiser in suburban Houston near Cypress. The airport has a large number of based aircraft and not much activity, which has

affected revenue for the Airpark. There are several flight training schools at EYQ, and many of the operations are touch-and-go.

Historical and TAF data are unavailable for this airport and the recommended forecast for based aircraft and general aviation operations is the dynamic market share. Growth projections use FAA Airport Master Record Form 5010 data and market share analysis. Little growth is expected, with rates of 0 to 1.5 percent.

8.3.24 Wharton Regional Airport

Wharton Regional Airport (ARM) enjoys support from the City of Wharton, the community and TxDOT. The stakeholders expect major commercial growth in the area in the next 10 years. As a result, they anticipate the airport evolving into a strong general aviation/corporate airport. A new terminal building is planned in the long term. Growth in the near term is expected to be slow as the economy recovers. The mid- and long terms will most likely experience growth in corporate operations as commercial development in the region occurs.

All of the forecasting results for ARM return similar results. The regression statistics indicate that the mix of independent variables produce a moderate to strong relationship to the dependent variables. The recommended forecasts for both based aircraft and general aviation operations are averages of the multiple regression forecast, the static market share and the dynamic market share. The models forecast growth of based aircraft between 0.7 and 1.6 percent per year and growth of operations between 2.1 and 2.4 percent per year.

8.3.25 North Houston Business Airport

North Houston Business Airport (9X1) is privately owned and operated by Williams Airport, Inc. It was recently acquired by a new owner who has begun a program of extensive improvements, including lengthening the runway, adding fueling facilities and drainage ditches. The airport is receiving inquiries from prospective corporate tenants wanting to base aircraft at the airport. Management is seeking to capture that market. Flight training is another line of business under consideration. However, the airport's proximity to IAH's Class B airspace is a concern. A non-precision instrument approach is being developed at 9X1 and is scheduled to be operational by the first quarter of 2011.

Without TAF data, the dynamic market share is the recommended forecast for both based aircraft and general aviation operations. Growth rates of 2 to 3 percent per year are anticipated.

8.3.26 Winnie-Stowell Airport

Winnie-Stowell Airport (T90) is unattended and is essentially an airstrip, used mostly for crop dusting operations. Once the airport fully recovers from Hurricane Ike damage, T90 has abundant opportunity for expansion.

T90's historical levels of aviation activity have been flat, and with the recent Hurricane Ike damage, both the trend line and the regression model show downward trends in based aircraft and operations. While no growth is probably realistic in the short term, it is unlikely to hold in the long term. Therefore, the recommended forecasts for both based aircraft and general aviation operations are the dynamic market share. The forecast for based aircraft indicates no growth until the mid-term, then growth rates of 0.8 to 1.8 percent per year. For operations, the forecast shows growth between 1.1 and 1.8 percent per year.

9 Airport Capacity Assessment

The capacity of an airport is defined as its ability to accommodate aviation operations without unacceptable delay. Airport capacity must be sufficient at each system airport if the entire system is to function efficiently. Not only can insufficient capacity at an airport produce a crowded and potentially unsafe situation at that airport, but it can also strain other airports as they try to fill the unmet demand.

This chapter presents an analysis of the existing capacity of each system airport in the Houston-Galveston region, and its ability to meet the forecast demand. It assesses the number of flight operations the airport can accommodate, and it assesses the capacity of other elements of the airport affecting its ability to meet the forecast demand.

9.1 Methods

Capacity is assessed for the following airport elements:

- Annual service volume
- Hourly airfield capacity
- Taxiways
- Runway length and pavement strength
- Navigational aids
- Aircraft parking and storage

The method used for the measurement of airfield capacity for system airports is described in Chapters 2 and 3 of the FAA's Advisory Circular 150/5060-5*, Airport Capacity and Delay*. The factors contributing to airfield capacity include weather conditions, runway configuration, fleet mix, flight training and taxiway infrastructure.

9.1.1 Weather Conditions

Weather conditions, the available instrumentation and published procedures influence the ability of aircraft to operate at an airfield. Weather conditions are generally divided into two categories: Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC). During VMC, all aircraft can land at the airport as long as they can maintain established cloud separation and visibility requirements. IMC are the weather conditions that require the pilot to fly the aircraft solely by reference to the instruments as opposed to visually. During IMC, flights can only operate on runways with a published precision or non-precision approach (and the pilot must be certified as well as the aircraft equipped to use that instrumentation). Instrument Flight Rules (IFR) specify procedures during IMC, while Visual Flight Rules (VFR) specify procedures during VMC. While the actual conditions dictating VFR or IFR may vary by airport, this analysis assumes standard FAA criteria for visual and instrument conditions:

- VFR occurs whenever the cloud ceiling is at least 1,000 feet above ground level and the visibility is at least three statute miles
- IFR occurs whenever the cloud ceiling is between 500 and 1,000 feet above ground level, or visibility is between one and three statute miles

The Hobby Airport Master Plan provides estimates of the proportion of the year under VFR conditions (92 percent) and under IFR conditions (8 percent) and these proportions are used in

this report for all system airports. Runways with a published instrument approach with minimum ceiling less than 1,000 feet and visibility less than three statute miles can be operated under IFR. If no IFR procedure exists at an airport, then it is assumed operations cannot occur at that airport during IFR conditions.

9.1.2 Runway Configuration

The number and layout of runways at an airport are primary factors in determining airfield capacity. If two runways intersect or converge toward each other, or are parallel and close to each other, the runways are dependent, since operations on one runway constrain operations on the other runway. Airports with more than one runway are assumed to be operated to maximize operations in the dominant wind conditions. Runway length can also be a factor influencing capacity. In this study, all runways at an airport are assumed to be used under VFR, although only runways with published instrument approach procedures are assumed to be used under IFR.

The FAA Advisory Circular contains depictions of various runway layouts for calculating capacity. The runway configuration most similar to the airport layout was selected for each system airport. The calculations assume each airport is operated with the runway configuration providing the greatest capacity 80 percent of the time.

9.1.3 Aircraft Operation Fleet Mix

The aircraft operation fleet mix is an important factor in determining airfield capacity. When there is a broad mix of aircraft sizes and weights at an airport, separation requirements between aircraft increase, and this decreases the airfield capacity. A more homogeneous fleet mix results in higher airfield capacity. The aircraft fleet is categorized according to approach speed and weight (Table 21) for calculating capacity. The formula for determining the aircraft mix value (the fleet mix value) is the percentage of Class C aircraft plus three times the percentage of Class D aircraft. The larger and heavier aircraft have a larger impact on airfield capacity when operating with small aircraft because they generate wake turbulence that can affect trailing aircraft, requiring increased separation and thus reducing capacity.

Table 21: FAA Aircraft Classifications

Aircraft Classification	Maximum Take-off Weight (pounds)	Type of Aircraft	Estimated Approach Speed (knots)
A	12,500 or less	Small single-engine	95
B	12,500 or less	Small multi-engine	120
C	12,500 to 300,000	Large	130
D	300,000 or more	Heavy	140

Source: FAA

For reliever and non-reliever general aviation airports (except Ellington Airport, which is a special case), this study assumes no heavy aircraft (aircraft classification D). The forecast fleet mix at each airport is grouped by aircraft with maximum take-off weight of 12,500 pounds or less (single engine + other) and aircraft with maximum take-off weight greater than 12,500 pounds (multi-engine + jet + rotor). Most of the airports have an aircraft mix value less than 20. However, several airports have much larger or increasing aircraft mix values over the forecast period: Palacios Municipal Airport's aircraft mix value increases from 31 in 2008 to 44 in 2030; Houston Executive Airport's aircraft mix value increases from 32 in 2008 to 62 by 2015. The effect on capacity of increasing aircraft mix values is that the airport will accommodate fewer operations over time, even without any physical change to the airport layout.

9.1.4 Flight Training Operations

Touch-and-go operations are more common at airports used for training. An aircraft lands and departs without stopping and exiting the runway and thus is counted as having done two operations. Touch-and-go operations increase the airfield capacity because they take less time than landing and departing normally. However, they can reduce the runway's availability for other types of operations. Several system airports have substantial flight training activity, as described in Section 5.3.5 above. The capacity analysis assumes 10 percent of the operations at all reliever airports are touch-and-go operations (if operations data from a control tower or an airport manager is lacking). For non-reliever airport, the analysis assumes 10 percent of its operations are touch and go only if the airport inventory indicates that the airport supports flight training. However, if any airport has a flight school, then the analysis assumes 50 percent of that airport's operations are touch-and-go.

9.1.5 Taxiways

Taxiways, as well as number and location of runway exits, also affect airfield capacity. Runway occupancy times are reduced at airports with appropriately located exits and a full-length taxiway parallel to the runway. Without a parallel taxiway the full length of the runway, arriving aircraft rolling past the last exit would have to U-turn on the runway and taxi back to exit the runway. Likewise, departing aircraft requiring the full length of the runway for takeoff would have to taxi on the runway to the runway end and U-turn to begin takeoff. Both of these operations increase runway occupancy times and thus decrease capacity.

9.1.6 Other Assumptions

Additional assumptions for this capacity analysis are as follows:

- The annual number of arrivals at an airport equals the annual number of departures.
- A typical ratio of the average annual demand to the average daily demand during the peak month, as provided in the FAA Advisory Circular, is assumed. For an aircraft mix value of 20, this ratio typically ranges from 280 to 310 and is assumed at 295 for this study.
- A typical ratio of the annual average daily demand to peak hour demand during the peak month, as provided in the FAA Advisory Circular, is assumed. For an aircraft mix value of 20, this ratio typically ranges from 7 to 11 and is assumed at 9 for this study.
- Ramp and hangar capacity are not considered in the analysis of airfield capacity. These elements are considered with landside capacity below.

The analysis is performed using graphs in the FAA Advisory Circular. Hourly capacity is first determined by applying the graph in the Advisory Circular corresponding to an airport's specific runway layout and relates capacity to airport parameters such as the runway exit factor and the touch-and-go factor. The ratios of average annual demand to average daily demand during the peak month, and average annual daily demand to peak hour demand during the peak month, are then applied to determine annual service volume, the main index of airfield capacity.

Airfield demand and capacity analyses were performed to assess each airport's capability to accommodate the current demand and the forecast demand. Airfield capacity is primarily a function of the runway layout and ability to land aircraft in various weather conditions. The number and orientation of runways and the types of operations are all factors affecting the capacity of an airport. In this study, the following items are discussed:

- Annual Service Volume
- Hourly Airfield Capacity
- Taxiways
- Runway Length and Pavement Strength
- All Weather Approaches

The study includes 26 airports: 2 air carrier airports, 10 reliever airports, and 14 other general aviation airports. The capacities of the three airports of the Houston Airport System (George Bush Intercontinental and William P. Hobby, both air carrier airports, and Ellington Airport, a reliever airport) are not assessed in this study; their capacities are taken from their respective airport master plans. The capacity of each of the remaining 23 airports is analyzed separately, using the method described above. All aircraft operations at an airport are considered in the capacity analysis, including commercial and military operations as well as general aviation operations.

9.2 Annual Service Volume

The Annual Service Volume (ASV) of an airport is the index of an airport's capacity for aviation operations over a year. It accounts for differences in runway use, aircraft mix and weather conditions likely to be encountered during an average year. If the airport handles more operations than the ASV in a year, the flights will experience unacceptable delays. Table 22 presents the calculated ASV along with forecast annual operations for all system airports other than the two air carrier airports. The columns titled "%ASV" show the ratios of forecast operations to the calculated ASV, indicating the percent of the capacity forecast to be met that year.

Table 22: Airport Annual Service Volume and Operations Demand Forecasts, 2008-2030

	2008			2015			2020			2030		
Airport	Ops	ASV	%ASV	Ops	ASV	%ASV	Ops	ASV	%ASV	Ops	ASV	%ASV
Reliever Airports												
Texas Gulf Coast Regional	60,000	170,400	35%	68,400	167,800	41%	74,100	167,800	44%	86,500	165,500	52%
D.W. Hooks Memorial	247,800	227,900	109%	274,800	226,100	122%	292,200	223,800	131%	326,300	222,000	147%
Ellington	153,200	217,000	71%	165,400	217,000	76%	172,500	217,000	79%	191,700	217,000	88%
Houston Southwest	46,400	186,500	25%	55,600	186,500	30%	62,000	184,100	34%	75,500	186,500	40%
La Porte Municipal	79,400	303,000	26%	85,300	303,000	28%	89,500	300,700	30%	96,800	303,800	32%
Lone Star Executive	83,900	223,800	38%	95,900	226,200	42%	102,600	226,200	45%	131,500	223,800	59%
Pearland Regional	87,400	227,000	38%	100,200	224,400	45%	109,700	224,400	49%	128,200	224,400	57%
Scholes International	35,500	196,200	18%	38,500	189,400	20%	41,400	187,200	22%	48,700	187,200	26%
Sugar Land Regional	75,600	149,600	51%	83,900	149,000	56%	90,100	148,500	61%	101,600	147,400	69%
West Houston	103,000	215,200	48%	115,100	212,800	54%	124,800	212,800	59%	142,500	215,200	66%
Other General Aviation Airports												
Bay City Municipal	8,700	177,700	5%	10,200	177,700	6%	11,400	177,700	6%	13,800	180,100	8%
Baytown	9,600	185,200	5%	10,600	183,000	6%	11,700	183,000	6%	13,900	180,800	8%
Chambers County	3,000	220,700	1%	3,400	220,700	2%	3,900	223,000	2%	5,000	209,000	2%
Cleveland Municipal	14,200	231,800	6%	16,400	231,800	7%	18,300	229,400	8%	21,800	229,400	10%
Eagle Lake	13,200	132,300	10%	16,200	132,300	12%	18,500	128,700	14%	23,300	132,300	18%
Houston Executive	9,000	149,900	6%	15,500	131,300	12%	17,000	131,300	13%	20,000	131,300	15%
Huntsville Municipal	21,500	204,400	10%	28,700	204,400	14%	31,700	186,600	17%	34,700	177,700	20%
Liberty Municipal	5,700	203,300	3%	6,500	203,300	3%	7,200	215,400	3%	8,400	200,800	4%
Palacios Municipal	3,000	209,000	1%	3,200	195,300	2%	3,500	191,500	2%	4,100	181,800	2%
Robert R. Wells	2,800	185,700	2%	3,400	185,700	2%	3,600	166,000	2%	4,100	166,000	2%
Weiser Airpark	38,000	238,500	16%	41,600	238,500	17%	44,900	238,500	19%	51,200	238,500	21%
Wharton Regional	11,800	166,000	7%	13,900	162,200	9%	15,400	156,200	10%	18,900	156,200	12%
North Houston Business	10,000	219,700	5%	12,600	219,700	6%	14,800	217,300	7%	19,000	198,200	10%
Winnie-Stowell	3,000	144,300	2%	3,400	146,300	2%	3,600	152,400	2%	4,200	156,500	3%

Source: FAA; TransSolutions

9.2.1 Air Carrier Airports

In 2010, the Houston Airport System (HAS) reported that George Bush Intercontinental Airport will be at capacity (its annual service volume, or ASV) when the activity level reaches 674,000 annual operations. At that level of activity, flights would experience departure delays averaging six minutes and arrival delays averaging three minutes. Although the 2010 FAA TAF forecasts this activity level will be reached by 2018, new HAS forecasts project much flatter growth. The new forecasts show IAH with 559,000 operations in 2015, 578,000 in 2020 and 629,000 in 2030. At the current ASV of 674,000, IAH would be at 93 percent capacity in 2030 if no improvements are made. However, assuming an ASV of 880,000 in 2030 as reported by HAS, Bush Intercontinental would be at 71 percent capacity.

For William P. Hobby Airport, HAS reports that the airport's ASV was 257,000 in 2008 and is projected to be 293,000 in 2030. The 2010 TAF estimates Hobby Airport will reach 243,000 annual operations by 2030, 83 percent of projected future capacity.

Unlike other regional airports, HAS continuously monitors demand through forecasting and modeling and develops annual capital programs in conjunction with the FAA. HAS plans to update the master plans for Bush Intercontinental and Hobby Airport in the near future.

9.2.2 Reliever Airports

Annual Service Volumes have been calculated for each reliever airport, using the existing airport layout and the fleet mix values for the years in the forecast. The ASV values for all reliever airports change very little over the forecast period.

Several of the single-runway airports have quite different ASVs, and the longer runways do not necessarily deliver a greater ASV. For example, although Sugar Land Regional Airport (SGR) has the longest runway of any single-runway airport in the study, SGR's ASV is one of the lowest because of the fleet mix and the runway exit locations. More than 50 percent of SGR's aircraft are large (greater than 12,500 pounds maximum take-off weight), and therefore the capacity calculation is affected by the number of runway exits at a distance of 3,500 feet to 6,500 feet from the touchdown end of the runway. SGR has one exit within that range landing to the north and two exits within that range landing to the south. With the airport having mostly larger aircraft operations, more distance is required between aircraft operations, resulting in lower capacity. Similarly, Texas Gulf Coast Regional Airport has a long runway at 7,000 feet and one of the lower ASVs among the system airports because Texas Gulf Coast Regional has a fleet mix with about 30 percent large aircraft and therefore a lower ASV.

The one water runway in the study, at David Wayne Hooks Memorial Airport, is located adjacent to Runway 17L/35R such that these two runways cannot be used at the same time. In other words, an aircraft could only be arriving or departing on one of the runways, but not both. Therefore, the two runways are treated as a single runway in the capacity calculations.

As seen in Table 22, operations at David Wayne Hooks Memorial Airport already exceed the airport's ASV, and D. W. Hooks is over its capacity. The current operations exceed the calculated ASV by 9 percent, which may result in some aircraft experiencing delays when operating at D. W. Hooks. All other system airports (other than the two air carrier airports) will have ASV levels exceeding the forecast demand through 2030. The FAA Advisory Circular suggests that airports should plan for additional runway capacity when their annual operations reach

80 percent of their ASV. By 2020, Ellington Airport will be at nearly 80 percent of its capacity, and by 2030, West Houston Airport will be approaching 80 percent of its capacity.

9.2.3 Other General Aviation Airports

Annual Service Volumes have been calculated for each non-reliever general aviation airport, using the existing airport layout and the fleet mix values for the years in the forecast. Some airports have ASV values that change markedly due to changes in fleet mix:

- ***Houston Executive.*** The 2008 ASV is 20,000 operations greater than the 2030 ASV, as larger aircraft with maximum take-off-weight greater than 12,500 pounds increases from 32 percent of the operations in 2008 to 62 percent in 2030, thus lowering the ASV.
- ***Huntsville Municipal.*** The 2008 ASV exceeds the 2030 ASV by over 25,000 operations as larger aircraft shift from 12 percent of the operations in 2015 to 20 percent in 2030.
- ***Palacios Municipal.*** The 2008 ASV is over 20,000 operations more than the 2030 ASV. In 2008, 31 percent of the aircraft are in the larger class, growing to 44 percent in 2030.
- ***R. R. Wells.*** This airport loses 40 percent of its 2008 ASV by 2020. The airport had no operations by aircraft with maximum take-off weight greater than 12,500 pounds in 2008; it is forecast to have 19 percent of its operations by aircraft in this class by 2020.
- ***Wharton Regional.*** This airport will see its ASV decline by 30 percent from 2008 to 2020, due to larger aircraft operations increasing from 16 percent to 21 percent by 2020.
- ***North Houston Business.*** Operations by aircraft with maximum take-off weight greater than 12,500 pounds will increase from 7 percent in 2008 to 13 percent in 2030, lowering ASV by 20,000 operations.

Other airports will change their ASV value very little over the planning period.

Some of the single-runway airports with shorter runways have unexpectedly high ASV values. Liberty Municipal's runway is 3,801 feet long, slightly shorter than Pearland Regional Airport's runway, which is 4,313 feet long. Pearland Regional's fleet mix has around 10 percent large aircraft, and Liberty Municipal's fleet mix has up to 18 percent large aircraft. With a lower percentage of larger aircraft at Pearland Regional, the necessary distance separation between aircraft operations is reduced and the capacity is higher than at Liberty Municipal.

Chambers County Airport and Weiser Airpark are the only system airports with turf runways. The turf runways at these airports are not included in the capacity analysis because the types of aircraft that can operate on them are very limited, and the turf runway at Weiser Airpark is for emergency use only.

9.3 Hourly Airfield Capacity

Hourly airfield capacity is a measure of the maximum number of aircraft operations that can be operated on the airport runways in an hour. This calculation identifies whether the airport can sufficiently accommodate the forecasted hourly demand within the planning period.

Hourly capacity for each system airport is calculated by using the approach in the FAA Advisory Circular as described in Section 9.1 above. While hourly capacity often provides a very useful number for planning, it is of limited benefit for this study since the forecast provides annual operations estimates and not peak-hour forecasts.

9.3.1 Air Carrier Airports

The George Bush Intercontinental Airport Master Plan reports hourly airfield capacities during IFR at 151 to 177 operations. The hourly airfield capacity during VFR is 220 operations. The variable hourly capacities depend on the runway configuration.

William P. Hobby Airport's hourly airfield capacities are presented in the master plan as 47 to 57 operations during IFR and 53 to 71 operations during VFR.

9.3.2 Reliever and Other General Aviation Airports

Table 23 shows hourly airfield capacity under visual and instrument flight rules. The variances in the hourly capacity values are due to the same factors as described previously in the section on ASV.

Table 23: Hourly Airfield Capacity for General Aviation Airports

	Hourly Airfield Capacity (operations/hr)							
	VFR				IFR			
Airport	2008	2015	2020	2030	2008	2015	2020	2030
Reliever Airports								
Texas Gulf Coast Regional	65	64	64	63	56	55	55	55
D.W. Hooks Memorial	95	94	93	92	52	52	51	51
Ellington	136	136	136	136	61	61	61	61
Houston Southwest	72	72	71	72	57	57	56	57
La Porte Municipal	133	133	132	134	79	79	78	79
Lone Star Executive	92	93	93	92	57	58	58	57
Pearland Regional	88	87	87	87	59	58	58	58
Scholes International	77	74	73	73	59	58	58	58
Sugar Land Regional	57	57	57	56	51	51	51	51
West Houston	83	82	82	83	60	60	60	60
Other General Aviation Airports								
Bay City Municipal	68	68	68	69	57	57	57	58
Baytown	72	71	71	70	51	51	51	51
Chambers County	85	85	86	80	62	62	62	61
Cleveland Municipal	90	90	89	89	59	59	59	59
Eagle Lake	52	52	51	52	21	21	21	21
Houston Executive	57	50	50	50	47	46	46	46
Huntsville Municipal	79	79	72	68	59	59	58	57
Liberty Municipal	78	78	83	77	60	60	61	60
Palacios Municipal	82	76	75	71	46	44	44	44
Robert R. Wells	76	76	68	68	0	0	0	0
Weiser Airpark	105	105	105	105	47	47	47	47
Wharton Regional	64	62	60	60	47	47	46	46
North Houston Business	90	90	89	81	0	0	0	0
Winnie-Stowell	59	60	62	64	0	0	0	0

Source: FAA; TransSolutions

Twenty-three airports in the study have at least one published instrument approach procedure. The other three airports show hourly capacity of zero during IFR in Table 23 because the airport cannot accommodate operations during IFR conditions. In the ASV calculations, the airport is assumed to have zero capacity during 8 percent of the year, when IFR conditions are assumed.

9.4 Taxiways

Taxiways provide access between runways, terminal areas and hangars. Taxiways are preferably arranged so that arriving aircraft taxiing to their parking position do not interfere with aircraft taxiing for takeoff, and aircraft can exit the runways as quickly as possible from one of several exits. Runway occupancy time is reduced when angled exits are less than 90 degrees difference from the runway heading; these are also called rapid exit taxiways. Full parallel taxiways are generally designed to facilitate aircraft movement and minimize potential safety hazards.

9.4.1 Air Carrier Airports

George Bush Intercontinental Airport has five runways, each with a full-length parallel taxiway adjacent to the runway. Each runway has several rapid exit taxiways, with angles less than a 90-degree difference from the runway headings. The airport master plan mentions a near-term

need for more departure queuing taxiway capacity and other additional taxiways to move aircraft more efficiently.

William P. Hobby Airport has four runways, all with full-length parallel taxiways. The runways have some perpendicular exits and several angled exits with less than a 90-degree difference from the runway headings. No airport taxiway constraints or potential modifications are discussed in the master plan.

9.4.2 Reliever and Other General Aviation Airports

For general aviation airports, as with air carrier airports, taxiway capacity plays an important role when the runways are at or close to capacity. Several system airports have angled exits from the runways, and most have full-length parallel taxiways, while four airports have partial parallel taxiways, and one airport (Eagle Lake Airport) has no parallel taxiway.

The five airports with partial or no parallel taxiways (Baytown, Eagle Lake, R. R. Wells, Scholes International and Weiser Airpark) are projected to have their future demand remain less than 50 percent of their airfield capacities. However, while the ASV calculations use information on runway exits, they are not adjusted if there is no full-length parallel taxiway. If the demand were approaching capacity at any of these airports, then the addition of a taxiway to the runway ends would be necessary to ensure the airport can achieve its capacity.

Although full parallel taxiways at these airports would increase capacity, the forecast demand does not show a strong need for providing full-length parallel taxiways. The 2009 TAF forecast was developed before the national economy went into recession, and the FAA's 2010 TAF lowers the number of forecast operations. Nonetheless, the relative percentage of business jets is still forecast to grow as compared to smaller piston aircraft. Building full parallel taxiways may not be necessary for capacity at these airports, but it may improve safety and is worthy of consideration on that basis alone.

9.5 Runway Length and Pavement Strength

According to the 2009-2025 FAA Aerospace Forecast, operations of single and multi-engine piston aircraft are expected to remain flat while demand for business jets will continue to grow. Where practical, some study airports may require runway extensions over the long term to accommodate the projected fleet mix. The ideal runway length for an airport can be calculated using guidance in FAA Advisory Circular AC 150/5325-4B (Table 24). The minimum ideal length for a runway at an airport is determined by designating the largest airplane expected to use that runway. Using the FAA's 2009-2013 General Aviation Regional Airport System Plan to classify airports by their critical aircraft, the system airports' longest runway lengths can be compared to the ideal runway lengths.

Table 24: Runway Reference Points

Reference Point		Ideal Runway Length (feet)
I	At least 100 based general aviation aircraft and commercial service, or reliever with at least 50 based aircraft	6,000
II	At least 50 based general aviation aircraft and commercial service, or reliever status and at least 10 based aircraft	5,500
III	At least 10 based general aviation aircraft	4,500
IV	Less than 10 based general aviation aircraft	4,000

Source: FAA

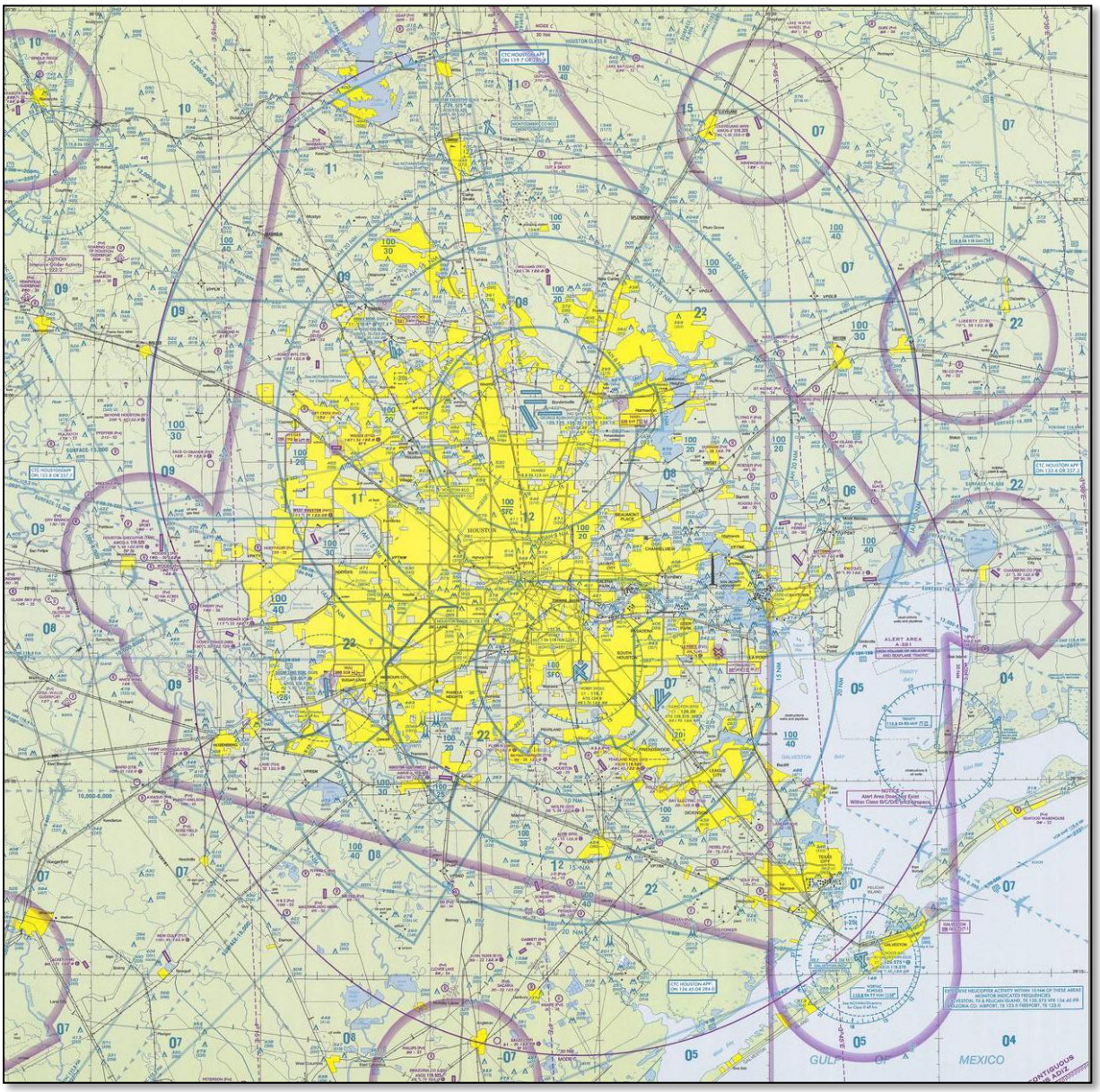
As noted in Section 5.2, runways are in good condition at many study airports; however, there are several airports with runway pavement in fair condition. The pavement conditions are included in Table 26 at the end of this section.

9.6 Airspace

The Houston Terminal Radar Approach Control (TRACON) facility controls airspace encompassing the Houston metropolitan area (Figure 26). At its longest point, the airspace is 135 nautical miles across.

The Houston TRACON airspace extends vertically from the surface to 16,000 feet above mean sea level at its highest point. The Houston TRACON airspace also encompasses the airspace

Figure 26: Houston TRACON

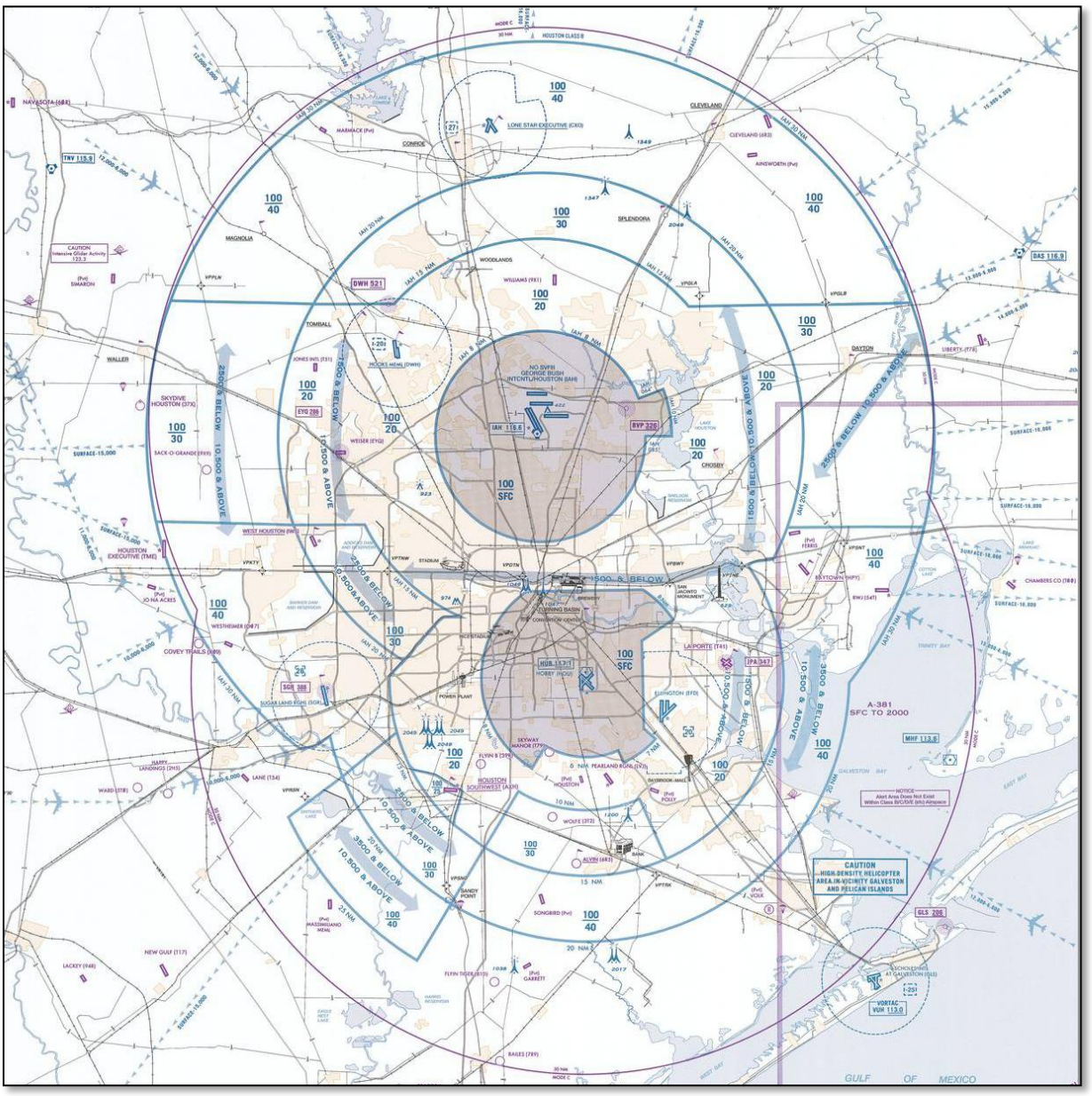


Source: Skytracker

over 16 of the system airports. The Houston TRACON contains radar operations from which air traffic controllers direct aircraft during the departure, descent and approach phases of flight. The TRACON controllers direct aircraft transitioning from en route through approach into a destination airport in the TRACON's airspace. For the seven airports with air traffic control towers, the TRACON controllers then hand off the arrival to the tower when the aircraft is on final approach. The TRACON also controls aircraft transitioning after takeoff until the flight is en route. The departure controller in the TRACON directs the ascending aircraft immediately upon takeoff leading away from the departure airport.

The Houston TRACON jurisdiction is not the same as the Houston Class B airspace. Houston has a relatively simple Class B airspace (Figure 27), with the rings centered on the Very high

Figure 27: Houston Class B Airspace



Source: Skytracker

frequency Omni-directional Radio (VOR) ranges at the two primary airports: the Humble VORTAC (Very high frequency Omni-directional Range Tactical Aircraft Control) at George Bush Intercontinental and the Hobby VORTAC. The Houston Class B airspace extends 30 nautical miles from the George Bush Intercontinental VORTAC and 20 nautical miles from the Hobby VORTAC. The floor of the Class B airspace varies, and the ceiling is at 10,000 feet elevation. The inner rings (eight nautical miles around George Bush Intercontinental and 6 to 8 nautical miles around Hobby) of Class B airspace extend down to the surface. The next ring (mostly 15 nautical miles around George Bush Intercontinental and 10 to 15 nautical miles around Hobby) extend down to 2,000 feet elevation, with successive rings to 3,000 and 4,000 feet elevation. Six system airports are under the second ring; VFR aircraft en route to and from these airports fly under 2,000 feet elevation to remain under Class B airspace.

There is no published preferred VFR route through the Class B airspace. However, light blue shaded lines or arcs in Figure 27 denote suggested VFR flyways at various altitudes. For example, there is an east-west flyway between George Bush Intercontinental and Hobby Airports at below 1,500 feet elevation. These corridors are under the Class B airspace and no coordination is needed with air traffic control.

Arrivals and departures at the airports underneath the Class B airspace must generally remain clear of the Houston Class B airspace as much as possible. By staying underneath Class B airspace, they do not require coordination by the air traffic control tower. If departures from airports with air traffic control towers are filing IFR flight plans, then the air traffic control tower must coordinate with the TRACON before permitting the aircraft to depart, so that the airspace does not saturate and the TRACON can maintain the required separations between aircraft. During busy departure peaks at George Bush Intercontinental, airspace constraints may limit the departure capacity at reliever airports with IFR traffic. The airports most affected by airspace constraints are those closest to the inner rings of the air carrier airports. However, for VFR traffic, the airspace structure has been developed so that the VFR traffic can remain below the Class B airspace. While aircraft flying that low for several miles may have lower than normal efficiency, the airspace structure manages safety in the busy airspace by keeping aircraft types within specific routes and altitudes.

The Houston Area Air Traffic System was expanded in September 2010, enlarging the airspace managed by the Houston TRACON by more than 30 percent. The Houston TRACON airspace now extends to the boundaries of the airspaces managed by Austin, Gray, Waco and San Antonio TRACONs.

9.7 All-Weather Approaches

The FAA is developing and deploying Lateral Precision performance with Vertical guidance (LPV), a Global Positioning System (GPS) satellite-based approach to support enhanced all-weather access to airports. Improving all-weather access to general aviation airports is an important component of achieving the FAA's Next Generation Air Transportation System (Next-Gen). To create an enhanced national airspace system, NextGen involves a shift from ground-based air traffic control to a satellite-based system for air traffic management.

LPV permits aircraft with a satellite-based Wide Area Augmentation System (WAAS) GPS receiver to use Instrument Landing System (ILS)-like approach capability at any airport with a published LPV approach. WAAS allows visibility minima as low as 200 feet height above touch-

down and one-half mile visibility, although LPV approach ceiling minima are generally 250 feet, with visibility minimums of three-fourths or one-half mile, depending on runway lighting.

LPV approaches provide general aviation airports with ILS-like capabilities without having to invest in and maintain ground-based navigation equipment. Besides the obvious cost benefits, LPV approaches can make diversion to an alternate airport unnecessary, saving fuel, reducing pilot stress and errors with non-precision approaches. A summary of the availability of LNAV, LNAV/VNAV and LPV approaches at system airports is shown in Table 25.

Table 25: Airports with LNAV, VNAV and LPV Approaches

Airport	Procedure	LNAV	LNAV/VNAV	LPV	LPV Publication Date
Air Carrier Airports					
George Bush Intercontinental	RNAV (GPS) Z RWY 8L	✓	✓		
	RNAV (GPS) Z RWY 8R	✓	✓		
	RNAV (GPS) Z RWY 9	✓	✓		
	RNAV (GPS) RWY 15R	✓	✓	✓	April 13, 2006
	RNAV (GPS) Z RWY 26L	✓	✓		
	RNAV (GPS) Z RWY 26R	✓	✓		
	RNAV (GPS) Z RWY 27	✓	✓		
	RNAV (GPS) RWY 33R	✓	✓	✓	July 5, 2007
William P. Hobby	RNAV (GPS) RWY 4	✓	✓	✓	July 7, 2005
	RNAV (GPS) RWY 12R	✓	✓	✓	July 7, 2005
	RNAV (GPS) RWY 22	✓	✓	✓	July 7, 2005
	RNAV (GPS) RWY 30L	✓	✓	✓	July 7, 2005
	RNAV (GPS) RWY 17	✓	✓		
	RNAV (GPS) RWY 35	✓			
Reliever Airports					
Texas Gulf Coast Regional	RNAV (GPS) RWY 17	✓	✓	✓	August 4, 2005
	RNAV (GPS) RWY 35	✓	✓	✓	August 4, 2005
D.W. Hooks Memorial	RNAV (GPS) RWY 35L	✓	✓	✓	May 10, 2007
	RNAV (GPS) RWY 17R	✓			
Ellington	RNAV (GPS) RWY 4	✓	✓		
	RNAV (GPS) RWY 17R	✓	✓		
	RNAV (GPS) RWY 22	✓	✓	✓	March 12, 2009
	RNAV (GPS) RWY 35L	✓	✓		
Houston Southwest	RNAV (GPS) RWY 9	✓	✓	✓	May 10, 2007
	RNAV (GPS) RWY 27	✓	✓	✓	May 10, 2007
La Porte Municipal	RNAV (GPS) RWY 30	✓			
Lone Star Executive	RNAV (GPS) RWY 1	✓	✓	✓	September 23, 2010
	RNAV (GPS) RWY 19	✓	✓	✓	September 23, 2010
	RNAV (GPS) RWY 14	✓	✓	✓	August 27, 2009
	RNAV (GPS) RWY 32	✓	✓	✓	September 23, 2010
Pearland Regional	RNAV (GPS) RWY 32	✓			
Scholes International	RNAV (GPS) RWY 13	✓	✓	✓	March 17, 2005
	RNAV (GPS) RWY 17	✓	✓	✓	September 28, 2006
	RNAV (GPS) RWY 31	✓	✓	✓	September 28, 2006
	RNAV (GPS) RWY 35	✓			
Sugar Land Regional	RNAV (GPS) RWY 17	✓	✓	✓	August 27, 2009
	RNAV (GPS) RWY 35	✓	✓	✓	August 4, 2005
West Houston	RNAV (GPS) RWY 15	✓	✓		
	RNAV (GPS) Z RWY 33	✓	✓		
	RNAV (GPS) Y RWY 33	✓			
Other General Aviation Airports					
Bay City Municipal	RNAV (GPS) RWY 13	✓			
	RNAV (GPS) RWY 31	✓			
Baytown	RNAV (GPS) RWY 14	✓			July 29, 2010
	RNAV (GPS) RWY 32	✓			July 29, 2010
Chambers County	RNAV (GPS) RWY 12	✓			

Airport	Procedure	LNAV	LNAV/VNAV	LPV	LPV Publication Date
Cleveland Municipal	RNAV (GPS) RWY 14	✓			
Eagle Lake	RNAV (GPS) RWY 35	✓			
	RNAV (GPS) RWY 17	✓			
Houston Executive	RNAV (GPS) RWY 18	✓	✓	✓	August 30, 2007
	RNAV (GPS) RWY 36	✓	✓	✓	August 30, 2007
Huntsville Municipal	RNAV (GPS) RWY 18	✓	✓	✓	March 12, 2009
Liberty Municipal	RNAV (GPS) RWY 16	✓			
Palacios Municipal	RNAV (GPS) RWY 13	✓			
Weiser Airpark	RNAV (GPS)-G	✓			
Wharton Regional	RNAV (GPS) RWY 14	✓	✓	✓	August 27. 2009
	RNAV (GPS) RWY 32	✓	✓	✓	August 27, 2009

Source: FAA

9.8 Airfield Demand and Capacity Summary

A summary of the airfield demand and capacity is provided in Table 26. Cells have been color-coded to indicate the capacity status of the airport: green denotes good, yellow denotes fair, and red denotes poor.

The analysis suggests that without major airfield improvements, the Houston-Galveston region's two primary airports will approach capacity by 2030. However, HAS advised that it has sufficient

Table 26: Airfield Capacity Summary

	Capacity vs Demand			Nav Aids			Runway		Taxiway	
Airport	2015	2020	2030	ILS/ RNAV	LPV	ATCT	Count	Condition	Full/ Partial	Condition
Air Carrier Airports										
George Bush Intercontinental	✓	✓	✓	✓	✓	✓	5	Good	Full	Good
William P. Hobby	✓	✓	✓	✓	✓	✓	4	Good	F/P	Good
Reliever Airports										
Texas Gulf Coast Regional	✓	✓	✓	✓	✓		1	Good	Full	Good
D. W. Hooks Memorial	X	X	X	✓	✓	✓	3	Fair	F/P	Fair
Ellington	✓	✓	✓	✓	✓	✓	3	Good/Fair	F/P	Good/Fair
Houston Southwest	✓	✓	✓	✓	✓		1	Fair	Full	Fair
La Porte Municipal	✓	✓	✓	✓			2	Good	Full	Good
Lone Star Executive	✓	✓	✓	✓	✓	✓	2	Good	F/P	Fair
Pearland Regional	✓	✓	✓	✓			1	Good	Full	Good
Scholes International	✓	✓	✓	✓	✓	✓	2	Good	Partial	Good
Sugar Land Regional	✓	✓	✓	✓	✓	✓	1	Good	Full	Good
West Houston	✓	✓	✓	✓	✓		1	Good	Full	n/a
Other General Aviation Airports										
Bay City Municipal	✓	✓	✓	✓			1	Good	Full	Good
Baytown	✓	✓	✓	✓			1	Good	Partial	Good
Chambers County	✓	✓	✓	✓	✓		2	Good/Fair	Full	Good
Cleveland Municipal	✓	✓	✓	✓			1	Fair	Full	Fair
Eagle Lake	✓	✓	✓		✓		1	Good	No parallel taxiway	
Houston Executive	✓	✓	✓	✓	✓		1	Good	Full	Good
Huntsville Municipal	✓	✓	✓	✓	✓		1	Good	Full	Fair
Liberty Municipal	✓	✓	✓	✓	✓		1	Good	Full	Good
Palacios Municipal	✓	✓	✓	✓			3	Fair	F/P	Fair
Robert R. Wells	✓	✓	✓				1	Fair	Partial	Fair
Weiser Airpark	✓	✓	✓		✓		1	Good	Partial	Fair
Wharton Regional	✓	✓	✓	✓	✓		1	Good	Full	Good
North Houston Business	✓	✓	✓				1	Fair	Full	Fair
Winnie-Stowell	✓	✓	✓				1	Fair	Full	Fair

Source: TransSolutions

capacity to handle all forecast airside traffic through the study period. David Wayne Hooks Memorial Airport already appears to exceed its capacity. According to 2010 TAF data, Ellington Airport will approach 80 percent capacity by 2020. However, all reliever airports except D.W. Hooks will operate at lower than their capacities throughout the planning period. The remaining 14 general aviation airports will be under 50 percent capacity through 2030.

There are several general aviation airports without full-length taxiways. Adding such taxiways would increase capacity, although capacity does not need to be added to these airports since their forecast demand is well below capacity. Still, a full-length parallel taxiway with midfield runway exits can improve safety. Even though not required for capacity, Eagle Lake may want to consider a parallel taxiway, even if partial in length, as this airport has no parallel taxiway. In addition, Weiser Air Park has only a parallel taxiway for a short distance on the west end of the runway and one with no parallel taxiway at all. These airports may not need to add or extend their taxiways for capacity reasons, but may wish to anyway to improve safety.

9.9 Landside Capacity

Landside facilities supporting general aviation include terminals, hangars and aprons for aircraft storage, fixed based operators and aircraft fuel facilities. Aircraft storage is often in short supply at general aviation airports, and this section presents a capacity analysis for conventional hangars, T-hangars, open-shade hangars and tie-downs at system airports.

The required area for conventional and T-hangars for each airport is shown in Table 27 and Table 28. Hangar requirements depend on the number of based aircraft, the type and relative

Table 27: Based Aircraft Conventional Hangar Demand

	Based Aircraft Conventional Hangar Demand (Sq. Ft)														
	2015					2020					2030				
Airport	Single Engine	Multi-Engine	Jet	Rotor	Total	Single Engine	Multi-Engine	Jet	Rotor	Total	Single Engine	Multi-Engine	Jet	Rotor	Total
Air Carrier Airports															
George Bush Intercontinental	2,400	29,400	68,400	3,600	103,800	2,400	28,000	77,400	3,600	111,400	2,400	23,800	97,200	3,600	127,000
William P. Hobby	32,400	47,600	309,600	6,000	395,600	25,200	36,400	363,600	6,000	431,200	21,600	32,200	403,200	6,000	463,000
Reliever Airports															
Texas Gulf Coast Regional	44,400	16,800	5,400	8,400	75,000	46,800	16,800	7,200	9,600	80,400	54,000	16,800	9,000	13,200	93,000
D. W. Hooks Memorial	152,400	40,600	45,000	15,600	253,600	157,200	39,200	54,000	16,800	267,200	171,600	36,400	73,800	21,600	303,400
Ellington	116,400	25,200	37,800		179,400	115,200	28,000	48,600		191,800	122,400	29,400	52,200		204,000
Houston Southwest	69,600	23,800		2,400	95,800	69,600	22,400	7,200	2,400	101,600	74,400	21,000	9,000	2,400	106,800
La Porte Municipal	84,000	12,600		2,400	99,000	82,800	12,600		2,400	97,800	80,400	9,800		3,600	93,800
Lone Star Executive	117,600	23,800	32,400		173,800	133,200	25,200	41,400		199,800	163,200	23,800	63,000		250,000
Pearland Regional	124,800	15,400		6,000	146,200	132,000	15,400	5,400	6,000	158,800	150,000	15,400	7,200	8,400	181,000
Scholes International	56,400	21,000	5,400	19,200	102,000	62,400	22,400	7,200	24,000	116,000	73,200	22,400	9,000	32,400	137,000
Sugar Land Regional	43,200	36,400	63,000	2,400	145,000	45,600	37,800	77,400	2,400	163,200	52,800	36,400	113,400	3,600	206,200
West Houston	165,600	26,600	16,200	6,000	214,400	176,400	26,600	19,800	6,000	228,800	207,600	29,400	28,800	8,400	274,200
Other General Aviation Airports															
Bay City Municipal	18,000	5,600	5,400		29,000	18,000	5,600	5,400		29,000	20,400	5,600	7,200		33,200
Baytown*	16,800	4,200	3,600	1,200	25,800	19,200	4,200	3,600	1,200	28,200	22,800	4,200	5,400	2,400	34,800
Chambers County	6,000	1,400			7,400	6,000	1,400			7,400	4,800	1,400	1,800		8,000
Cleveland Municipal	27,600	4,200			31,800	30,000	4,200	3,600		37,800	36,000	4,200	3,600		43,800
Eagle Lake	15,600	4,200			19,800	16,800	4,200	3,600		24,600	20,400	4,200	3,600		28,200
Houston Executive	7,200	1,400	14,400	1,200	24,200	8,400	12,600	18,000	1,200	40,200	9,600	12,600	23,400	1,200	46,800
Huntsville Municipal	21,600	2,800	1,800	1,200	27,400	20,400	2,800	3,600	1,200	28,000	21,600	2,800	9,000	1,200	34,600
Liberty Municipal	6,000	2,800			8,800	6,000	2,800			8,800	6,000	2,800	1,800		10,600
Palacios Municipal	7,200			4,800	12,000	6,000		1,800	4,800	12,600	7,200		3,600	4,800	15,600
Robert R. Wells	9,600				9,600	8,400	2,800	3,600		14,800	9,600	2,800	3,600		16,000
Weiser Airpark	44,400	5,600		2,400	52,400	45,600	5,600		3,600	54,800	50,400	5,600		3,600	59,600
Wharton Regional	22,800	9,800	3,600		36,200	22,800	8,400	10,800		42,000	25,200	8,400	16,200		49,800
North Houston Business	36,000	5,600			41,600	39,600	5,600	5,400		50,600	52,800	5,600	16,200		74,600
Winnie-Stowell	1,200	7,000	3,600	1,200	13,000	1,200	5,600	3,600	1,200	11,600	1,200	4,200	3,600	1,200	10,200

Source: TransSolutions
*Baytown Airport reported 30,600 sq.ft. of conventional hangar space in 2010.

Table 28: Based Aircraft T-Hangar Demand

	Based Aircraft T-Hangar Demand (sq.ft.)											
	2015				2020				2030			
Airport	Single Engine	Multi-Engine	Other	Total	Single Engine	Multi-Engine	Other	Total	Single Engine	Multi-Engine	Other	Total
Air Carrier Airports												
George Bush Intercontinental	1,400	8,400		9,800	1,400	7,000		8,400	1,400	7,000		8,400
William P. Hobby	19,600	12,600		32,200	14,000	9,800		23,800	12,600	8,400		21,000
Reliever Airports												
Texas Gulf Coast Regional	26,600	4,200		30,800	28,000	4,200	2,800	35,000	32,200	4,200	2,800	39,200
D. W. Hooks Memorial	88,200	11,200		99,400	91,000	9,800	2,800	103,600	98,000	9,800	2,800	110,600
Ellington	67,200	7,000		74,200	67,200	7,000		74,200	70,000	8,400		78,400
Houston Southwest	40,600	7,000		47,600	40,600	5,600	2,800	49,000	43,400	5,600	2,800	51,800
La Porte Municipal	49,000	4,200		53,200	47,600	4,200	1,400	53,200	46,200	2,800	2,800	51,800
Lone Star Executive	68,600	7,000		75,600	77,000	7,000	2,800	86,800	93,800	7,000	2,800	103,600
Pearland Regional	71,400	4,200		75,600	75,600	4,200		79,800	86,800	4,200	2,800	93,800
Scholes International	33,600	5,600	5,600	44,800	36,400	5,600	7,000	49,000	42,000	5,600	8,400	56,000
Sugar Land Regional	25,200	9,800		35,000	26,600	9,800	2,800	39,200	30,800	9,800	2,800	43,400
West Houston	95,200	7,000		102,200	102,200	7,000		109,200	119,000	8,400		127,400
Other General Aviation Airports												
Bay City Municipal	11,200	1,400	7,000	19,600	11,200	1,400	8,400	21,000	12,600	1,400	9,800	23,800
Baytown	9,800	1,400		11,200	11,200	1,400	2,800	15,400	14,000	1,400	2,800	18,200
Chambers County	4,200	1,400		5,600	4,200	1,400	1,400	7,000	2,800	1,400	1,400	5,600
Cleveland Municipal	16,800	1,400		18,200	16,800	1,400	2,800	21,000	21,000	1,400	2,800	25,200
Eagle Lake	9,800	1,400		11,200	9,800	1,400	2,800	14,000	12,600	1,400	2,800	16,800
Houston Executive	4,200	1,400	1,400	7,000	5,600	4,200	1,400	11,200	5,600	4,200	1,400	11,200
Huntsville Municipal	12,600	1,400		14,000	12,600	1,400	1,400	15,400	12,600	1,400	2,800	16,800
Liberty Municipal	4,200	1,400	2,800	8,400	4,200	1,400	2,800	8,400	4,200	1,400	2,800	8,400
Palacios Municipal	4,200			4,200	4,200		1,400	5,600	4,200		2,800	7,000
Robert R. Wells	5,600			5,600	4,200	1,400	2,800	8,400	5,600	1,400	2,800	9,800
Weiser Airpark	25,200	1,400		26,600	26,600	1,400	2,800	30,800	29,400	1,400	2,800	33,600
Wharton Regional	14,000	2,800	21,000	37,800	14,000	2,800	23,800	40,600	15,400	2,800	29,400	47,600
North Houston Business	21,000	1,400		22,400	23,800	1,400	2,800	28,000	30,800	1,400	2,800	35,000
Winnie-Stowell	1,400	2,800		4,200	1,400	1,400	1,400	4,200	1,400	1,400	1,400	4,200

Source: TransSolutions

value of aircraft, owner preferences, hangar rental costs and local climate. Several assumptions are made to determine hangar requirements to distribute based aircraft:

- 75 percent of based single-engine aircraft will need hangar space, comprised of 25 percent requiring T-hangars and 50 percent requiring conventional hangars
- 90 percent of multi-engine piston aircraft will require hangar space, comprised of 72 percent requiring conventional hangars and 18 percent requiring T-hangars
- All based multi-engine turbine and jet aircraft will require conventional hangars
- All based aircraft in the “other” category will require T-hangars
- Conventional hangar space is set at 1,200 square feet for a single-engine aircraft or a rotor-craft, 1,400 square feet for a multi-engine aircraft and 1,800 square feet for a multi-engine turbine or jet aircraft
- T-hangar space is set at 1,400 square feet per aircraft

The area calculations were then applied to the assumptions of based aircraft distribution to determine overall hangar area requirements.

Since conventional hangars vary in size, as do the number of aircraft stored in them, only the required area is listed. T-hangars typically store only one aircraft and the dimensions of the hangars are generally consistent.

Based aircraft apron requirements were calculated for those aircraft using tie-down space instead of hangar storage. This analysis assumes based aircraft using tie-down space include 25 percent of the single-engine piston aircraft, 10 percent of the multi-engine piston aircraft, and 50 percent of rotorcraft. The standard for calculating paved tie-down area is 300 square yards per aircraft. Applying these standards, the total tie-down area needed at each airport is calculated and is shown in Table 29.

Transient apron area is required for aircraft not based at an airport that need temporary storage at the airport. To estimate a busy day, 11 percent of the annual operations are assumed to occur in a peak month, and the peak month's average daily traffic is increased by 10 percent. Transient operations are assumed at 70 percent of the busy-day itinerant operations. The number of transient aircraft totals half of the busy-day transient operations (assume each aircraft is two operations: arrival and departure). Space on the transient ramp is provided for 80 percent of the busy-day transient aircraft, which are assumed to be two-thirds single-engine aircraft and one-third multi-engine aircraft. Overall apron space requirements are determined by applying established guidelines for transient apron areas. Typically, 360 square yards of apron space is adequate for transient single-engine aircraft and 600 square yards for transient multi-engine aircraft. An additional 20 percent is added to account for the area needed for fueling and loading. Table 30 depicts the resulting calculations of required ramp space for each airport.

Table 29: Based Aircraft Tie-Down Demand

	Based Aircraft Tie-Down Demand (sq.yds.)											
	2015				2020				2030			
Airport	Single Engine	Multi-Engine	Rotor	Total	Single Engine	Multi-Engine	Rotor	Total	Single Engine	Multi-Engine	Rotor	Total
Air Carrier Airports												
George Bush Intercontinental	300	900	900	2,100	300	900	900	2,100	300	900	900	2,100
William P. Hobby	4,200	1,500	1,500	7,200	3,300	1,200	1,500	6,000	2,700	1,200	1,500	5,400
Reliever Airports												
Texas Gulf Coast Regional	5,700	600	2,100	8,400	6,000	600	2,400	9,000	6,900	600	3,300	10,800
D.W. Hooks Memorial	18,900	1,200	3,900	24,000	19,500	1,200	4,200	24,900	21,300	1,200	5,400	27,900
Ellington	14,700	900		15,600	14,400	900		15,300	15,300	900		16,200
Houston Southwest	8,700	900	600	10,200	8,700	900	600	10,200	9,300	600	600	10,500
La Porte Municipal	10,500	600	600	11,700	10,200	600	600	11,400	10,200	300	900	11,400
Lone Star Executive	14,700	900		15,600	16,500	900		17,400	20,400	900		21,300
Pearland Regional	15,600	600	1,500	17,700	16,500	600	1,500	18,600	18,900	600	2,100	21,600
Scholes International	7,200	900	4,800	12,900	7,800	900	6,000	14,700	9,000	900	8,100	18,000
Sugar Land Regional	5,400	1,200	600	7,200	5,700	1,200	600	7,500	6,600	1,200	900	8,700
West Houston	20,700	900	1,500	23,100	22,200	900	1,500	24,600	25,800	900	2,100	28,800
Other General Aviation Airports												
Bay City Municipal	2,400	300		2,700	2,400	300		2,700	2,700	300		3,000
Baytown	2,100	300	300	2,700	2,400	300	300	3,000	3,000	300	600	3,900
Chambers County	900	300		1,200	900	300		1,200	600	300		900
Cleveland Municipal	3,600	300		3,900	3,900	300		4,200	4,500	300		4,800
Eagle Lake	2,100	300		2,400	2,100	300		2,400	2,700	300		3,000
Houston Executive	900	300	300	1,500	1,200	600	300	2,100	1,200	600	300	2,100
Huntsville Municipal	2,700	300	300	3,300	2,700	300	300	3,300	2,700	300	300	3,300
Liberty Municipal	900	300		1,200	900	300		1,200	900	300		1,200
Palacios Municipal	900		1,200	2,100	900		1,200	2,100	900		1,200	2,100
Robert R. Wells	1,200			1,200	900	300		1,200	1,200	300		1,500
Weiser Airpark	5,700	300	600	6,600	5,700	300	900	6,900	6,300	300	900	7,500
Wharton Regional	3,000	300		3,300	3,000	300		3,300	3,300	300		3,600
North Houston Business	4,500	300		4,800	5,100	300		5,400	6,600	300		6,900
Winnie-Stowell	300	300	300	900	300	300	300	900	300	300	300	900

Source: TransSolutions

Table 30: Transient Aircraft Apron Demand

Airport	Transient Apron Capacity (sq.yds.)	General Aviation Transient Aircraft Apron Demand (sq.yds.) 2015 Single Engine	2015 Multi-Engine	2015 Other	2015 Total	2020 Single Engine	2020 Multi-Engine	2020 Other	2020 Total	2030 Single Engine	2030 Multi-Engine	2030 Other	2030 Total
Air Carrier Airports													
George Bush Intercontinental	923,154	4,000	3,600	1,500	9,100	4,000	3,600	1,500	9,100	4,700	4,200	1,800	10,700
William P. Hobby	800,000	22,000	18,600	8,120	48,720	22,000	19,200	8,200	49,400	22,700	19,800	8,500	51,000
Reliever Airports													
Texas Gulf Coast Regional		7,200	6,600	2,760	16,560	7,900	7,200	3,000	18,100	9,400	7,800	3,400	20,600
D.W. Hooks Memorial	18,460	30,200	26,400	11,320	67,920	32,400	27,600	12,000	72,000	36,400	31,200	13,500	81,100
Ellington	13,737	19,100	16,200	7,060	42,360	20,200	17,400	7,500	45,100	23,800	20,400	8,800	53,000
Houston Southwest		5,400	4,800	2,040	12,240	6,100	5,400	2,300	13,800	7,200	6,600	2,800	16,600
La Porte Municipal		7,200	6,600	2,760	16,560	7,600	6,600	2,800	17,000	8,300	7,200	3,100	18,600
Lone Star Executive	289,914	11,900	10,200	4,420	26,520	12,600	10,800	4,700	28,100	16,200	13,800	6,000	36,000
Pearland Regional	180,000	9,400	8,400	3,560	21,360	10,100	9,000	3,800	22,900	11,900	10,200	4,400	26,500
Scholes International		4,300	3,600	1,580	9,480	4,700	4,200	1,800	10,700	5,400	4,800	2,000	12,200
Sugar Land Regional	57,000	7,900	7,200	3,020	18,120	9,000	7,800	3,400	20,200	10,800	9,600	4,100	24,500
West Houston	9,680	10,100	9,000	3,820	22,920	11,200	9,600	4,200	25,000	12,600	10,800	4,700	28,100
Other General Aviation Airports													
Bay City Municipal		1,100	1,200	460	2,760	1,100	1,200	500	2,800	1,100	1,200	500	2,800
Baytown		1,400	1,200	520	3,120	1,400	1,200	500	3,100	1,800	1,800	700	4,300
Chambers County		400	600	200	1,200	400	600	200	1,200	400	600	200	1,200
Cleveland Municipal		1,800	1,800	720	4,320	1,800	1,800	700	4,300	2,200	1,800	800	4,800
Eagle Lake		1,100	1,200	460	2,760	1,400	1,200	500	3,100	1,800	1,800	700	4,300
Houston Executive		1,400	1,200	520	3,120	1,400	1,200	500	3,100	1,400	1,200	500	3,100
Huntsville Municipal	10,000	1,100	1,200	460	2,760	700	600	300	1,600	400	600	200	1,200
Liberty Municipal		700	600	260	1,560	700	600	300	1,600	700	600	300	1,600
Palacios Municipal		400	600	200	1,200	400	600	200	1,200	400	600	200	1,200
Robert R. Wells		400	600	200	1,200	700	600	300	1,600	700	600	300	1,600
Weiser Airpark		4,700	4,200	1,780	10,680	5,000	4,200	1,800	11,000	5,400	4,800	2,000	12,200
Wharton Regional		1,400	1,200	520	3,120	1,400	1,800	600	3,800	1,800	1,800	700	4,300
North Houston Business	1,733	1,400	1,200	520	3,120	1,800	1,800	700	4,300	2,200	1,800	800	4,800
Winnie-Stowell		400	600	200	1,200	400	600	200	1,200	400	600	200	1,200

Source: TransSolutions

9.10 Capacity Summaries by Airport

This section presents findings for each system airport and reasons for reaching these findings. The results of the aviation activity forecasts, airfield and landside capacity analysis and opportunities and constraints for airport improvement are among these reasons. Airside capacity is discussed in terms of the 2030 forecast, due to the typically lengthy process to build additional runways. Landside capacity is discussed in terms of the 2020 forecast, since development of aircraft storage requires less time.

9.10.1 George Bush Intercontinental Airport

George Bush Intercontinental Airport completed a master plan in 2006 that identified the need for additional runways. New HAS forecasts indicate that annual operations may exceed 90 percent capacity by 2030 without more runway capacity. The master plan also identifies the need for new taxiways to provide more departure queuing capacity and improve airfield efficiency. HAS confirmed this conclusion in 2010 and plans to update the Bush Intercontinental master plan in the near future.

General aviation operations account for 4 to 5 percent of George Bush Intercontinental operations. With a very busy commercial operation and major hub for Continental Airlines, many general aviation pilots prefer to fly out of other area airports. George Bush Intercontinental staff indicates that the airport does not have space to accommodate more general aviation aircraft

and facilities. This study indicates that George Bush Intercontinental needs 111,400 sq.ft. of conventional hangar space, 8,400 sq.ft. of T-hangar space, 2,100 sq.yds. of based aircraft apron, and 9,100 sq.yds. of transient apron to accommodate general aviation in 2020.

9.10.2 William P. Hobby Airport

The 2003 master plan for William P. Hobby Airport estimates ASV at 236,000, and HAS reports that the ASV in 2008 was 257,000 and will be 293,000 in 2030. The 2010 TAF estimates Hobby Airport will reach 243,000 annual operations by 2030, 83 percent of projected future capacity. As mentioned previously, HAS plans to update Hobby's master plan.

General aviation operations account for about 36 percent of the overall airport operations. Hobby is bordered on all sides by developed land, so expansion opportunities are limited. The airport does not have space to accommodate more general aviation aircraft, and the airport manager would like to transfer some general aviation operations to reliever airports to free up space for commercial aviation facilities. However, Hobby is a desirable base for jet owners and demand for general aviation facilities continues to increase. This study shows that Hobby will need 431,200 sq.ft. of conventional hangar space, 23,800 sq.ft. T-hangar, 6,000 sq.yds. of based aircraft apron, and 49,400 sq.yds. of transient apron to accommodate general aviation in 2020.

9.10.3 Texas Gulf Coast Regional Airport

Texas Gulf Coast Regional Airport has a relatively large percentage of large aircraft for a reliever airport. This study assumes 28 percent of the 2008 operations have maximum take-off weight greater than 12,500 pounds, increasing slightly to 32 percent by 2030. The ASV is estimated to be more than 170,000 operations, while the forecast is well below 100,000 operations in 2030, and so airside capacity is adequate for projected operations throughout the 20-year planning horizon.

The runway was reconstructed in 2010, providing excellent runway conditions. Undeveloped land surrounds Texas Gulf Coast Regional, providing opportunities for development. All the landside facilities are on the east side of the runway. By 2020, this study estimates Texas Gulf Coast Regional will need a total of 80,400 sq.ft. of conventional hangar space, 35,000 sq.ft. of T-hangar space, 9,000 sq.yds. of based aircraft apron, and 18,100 sq.yds. of transient apron.

9.10.4 David Wayne Hooks Memorial Airport

David Wayne Hooks Memorial Airport is limited in both airfield capacity and aircraft storage. D.W. Hooks has flight training activity and the airport's master plan states that 55 percent of the operations are touch-and-go. The water runway 17W/35W is adjacent to the short parallel runway and both runways cannot be operated simultaneously. Capacity is calculated for two parallel runways with about 322 feet of separation. The ASV is estimated at 225,000 to 230,000 operations, which is close to the ASV calculated for the airport's master plan. Although operations in 2008 exceeded that level by about 9 percent, 2010 operations dropped to 205,000, 10 percent below ASV.

D.W. Hooks Airport is a very active facility. During busy times, aircraft are already experiencing some levels of delay. A sensitivity analysis was performed on the ASV calculation to test how different assumptions would affect the capacity calculations. This analysis varies the assumed values of two ratios used in the capacity calculations (D, the ratio of annual to average day peak

month demand, and H, the ratio of daily demand to peak hour demand) as suggested in FAA Advisory Circular 150/5060-5. Considering DWH's fleet mix, the Advisory Circular proposes that D could be increased from 295 to 300 and H from 9 to 10. When this is done, ASV increases to over 250,000. Yet even at this higher ASV estimate, D.W. Hooks exceeds capacity during the next 10 years. Planning for additional runway capacity should begin within the next five years, or the excess aviation activity may have to be accommodated at other airports.

D.W. Hooks has residential development and roadways on all sides of the airport, and little land is available for acquisition. By 2020, this study estimates D.W. Hooks will need a total of 267,200 sq.ft. of conventional hangar space, 103,600 sq.ft. of T-hangar space, 24,900 sq.yds. of based aircraft apron, and 72,000 sq.yds. transient apron. D.W. Hooks currently has 18,500 sq.yds. of transient apron.

9.10.5 Ellington Airport

As a joint-use airport, Ellington Airport accommodates military, NASA and commercial operations along with general aviation. The 2004 Ellington Master Plan estimates capacity at 217,000 annual operations. The number of military operations has decreased since 2007 following the Base Realignment and Closure Commission's recommendation to retire the Texas Air National Guard's F-16s. The airport is operating just over 70 percent capacity now and will nearly reach 80 percent capacity in 2020, based on 2010 TAF data.

By 2020, this study estimates Ellington will need a total of 191,800 sq.ft. of conventional hangar space, 74,200 sq.ft. of T-hangar space, 15,300 sq.yds. of based aircraft apron, and 45,100 sq.yds. of transient apron for general aviation operations. Although the airport is surrounded by roads and residential and industrial land, there is substantial undeveloped space on airport property to add apron and hangars.

9.10.6 Houston Southwest Airport

The estimated ASV for Houston Southwest Airport in 2030 is more than 180,000 operations, while the 2030 forecast demand is 75,000 operations. Houston Southwest has some flight training activity, and this analysis assumes 10 percent of operations are touch-and-go. Airside capacity is adequate for projected operations throughout the 20-year planning period. Several airfield projects are underway or in planning at Houston Southwest, including a runway extension to 5,500 feet and repair of the taxiway pavement. While the airport has acquired land to the north and east, there is residential development near the west runway end that limits the airport's options to extend its runway in that direction. The airport is also constrained by the close proximity of a railroad east and south of Houston Southwest.

Houston Southwest has the airfield capacity to accommodate forecast operations and needs more hangars or apron space for aircraft storage. The airport recognizes that additional aircraft storage space is needed. By 2020, this study estimates Houston Southwest will need a total of 101,600 sq.ft. of conventional hangar space, 49,000 sq.ft. of T-hangar space, 10,200 sq.yds. of based aircraft apron, and 13,800 sq.yds. of transient apron.

9.10.7 La Porte Municipal Airport

The 2030 ASV for La Porte Municipal Airport is estimated at 300,000 operations, while the 2030 forecast is just below 100,000 operations, so the airport has sufficient airside capacity for

projected operations throughout the 20-year planning period. With several flight training schools at La Porte Municipal, this analysis assumes 50 percent of the operations are touch-and-go.

La Porte Municipal will need more hangars and apron space for aircraft storage. This analysis estimates by 2020, La Porte Municipal will need a total of 97,800 sq.ft. of conventional hangar space, 53,200 sq.ft. of T-hangar space, 11,400 sq.yds. of based aircraft apron, and 17,000 sq.yds. of transient apron. Although the airport is nearly surrounded with developed residential and industrial land, there is some undeveloped land on the airfield that could be used for additional aircraft storage.

9.10.8 Lone Star Executive Airport

Lone Star Executive Airport's 2003 Master Plan identifies the need to extend Runway 14/32 from 6,000 to 8,000 feet to meet the needs of corporate aircraft, and to extend the partial parallel taxiway serving Runway 14/32. The airport has some flight training activity, and this analysis assumes 10 percent of the operations are touch-and-go. Lone Star Executive's ASV is estimated to be over 220,000 operations in 2030, while the forecast demand for 2030 is 130,000 operations. Airside capacity is adequate for projected operations over the next 20 years.

Lone Star Executive has the airfield capacity to accommodate the projected operations, although it would need more hangars and apron space for aircraft storage. This analysis estimates by 2020, Lone Star Executive will need a total of 199,800 sq.ft. of conventional hangar space, 86,800 sq.ft. of T-hangar space, 17,400 sq.yds. of based aircraft apron, and 28,100 sq.yds. of transient apron. The airport property has developable land for expansion. Several development projects are underway to add hangars of various types.

9.10.9 Pearland Regional Airport

Pearland Regional Airport's ASV is estimated at 220,000 operations in 2030, while the 2030 forecast demand is for 128,000 operations. Flight training is done at Pearland Regional and this analysis assumes 10 percent of the operations are touch-and-go. Helicopters at Pearland Regional are assumed to use the runway and are included in the ASV calculation. Thus, airside capacity is adequate through 2030. The TASP lists a runway extension project (to 5,500 feet).

More hangars and apron space will be needed for aircraft storage. This analysis estimates by 2020, Pearland Regional will need a total of 158,800 sq.ft. of conventional hangar space, 79,800 sq.ft. of T-hangar space, 18,600 sq.yds. of based aircraft apron, and 22,900 sq.yds. of transient apron. Although much of the surrounding land is developed, there is space to extend the runway and to add hangars and storage capacity on the airport property.

9.10.10 Scholes International Airport

Scholes International Airport has a relatively high percentage (33 percent) of larger general aviation aircraft, and the percentage is expected to increase to 38 percent by 2030, limiting capacity. This analysis assumes the instrument landing equipment damaged by Hurricane Ike will be fully repaired and operational by 2015, and the airport has 10 percent touch-and-go operations. With no helipad and helicopters at up to 25 percent of the fleet mix, rotorcraft are assumed to use the runway and are included in the ASV. Scholes International's ASV is estimated at 190,000 operations, while the 2030 forecast demand is less than 50,000 operations, and therefore the airport has the airfield capacity to accommodate additional GA operations.

Scholes International will need more hangars and apron space for aircraft storage. This analysis estimates by 2020, the airport will need a total of 116,000 sq.ft. of conventional hangar space, 49,000 sq.ft. of T-hangar space, 14,700 sq.yds. of based aircraft apron, and 10,700 sq.yds. of transient apron. Located on Galveston Island, Scholes International is surrounded by water and developed land; however, there is still land on airport property for expansion.

9.10.11 Sugar Land Regional Airport

Sugar Land Regional Airport's ASV is estimated at close to 150,000. The ASV is relatively low for an airport with an 8,000-foot runway. Taxiway pull-offs are not sufficient to support higher capacity and there is a large percentage of heavy aircraft operations. Fifty percent of operations are by aircraft with maximum take-off weight greater than 12,500 pounds, growing to 54 percent by 2030. With some flight training activity, this analysis also assumes 10 percent of the operations are touch-and-go. Since Sugar Land Regional's forecast for 2030 is just over 100,000 operations, airside capacity is adequate for projected operations.

The airport will need more hangars or apron space for aircraft storage. By 2020, this analysis estimates Sugar Land Regional will need a total of 163,200 sq.ft. of conventional hangar space, 39,200 sq.ft. of T-hangar space, 7,500 sq.yds. of based aircraft apron, and 20,160 sq.yds. of transient apron. The airport is considering acquiring property to the west to add a taxiway, offices and hangar facilities.

9.10.12 West Houston Airport

West Houston Airport's 2030 ASV is estimated at 215,000 operations, while the forecast demand is for over 142,000 operations in 2030. The capacity calculation assumes 10 percent of operations are touch-and-go. Runway expansion is unlikely at West Houston because land to the north and west is developed with residential properties and land to the south and east is a reservoir operated by the Corps of Engineers. While airside capacity is adequate for projected operations throughout the planning horizon, it will approach 80 percent capacity by 2030.

The airport will need more hangars or apron space for aircraft storage by 2020. This analysis estimates West Houston will need a total of 228,800 sq.ft. of conventional hangar space, 109,200 sq.ft. of T-hangar space, 24,600 sq.yds. of based aircraft apron, and 25,000 sq.yds. of transient apron.

9.10.13 Bay City Municipal Airport

Bay City Municipal Airport shows a projected 2030 ASV at 180,000 operations, including 10 percent touch-and-go operations for flight training. The airport is forecast to reach only 13,800 operations in 2030, so there is ample airside and runway capacity to accommodate the projected operations throughout the study's planning timeline.

Bay City Municipal has the airfield and runway capacity to accommodate a large number of general aviation operations. It still needs more hangars or apron space for aircraft storage. By 2020, the airport will need 29,000 sq.ft. of conventional hangar space, 21,000 sq.ft. of T-hangar space, 2,800 sq.yds. of based aircraft apron, and 2,700 sq.yds. of transient apron.

9.10.14 Baytown Airport

Baytown Airport's airfield capacity is limited by several factors. Larger aircraft are expected to be a larger proportion of operations over the next 20 years, growing from 16 percent to 18 percent.

The airport recently received published instrument approaches on both runway directions and can now accommodate operations during IFR conditions. Assuming 10 percent touch-and-go operations, the ASV is estimated at more than 180,000 operations, while the forecast demand will remain less than 14,000 by 2030. There is ample airside capacity to accommodate the projected operations throughout the study's planning timeline. While a parallel taxiway would increase efficiency and safety, the forecast demand does not require it for capacity. Furthermore, capacity expansion is limited due to residential areas on both ends of the runway and very close to part of the airport's western side.

Baytown Airport will need more hangars or apron space for aircraft storage to meet future demand. This analysis estimates by 2020, Baytown will need 15,400 sq.ft. of T-hangar space, 3,000 sq.yds. of based aircraft apron, and 3,100 sq.yds. of transient apron.

9.10.15 Chambers County Airport

Chambers County Airport has a relatively short runway (just over 3,000 feet) and relatively high capacity (220,000 operations in 2030), due to its runway and taxiway configuration and its fleet of mostly smaller aircraft. This assessment also assumes 10 percent touch-and-go operations. The airport is forecast to have only 5,000 operations in 2030, and there is ample airside capacity to accommodate aircraft operations over the planning period. A 700-foot runway extension is in the TASP for Chambers County.

This study estimates by 2020, Chambers County will need a total of 7,400 sq.ft. of conventional hangar space, 7,000 sq.ft. of T-hangar space, 1,200 sq.yds. of based aircraft apron, and 1,152 sq.yds. of transient apron. Therefore, Chambers County will need more hangars or apron space for aircraft storage over the planning period.

9.10.16 Cleveland Municipal Airport

Cleveland Municipal Airport's calculated 2030 ASV is 230,000 operations (assuming 10 percent touch-and-go operations), which is more than enough capacity to handle the forecast 21,800 operations in 2030. However, by 2020, the airport will need more hangars or apron space for aircraft storage: 37,800 sq.ft. of conventional hangar space, 21,000 sq.ft. of T-hangar space, 4,200 sq.yds. of based aircraft apron, and 4,320 sq.yds. of transient apron.

9.10.17 Eagle Lake Airport

Eagle Lake Airport, which lacks a parallel taxiway, has an estimated capacity of 130,000 operations in 2030. (The ASV calculation assumes 10 percent touch-and-go operations.) This number may overestimate the capacity at Eagle Lake since the Advisory Circular does not cover all capacity constraints for airports with runways without parallel taxiways. Even if the true capacity is somewhat less than 130,000 operations, it far exceeds the forecast demand 23,300 operations in 2030, so there is ample runway capacity to accommodate the projected operations throughout the study's planning timeline.

Although Eagle Lake will not need to build a parallel taxiway for capacity reasons through 2030, this project is still worthy because it would improve safety. This is especially true if the airport proceeds with its desire to extend its runway. The airport has undeveloped land to the north, east and south as options for expansion.

More hangar space or apron space will be needed for aircraft storage. This study estimates by 2020, Eagle Lake will need 24,600 sq.ft. of conventional hangar space, 14,000 sq.ft. of T-hangar space, 2,400 sq.yds. of based aircraft apron, and 3,100 sq.yds. of transient apron.

9.10.18 Houston Executive Airport

Houston Executive Airport's current ASV is estimated at 150,000 operations, which will decrease to 131,300 operations by 2030, because large aircraft operations at Houston Executive are projected to go from 32 percent to 62 percent over the forecast period. The airport's forecast demand is only 34,700 operations in 2030, and therefore it has the airfield capacity to accommodate additional operations through 2030. Currently, Houston Executive does not allow touch-and-go operations.

The airport has 600 acres of unused land for additional development. This study estimates by 2020, Houston Executive will need 40,200 sq.ft. of conventional hangar space, 11,200 sq.ft. of T-hangar space, 2,100 sq.yds. of based aircraft apron, and 3,100 sq.yds. of transient apron.

9.10.19 Huntsville Municipal Airport

Huntsville Municipal Airport, like Houston Executive, will see its capacity decrease from 2008 to 2030 due to an increase in the proportion of large aircraft using the airport. The ASV for Huntsville Municipal is 204,400 operations in 2008, with 12 percent of operations by large aircraft. The ASV will drop to 177,700 operations in 2030, with 20 percent of operations by large aircraft. The airport supports some flight training activity, and this analysis assumes 10 percent of the operations are touch-and-go. Huntsville Municipal will maintain sufficient airfield capacity to accommodate the forecast 35,000 annual operations by 2030.

Huntsville Municipal is projected to need more hangars or apron space for aircraft storage. This study estimates by 2020, the airport will need a total of 28,000 sq.ft. of conventional hangar space, 15,400 sq.ft. of T-hangar space, 3,300 sq.yds. of based aircraft apron, and 1,600 sq.yds. of transient apron. Construction of additional hangars is already under contract.

9.10.20 Liberty Municipal Airport

Liberty Municipal Airport is estimated to have 2030 ASV over 200,000 operations, while the airport is forecast to have only 8,400 operations in 2030. There is ample airside capacity to accommodate the projected operations throughout the study's planning timeline. However, more hangar space or apron space will be needed for aircraft storage. This study estimates by 2020, Liberty Municipal will need 8,800 sq.ft. of conventional hangar space, 8,400 sq.ft. of T-hangar space, 1,200 sq.yds. of based aircraft apron, and 1,600 sq.yds. of transient apron. Hangar reconstruction after Hurricane Ike damaged the airport is underway.

9.10.21 Palacios Municipal Airport

Palacios Municipal Airport, with three runways and forecast 2030 demand of 4,100 operations, has substantial excess capacity for aircraft operations. The ASV calculation assumes 10 percent touch-and-go operations, and 31 percent of the operations are large aircraft in 2008, increasing to 44 percent by 2030. In 2008, Palacios Municipal's ASV is 209,000, decreasing to 181,800 in 2030 due to the fleet mix change.

The airport is currently in need of additional hangars. This study estimates by 2020, Palacios Municipal will need 12,600 sq.ft. of conventional hangar space, 5,600 sq.ft. of T-hangar space, 2,100 sq.yds. of based aircraft apron, and 1,152 sq.yds. of transient apron.

9.10.22 Robert R. Wells, Jr. Airport

Robert R. Wells, Jr. Airport is limited in capacity by its partial parallel taxiway, increasing proportion of large aircraft and lack of instrument landing system for IFR operation. The current ASV is near 185,000, declining to 166,000 by 2030 with the fleet mix change. Nonetheless, R.R. Wells is forecast to have 4,100 operations in 2030, so there is ample airside capacity to accommodate the projected operations throughout the study's planning timeline.

R.R. Wells has the airfield and runway capacity to accommodate additional operations; however, it will need more hangars and apron space for aircraft storage. This study estimates by 2020, R.R. Wells will need 14,800 sq.ft. of conventional hangar space, 8,400 sq.ft. of T-hangar space, 1,200 sq.yds. of based aircraft apron, and 1,600 sq.yds. of transient apron.

9.10.23 Weiser Airpark

Weiser Airpark is a very busy small airport with mostly single-engine aircraft operations and several active flight schools. The analysis assumes 50 percent of operations are touch and go. Weiser Airpark's 2030 ASV is estimated at 238,500 operations, while the forecast demand for 2030 is 51,200 operations. The airport has a published LPV instrument approach. Weiser Airpark's airside capacity is adequate for projected operations through the planning horizon.

Additional hangar space or apron space is needed for aircraft storage, although land on which to build the space is not easily available due to extensive residential development around the airport. This study estimates by 2020, Weiser Airpark will need 54,800 sq.ft. of conventional hangar space, 30,800 sq.ft. of T-hangar space, 6,900 sq.yds. of based aircraft apron, and 11,100 sq.yds. of transient apron.

9.10.24 Wharton Regional Airport

Wharton Regional Airport's calculated ASV in 2008 is 196,100 operations; this will decline by 2030 to 156,200 as larger aircraft take a greater percentage of the fleet mix (from 16 percent in 2008 to 21 percent in 2030). This assessment assumes 10 percent touch-and-go operations. The forecast demand is 18,900 in 2030. Therefore, Wharton Regional has ample airside and runway capacity to accommodate the projected operations through 2030.

Wharton Regional has sufficient airfield capacity but not aircraft storage capacity. This study estimates by 2020, the airport will need 42,000 sq.ft. of conventional hangar space, 40,600 sq.ft. of T-hangar space, 3,300 sq.yds. of based aircraft apron, and 3,800 sq.yds. of transient apron. Undeveloped land surrounding the airport offers opportunities for adding hangars or apron space.

9.10.25 North Houston Business Airport

North Houston Business Airport is currently expanding its runway and other airside facilities, which will increase its airside capacity. Over the 20-year planning period, the airport is forecast to increase its proportion of large aircraft operations from 7 percent to 13 percent, and the ASV is estimated to be 198,200 in 2030. Nonetheless, the airport's forecast demand is 19,000 operations in 2030, which can easily be met by the available capacity. Although North Houston

Business does not currently have a published instrument approach, the airport is currently pursuing a published approach with FAA. The airport is assumed to have 10 percent touch-and-go operations.

This study estimates by 2020, North Houston Business will need 50,600 sq.ft. of conventional hangar space, 28,000 sq.ft. of T-hangar space, 5,400 sq.yds. of based aircraft apron, and 4,300 sq.yds. of transient apron. Undeveloped land on the airport property and available land to the south of the airport offer opportunities for locating aircraft storage.

9.10.26 Winnie-Stowell Airport

Winnie-Stowell Airport is used primarily for crop dusting operations, and 10 percent touch-and-go operations are assumed. Capacity is limited by the lack of instrument approaches are available, and the capacity is zero for 8 percent of the year during instrument conditions. The airport's capacity is calculated to be 156,500 in 2030, and the forecast demand is 4,200 in 2030, so there is ample airside capacity through the planning period.

Winnie-Stowell has very little storage space today, and the need for aircraft storage will increase. By 2020, the airport will need 11,600 sq.ft. of conventional hangar space, 4,200 sq.ft. of T-hangar space, 900 sq.yds. of based aircraft apron, and 1,200 sq.yds. of transient apron. Undeveloped land surrounding the airport offers opportunities for expansion, except on the north side due to the proximity of Interstate 10.

10 Scenario Assessment

Chapter 8 presents demand forecasts for aviation operations and based aircraft at each system airport from 2010 through 2030, unconstrained by actual airport facilities and events. Chapter 9 assesses the capacity of each airport to handle this aviation demand, and identifies airports with potential supply shortfalls to meet the forecast demand. The aviation forecasts and capacity analyses assume the current system airports remain open through 2030, no airport closes, no new airport is opened, and no major change to any airport's role and function occurs.

Despite this assumption, major changes to system airports are possible. An airport may close, a new airport may be built, or an airport may gain or lose functionality for various reasons. These kinds of events have happened several times in the past 20 years. Andrau Airport, in west Houston, closed in 1998; Houston Gulf Airport, near League City in Galveston County, closed in 2002; Houston Executive Airport, in Waller County, opened in 2007; Hurricane Ike, in 2008, devastated hangars at several airports in the region and lowered their based aircraft capacity overnight. In each event, the users of the airport system responded by moving their airplanes from airport to airport within the region, or to other airports outside the region. Airport owners responded by repairing damaged airport facilities, improving or adding new facilities to meet the change in demand, or removing facilities no longer needed. None of these events was included in aviation forecasts in the 1980s and 1990s, and the FAA considers three changes in 20 years as indicating a stable regional aviation system. Nonetheless, the resulting changes in the demand and capacity of system airports caused actual aviation activity in the system to vary from forecasts assuming a constant system.

The purpose of the scenario analysis in this chapter is to anticipate possible events affecting the regional aviation system, determine the potential impacts to the system, and recommend measures to include in aviation system planning to mitigate undesirable results of such changes. Hypothetical scenarios are developed in which one of the system airports is closed or opened, and the impacts on other airports and on the regional aviation system are examined. These scenarios are purely hypothetical and are developed for planning purposes only; this report makes no claim or recommendation that any specific airport is planned for closing or opening.

A wide range of scenarios are possible, from the complete loss to the complete gain of an airport: total closure of an airport, closure of a runway, loss of several hangars, loss of navigational aids, loss of a terminal building, a new taxiway, a runway extension, a new runway or an entirely new airport. The scenario analysis in this report is for the extreme cases—loss or gain of an entire airport—to determine the full potential extent of impacts to the aviation system. Events between these two extremes in scale will have intermediate impacts to the aviation system, and therefore planning for the extreme events will also plan for intermediate events. A baseline scenario is also included, in which no change occurs to the current airport system.

The outcome of the scenario analysis is used in Chapter 13 to develop an optimal plan and in Chapter 14 to set development priorities. The system developed under the optimal plan should be more resilient to the kinds of changes envisioned in the scenario analysis because this scenario analysis is part of the planning of the Houston-Galveston regional aviation system.

10.1 Scenario A: Nothing Changes

The baseline scenario assumes all system airports maintain their current role and function through 2030, and all currently programmed and funded projects are built. No new airport is built in the region and no system airport closes. If no unforeseen event changes the regional airport system by 2030, then the forecasts of aviation demand presented in Chapter 8 hold, and the airport capacity analysis presented in Chapter 9 indicates whether each airport will be able to meet its forecast demand.

10.2 Scenario B: A Reliever Airport Closes

Closure of a reliever airport in the Houston-Galveston area could have serious impacts to the aviation system. As discussed above, two private airports in the region have closed over the past 20 years, as land values rose, the owner's circumstances changed, or the owner found it advantageous to sell the land to developers. No publicly-owned airport has ever closed in the Houston-Galveston region, although a publicly-owned airport could become less usable if its governmental owner chooses to re-allocate its budget resources to other purposes, especially if the airport requires major capital investment to continue its full operating capabilities. Although scenarios that close publicly-owned airports would not actually be expected to occur, the results would indicate the extreme limit of the potential effects of a publicly-owned airport losing capacity due to poor maintenance or capitalization.

This scenario examines the effects of the hypothetical closure of one reliever airport in the Houston-Galveston region on the remaining system airports. On closure of a reliever airport, the aircraft operations at that airport can move to another nearby airport, if it is suitable and has capacity available for them, or to an airport at a greater distance than is desirable, or out of the region altogether if nearby airports are too crowded or unsuitable. Thus, under this scenario, nearby airports would experience greater growth than they would have without the closure, while the region may experience a net loss in aviation activity (and based aircraft, which are the source of many of the aircraft operations).

The scenario describes a purely hypothetical event. Each airport is simulated to close in this analysis because it is impossible to know in advance which airport, if any, would close during the planning period. This analysis is not meant to imply in any way that closure of any specific airport is recommended or considered likely.

10.3 Scenario C: A Non-Reliever General Aviation Airport Closes

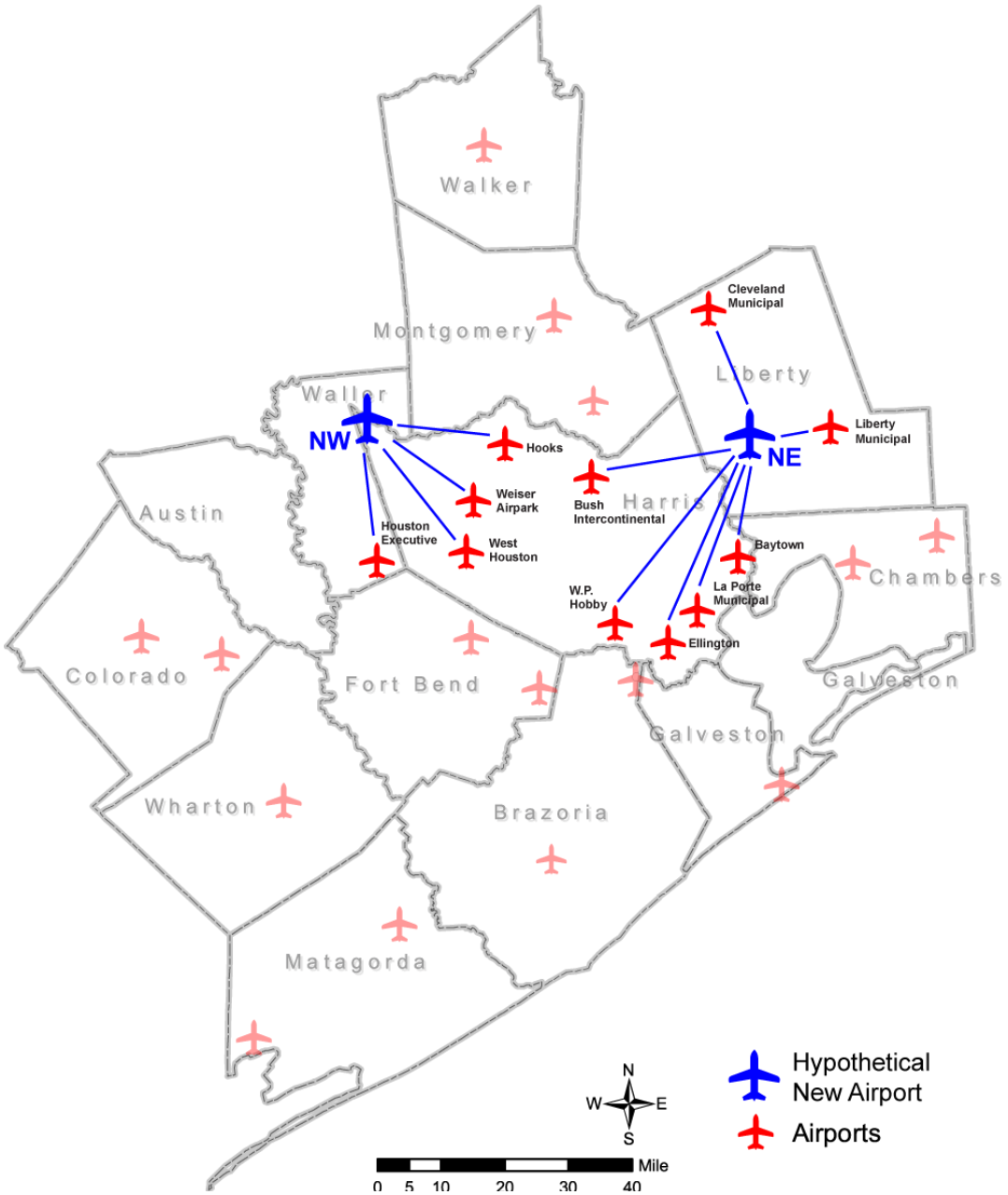
This scenario hypothesizes the closure of a non-reliever general aviation airport in the Houston-Galveston area. It is similar to the previous scenario (closure of a reliever airport) except that non-reliever airports typically fulfill different roles and have fewer aircraft operations than reliever airports. As with Scenario B, closing a non-reliever airport would cause aircraft operations to move to another nearby airport (if it is suitable and has available capacity), or to an airport further out, or to an airport outside the region. Again, each non-reliever general aviation airport is simulated to close in this scenario.

The difference between an airport closing in this scenario and in the previous scenario is the airport's fleet mix (more single-engine airplanes, fewer or no multi-engine or jet airplanes) and a small number of displaced aircraft. As with Scenario B, Scenario C describes a purely hypothetical event and is not meant to imply that closure of any airport is recommended or likely.

10.4 Scenario D: A New General Aviation Airport Opens

Scenario D hypothesizes a new reliever-class general aviation airport opening somewhere near the urbanized area of the Houston-Galveston region. Two hypothetical locations for the new airport are considered in this scenario, as shown in Figure 28. This analysis does not presume either location is feasible, and no claim is made that either location is actually under consideration; both locations are completely hypothetical. The "Hypothetical NW" location is in northwest Harris County, generally around the intersection of the Grand Parkway and US 290. The "Hypothetical NE" location is in Liberty County, generally around the intersection of the proposed Grand Parkway and US 90. Both locations are in major growth directions for the Houston urban area and are expected to experience significant population and employment growth in the next

Figure 28: Relative Locations for a Hypothetical New Airport



twenty years. Both locations are also at reasonable distances from existing general aviation airports.

10.5 Analysis of Impacts

This section presents the results of the multiple simulations run for each scenario. Although the airports in the simulations are real system airports, the results are presented so that the range of results indicates the potential extent of impacts to the system. This analysis is not concerned with the particular impacts of individual airports; rather, it assesses the magnitude of potential impacts should any one of them close.

10.5.1 Scenario A: Nothing Changes

The baseline scenario assesses whether the current regional aviation system will be able to meet the forecast demand in 2030 if it does not make changes in airport capacity beyond those currently programmed and funded, assuming no airport closes and no new airport is built. This scenario assumes airports remain open and maintain their current capacity.

The aviation forecasts and airport capacity analysis for the RASP have set aviation demand and airport capacity for this analysis. Table 22 and Table 26 in Chapter 9 show each airport's annual service volume (its capacity for aircraft operations per year), forecast annual operations (the demand for aviation activity at that airport) and percentage of forecast operations to total capacity, from 2008 to 2030. As capacity reaches 80 percent at an airport, pilots may begin to experience delays in takeoffs and landings. At 100 percent of capacity, delays increase, and pilots may choose to move their operations to other airports in the system if the airport owner does not add capacity.

Table 26 indicates that four of the ten reliever airports in the system will reach at least 60 percent capacity by 2030. At David Wayne Hooks Memorial Airport, aviation capacity already exceeds demand by eight percent. Ellington Airport is forecast to reach 80 percent capacity by 2030, and West Houston Airport will approach 80 percent by 2030. Scenario A shows that the system can still accommodate all the operations forecast by 2030, even though there may be movement of some operations from the airports approaching or reaching their capacity to other airports with available capacity.

10.5.2 Scenario B: A Reliever Airport Closes

Ten reliever airports are in the Houston-Galveston region. These ten reliever airports have a wide range of runway lengths and airfield facilities. For this scenario, ten simulations are run in which each airport in turn is simulated to close and its aircraft operations are moved to other nearby airports. Aircraft operations are allocated in relation to the proximity of the closed airport to other airports capable of handling the operations. Thus, jet aircraft operations are moved only to airports that can handle jet operations. The remaining airports' capacity to absorb the extra demand is then evaluated.

Figure 29 shows how this scenario is simulated. The closing airport is surrounded by Airports A, B and C, and the circles represent the 30-minute drive time areas for the airport in the middle of the area. In the simulation, the number of aircraft operations shifted from the closing airport to each nearby airport is calculated by multiplying the total annual operations at the closed airport by the ratio of the population of the area of overlap of the 30-minute drive time areas of the two

airports to the population of the 30-minute drive time area of the closing airport. In this way, the aircraft operations are allocated to airports within the limits of convenient use. Unallocated aircraft operations may relocate to airports beyond the 30-minute contour or move to non-system airports such as Jones International and Covey Trails. However, if insufficient hangar and apron space were available, the aircraft based at the closed airport would be unable to relocate and may leave the region.

Figure 29: The Scenario Assessment Process

The formula for calculating displaced operations from closing Airport X to nearby Airport A is:

$$\boldsymbol{Ops_{XA}} = \boldsymbol{Ops_X} \times \frac{\boldsymbol{Pop_{XA}}}{\boldsymbol{Pop_X}}$$

where $\boldsymbol{Ops_{XA}}$ = the number of annual aviation operations displaced from closing Airport X to nearby Airport A

$\boldsymbol{Ops_X}$ = the total annual aviation operations at closing Airport X

$\boldsymbol{Pop_X}$ = the population of the 30-minute drive time area around closing Airport X

$\boldsymbol{Pop_{XA}}$ = the population of the overlapping area for the 30-minute drive time areas for Airports X and A

Table 31 shows the results of the ten simulations of a reliever airport closing. Each row represents one simulation in which the airport in the left column is simulated to close. The number of aircraft operations at that airport able to be accommodated by nearby airports overlapping their 30-minute drive time areas with the closed airport is calculated, based on the population and the extent of overlap of the areas. All remaining operations are unallocated and are at risk of leaving the region. Although the simulations using 30-minute drive times show large areas that do not overlap for some airports, there are airports within 45 to 60 minutes that can accommodate this demand with an investment in infrastructure. These simulations show that closure of a reliever airport could cause significant impact to the regional aviation system. Some aviation activity may leave the system and nearby airports may reach their capacity sooner than forecast.

If these simulations are repeated using 45-minute drive time areas instead of 30-minute drive time areas, the results (Table 32) are less unallocated operations and less impact to the region in case a reliever airport closes. Four of the simulated closed airports have any unallocated operations at all, with up to 2,400 (2.8 percent) of their operations unallocated. This would not be a significant impact to the region, although it would still cause other airports to reach their capacity sooner than forecast. However, review of the recipient airports in Table 32 shows that some of the recipient airports are in quite different geographical areas as the closed airport and do not serve the same markets.

Table 31: Simulation Results for Closing a Reliever Airport, 30-Minute Drive Time

Simulated Closed Airport	2005 Estimated Economic Impact	2030 Operations at Closed Airport	Operations Allocated to Other Airports	Operations Not Allocated and Potentially Lost	Receiving Airports (% Capacity Used in 2030)
Texas Gulf Coast Regional	240 jobs; $31 million	86,500	40,000	46,500	Pearland Regional (57%) Houston Southwest (40%) Bay City Municipal (8%)
D. W. Hooks Memorial	650 jobs; $84 million	326,300	166,300	160,000	Lone Star Executive (59%) North Houston Business (10%) Sugar Land Regional (69%) West Houston (66%) Houston Executive (15%) Weiser Airpark (21%)
Ellington	2,700 jobs; $345 million	191,700	187,500	4,200	North Houston Business (10%) Weiser Airpark (21%) West Houston (66%) Houston Executive (15%) Sugar Land Regional (69%) Houston Southwest (40%) Pearland Regional (57%) Scholes International (26%) Baytown (8%) La Porte Municipal (32%)
Houston Southwest	170 jobs; $13 million	75,500	74,700	800	Sugar Land Regional (69%) Pearland Regional (57%) Texas Gulf Coast Regional (52%) West Houston (66%) La Porte Municipal (32%)
La Porte Municipal	180 jobs; $17 million	131,500	130,000	1,500	Chambers County (2%) Baytown (8%) Houston Southwest (40%) Pearland Regional (57%) Scholes International (26%)
Lone Star Executive	1,000 jobs; $152 million	131,500	86,400	45,100	North Houston Business (10%) Cleveland Municipal (10%) Weiser Airpark (21%) Huntsville Municipal (20%)
Pearland Regional	200 jobs; $33 million	128,200	127,800	400	Sugar Land Regional (69%) Texas Gulf Coast Regional (52%) Scholes International (26%) Houston Southwest (40%) La Porte Municipal (32%)
Scholes International	800 jobs; $113 million	48,700	19,400	29,300	Pearland Regional (57%) La Porte Municipal (32%)
Sugar Land Regional	430 jobs; $95 million	101,600	98,800	2,800	Houston Executive (15%) Wharton Regional (12%) Houston Southwest (40%) West Houston (66%)
West Houston	190 jobs; $17 million	142,500	142,500	0	Weiser Airpark (21%) Houston Executive (15%) Sugar Land Regional (69%) Houston Southwest (40%) La Porte Municipal (32%) North Houston Business (10%)

Table 32: Simulation Results for Closing a Reliever Airport, 45-Minute Drive Time

Simulated Closed Airport	2005 Estimated Economic Impact	2030 Operations at Closed Airport	Operations Allocated to Other Airports	Operations Not Allocated and Potentially Lost	Receiving Airports (% Capacity Used in 2030)
Texas Gulf Coast Regional	240 jobs; $31 million	86,500	84,100	2,400	Pearland Regional (57%) Scholes International (26%) La Porte Municipal (32%) Houston Southwest (40%) Sugar Land Regional (69%) Bay City Municipal (8%)
D. W. Hooks Memorial	650 jobs; $84 million	326,300	326,200	100	Huntsville Municipal (20%) Cleveland Municipal (10%) Lone Star Executive (59%) North Houston Business (10%) Baytown (8%) La Porte Municipal (32%) Pearland Regional (57%) Houston Southwest (40%) Sugar Land Regional (69%) West Houston (66%) Houston Executive (15%) Weiser Airpark (21%)
Ellington	2,700 jobs; $345 million	191,700	191,700	0	North Houston Business (10%) Weiser Airpark (21%) West Houston (66%) Houston Executive (15%) Sugar Land Regional (69%) Houston Southwest (40%) Pearland Regional (57%) Scholes International (26%) Baytown (8%) La Porte Municipal (32%) Texas Gulf Coast Regional (52%)
Houston Southwest	170 jobs; $13 million	75,500	75,500	0	Houston Executive (15%) Sugar Land Regional (69%) Pearland Regional (57%) Texas Gulf Coast Regional (52%) Bay City Municipal (8%) West Houston (66%) Weiser Airpark (21%)
La Porte Municipal	180 jobs; $17 million	131,500	131,500	0	North Houston Business (10%) Chambers County (2%) Baytown (8%) Houston Southwest (40%) Pearland Regional (57%) Texas Gulf Coast Regional (52%) Scholes International (26%)
Lone Star Executive	1,000 jobs; $152 million	131,500	131,100	400	North Houston Business (10%) Cleveland Municipal (10%) Weiser Airpark (21%) Huntsville Municipal (20%)
Pearland Regional	200 jobs; $33 million	128,200	128,200	0	Sugar Land Regional (69%) West Houston (66%) Texas Gulf Coast Regional (52%) Scholes International (26%) Houston Southwest (40%) La Porte Municipal (32%) Baytown (8%) Weiser Airpark (21%)

Simulated Closed Airport	2005 Estimated Economic Impact	2030 Operations at Closed Airport	Operations Allocated to Other Airports	Operations Not Allocated and Potentially Lost	Receiving Airports (% Capacity Used in 2030)
Scholes International	800 jobs; $113 million	48,700	47,300	1,400	Texas Gulf Coast Regional (52%) Pearland Regional (57%) La Porte Municipal (32%) Houston Southwest (40%) Baytown (8%) Chambers County (2%)
Sugar Land Regional	430 jobs; $95 million	101,600	101,600	0	Houston Executive (15%) Wharton Regional (12%) Texas Gulf Coast Regional (52%) Houston Southwest (40%) Pearland Regional (57%) La Porte Municipal (32%) West Houston (66%)
West Houston	190 jobs; $17 million	142,500	142,500	0	Weiser Airpark (21%) Houston Executive (15%) Sugar Land Regional (69%) Houston Southwest (40%) La Porte Municipal (32%) North Houston Business (10%)

10.5.3 Scenario C: A Non-Reliever General Aviation Airport Closes

The simulation process for this scenario is similar to that for Scenario B. Fourteen simulations are run; in each, one of the non-reliever general aviation airports is simulated to close, and its aircraft operations are allocated to each nearby airport in proportion to the population of the closed airport's 30 minute drive time area and the overlap of the two airports' areas. If all the nearby airports do not have the capacity or the facilities to handle the displaced aircraft operations, then aircraft may relocate to airports beyond the 30-minute contour or leave the region.

Table 33 shows the results of the 14 simulations of a non-reliever general aviation airport closing. In this scenario, almost all of the displaced aircraft operations can be accommodated by nearby airports. Huntsville is an exception due to its great distance from other airports in the region. Although the loss of operations may not have a major impact on the regional system, closing an airport may cause some airports near capacity to reach capacity sooner than forecast. Furthermore, closure of an airport would have a negative economic impact on the adjacent community, including the loss of revenue and jobs.

Table 33: Simulation Results for Closing a Non-Reliever Airport, 30-Minute Drive Time

Simulated Closed Airport	2005 Estimated Economic Impact	2030 Operations at Closed Airport	Operations Allocated to Other Airports	Operations Not Allocated and Potentially Lost	Receiving Airports (% Capacity Used in 2030)
Bay City Municipal	20 jobs; $6.6 million	13,800	8,700	5,100	Wharton Regional (12%) Palacios Municipal (2%) Texas Gulf Coast Regional (52%)
Baytown	n/a	13,900	13,400	500	Liberty Municipal (4%) La Porte Municipal (32%) Chambers County (2%)
Chambers County	20 jobs; $6.0 million	5,000	4,900	100	Liberty Municipal (4%) Baytown (8%) Winnie-Stowell (3%)
Cleveland Municipal	10 jobs; $0.9 million	21,800	18,600	3,200	North Houston Business (10%) Liberty Municipal (4%) Lone Star Executive (59%)

Simulated Closed Airport	2005 Estimated Economic Impact	2030 Operations at Closed Airport	Operations Allocated to Other Airports	Operations Not Allocated and Potentially Lost	Receiving Airports (% Capacity Used in 2030)
Eagle Lake	n/a	23,300	22,200	1,100	Wharton Regional (12%) Robert R. Wells, Jr. (2%) Sugar Land Regional (69%) Houston Executive (15%)
Houston Executive	n/a	20,000	19,900	100	Weiser Airpark (21%) Robert R. Wells, Jr. (2%) West Houston (66%) Eagle Lake (18%)
Huntsville Municipal	60 jobs; $8 million	34,700	900	33,800	Lone Star Executive (59%)
Liberty Municipal	3 jobs; $0.2 million	8,400	5,700	2,700	Winnie-Stowell (3%) Baytown (8%) Chambers County (2%) Cleveland Municipal (10%)
Palacios Municipal	2 jobs; $0.2 million	4,100	1,800	2,300	Wharton Regional (12%) Bay City Municipal (8%)
Robert R. Wells, Jr.	n/a	4,100	4,100	0	Eagle Lake (18%) Wharton Regional (12%) Houston Executive (15%)
Weiser Airpark	n/a	51,200	41,800	9,400	North Houston Business (10%) Houston Executive (15%) West Houston (66%) Sugar Land Regional (69%) La Porte Municipal (32%)
Wharton Regional	20 jobs; $2.2 million	18,900	18,900	0	Eagle Lake (18%) Bay City Municipal (8%) Sugar Land Regional (69%)
North Houston Business	n/a	19,000	11,500	7,500	Lone Star Executive (59%) Cleveland Municipal (10%) Weiser Airpark (21%)
Winnie-Stowell	5 jobs; $0.5 million	4,200	3,800	400	Liberty Municipal (4%) Baytown (8%) Chambers County (2%)

If the drive time areas are extended to 45 minutes (Table 34), then the same overall conclusions hold as for the 30-minute drive times, with fewer aircraft relocating from the system.

Table 34: Simulation Results for Closing a Non-Reliever Airport, 45-Minute Drive Time

Simulated Closed Airport	2005 Estimated Economic Impact	2030 Operations at Closed Airport	Operations Allocated to Other Airports	Operations Not Allocated and Potentially Lost	Receiving Airports (% Capacity Used in 2030)
Bay City Municipal	20 jobs; $6.6 million	13,800	13,600	200	Wharton Regional (12%) Palacios Municipal (2%) Texas Gulf Coast Regional (52%) Sugar Land Regional (69%)
Baytown	n/a	13,900	13,900	0	Cleveland Municipal (10%) Weiser Airpark (21%) Liberty Municipal (4%) La Porte Municipal (32%) North Houston Business (10%) Scholes International (26%) Winnie-Stowell (3%)
Chambers County	20 jobs; $6.0 million	5,000	5,000	0	Cleveland Municipal (10%) Baytown (8%) Winnie-Stowell (3%) North Houston Business (10%) Scholes International (26%)

Simulated Closed Airport	2005 Estimated Economic Impact	2030 Operations at Closed Airport	Operations Allocated to Other Airports	Operations Not Allocated and Potentially Lost	Receiving Airports (% Capacity Used in 2030)
Cleveland Municipal	10 jobs; $0.9 million	21,800	21,800	0	North Houston Business (10%) Baytown (8%) Liberty Municipal (4%) Chambers County (2%) Lone Star Executive (59%)
Eagle Lake	n/a	23,300	23,300	0	Wharton Regional (12%) Robert R. Wells, Jr. (2%) Sugar Land Regional (69%) Houston Executive (15%)
Houston Executive	n/a	20,000	20,000	0	Weiser Airpark (21%) Sugar Land Regional (69%) Houston Southwest (40%) Wharton Regional (12%) Eagle Lake (18%)
Huntsville Municipal	60 jobs; $8 million	34,700	20,900	13,800	North Houston Business (10%) Cleveland Municipal (10%) Lone Star Executive (59%)
Liberty Municipal	3 jobs; $0.2 million	8,400	8,400	0	Winnie-Stowell (3%) Baytown (8%) Chambers County (2%) Cleveland Municipal (10%)
Palacios Municipal	2 jobs; $0.2 million	4,100	4100	0	Wharton Regional (12%) Bay City Municipal (8%)
Robert R. Wells, Jr.	n/a	4,100	4,100	0	Eagle Lake (18%) Wharton Regional (12%) Houston Executive (15%) Sugar Land Regional (69%)
Weiser Airpark	n/a	51,200	51,100	100	North Houston Business (10%) Houston Executive (15%) West Houston (66%) Houston Southwest (40%) Pearland Regional (57%) La Porte Municipal (32%)
Wharton Regional	20 jobs; $2.2 million	18,900	18,900	0	Eagle Lake (18%) Bay City Municipal (8%) Palacios Municipal (2%) Sugar Land Regional (74%)
North Houston Business	n/a	19,000	11,500	7,500	Lone Star Executive (59%) Cleveland Municipal (10%) Weiser Airpark (21%)
Winnie-Stowell	5 jobs; $0.5 million	4,200	4,200	0	Liberty Municipal (4%) Baytown (8%) Chambers County (2%) Scholes International (26%)

10.5.4 Scenario D: A New General Aviation Airport Opens

If a new reliever-class general aviation airport were to open in the Houston metropolitan area, it would draw aircraft operations away from nearby airports. This scenario presents the impacts of opening a new airport in one of the two locations shown in Figure 28. Two simulations are presented, one for a new airport at each site. The number of aircraft operations that could be attracted to an airport at either site is calculated by determining the overlap of the 30-minute drive time areas for the hypothetical airport site and nearby system airports, then allocating aircraft operations to the extent of the overlap of their 30-minute drive time areas.

The formula for calculating attracted operations from existing Airport A to the new Airport X is:

$$Ops_{AX} = Ops_A \times \frac{Pop_{AX}}{Pop_A} \times \frac{Demand_A}{Capacity_A} \times \frac{1}{2}$$

where Ops_{AX} = the number of annual aviation operations allocated from nearby Airport A to new Airport X
Ops_A = the total annual aviation operations at Airport A
Pop_A = the population of the 30-minute drive time area around Airport A
Pop_{AX} = the population of the overlapping area for the 30-minute drive time areas for Airports A and X
$Demand_A$ = the forecast aviation demand for Airport A in 2030; and
$Capacity_A$ = the calculated 2030 capacity (annual service volume) of Airport A.

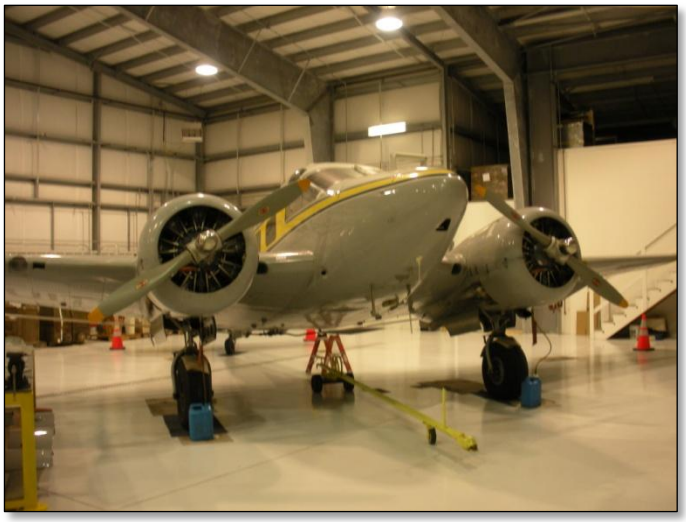
As shown in Table 35, the northeastern location drive-time area overlaps with those of seven existing system airports, and the northwestern location overlaps with three, based on 30-minute drive time areas. Using 45-minute drive time areas, the northeastern location drive time area overlaps with those of 16 existing airports, and the northwestern location overlaps with 10. The simulation predicts owners and pilots could find it convenient to move 8,600 annual operations to an airport at the northeastern location or 6,200 annual operations to an airport at the northwestern location, as the new airport would be closer to them than their current airports. If the simulation uses 45-minute drive time areas to allocate operations from nearby airports to the new northeast airport, the overlap areas become much larger and involve many more airports. For the northeast airport, 16 airports overlap 45-minute drive time areas, and for the northwest airport, 10 nearby airport areas overlap.

The presence of a new airport at either location would create a new competitive situation at nearby airports that could attract some of the aviation activity from nearby airports, especially if the existing airport is already congested. Although most nearby airports would be relatively unaffected, airports already operating at or near capacity (*e.g.*, David Wayne Hooks Memorial)

Table 35: Operations Relocating to Hypothetical New Reliever Airports

	New Northeast Airport		New Northwest Airport	
Donor Airport	30-Minute Drive Time	45-Minute Drive Time	30-Minute Drive Time	45-Minute Drive Time
George Bush Intercontinental	700	4,000		1,500
William P. Hobby	400	20,800		6,900
D.W. Hooks Memorial		53,500	5,500	49,800
Ellington	5,000	32,700		
Houston Southwest		4,800		1,000
La Porte Municipal	2,000	7,300		
Lone Star Executive		14,000		12,300
Pearland Regional		14,100		
Sugar Land Regional		10,000		7,600
West Houston		12,900	500	10,200
Baytown	200	500		
Chambers County		100		
Cleveland Municipal	200	700		
Eagle Lake				500
Houston Executive				400
Liberty Municipal	100	200		
Weiser Airpark		2,700	200	1,800
Winnie-Stowell		100		
Total	**8,600**	**178,400**	**6,200**	**92,000**

could have many annual operations relocated to a new airport. A new airport could therefore act as a "reliever's reliever" and benefit the aviation system in the long term when system airports become congested.



10.6 Conclusions

The scenario with the greatest potential impact to the Houston-Galveston regional aviation system would be the loss of a reliever airport in the metropolitan Houston area. Sufficient capacity is available to meet the forecast demand for aviation activity through 2030 if all airports keep operating (allowing for some movement of aircraft within the system). However, the loss of one of the busier reliever airports could have a major impact on the system.

If any of the non-reliever general aviation system airports were to close, the impact on regional aviation would not be significant. However, the affected community would lose not only aviation activity, but also jobs and revenue to the local economy. The closure of an airport would mean the loss of a transportation asset not likely to be replaced.

If a new general aviation airport were to be built, it would increase competition between it and other airports with sufficient capacity, resulting in substantial unused capacity. The new airport could also help to relieve congestion at airports projected to be over capacity.

Combining the scenarios brings more interesting results. If one reliever airport were to close as another opened nearby, the new airport could become a home for many of the displaced aircraft operations from the closed airport, thus maintaining system capacity and alleviating negative impacts on other nearby airports. It appears that the general location with the greatest potential for benefit is the northwest part of the Houston metropolitan area, although the northeast location (or potentially other locations near the urbanized part of the region) could also provide benefits to the aviation system.

11 Environmental Issues

The system airports of the RASP are located in diverse environments, from tall-grass prairie to pine forest to coast marshland. Many system airports are near a stream or lowland forest area, and some are near estuaries. While the airport land use is often an excellent way to preserve natural habitat since little of the airfield is actually paved, airports planning to extend runways, add aprons or hangars may find that environmental resources are affected. Airports in marshy areas (Chambers County) or in prairies (Houston Executive, Pearland Regional, Texas Gulf Coast Regional) are more likely to encounter environmental resources requiring special handling. Table 36 shows the environmental resources that could be affected by projects at system airports.

FAA requires airports to prepare and update a master plan and an airport layout plan before federal funds can be granted to airports. The master planning process considers sensitive or valuable environmental resources in planning airport expansion, as prescribed by the FAA (Advisory Circular AC 5050.1E). The process considers such environmental resources as

Table 36: Environmental Resources at System Airports

Airport	Air Quality	Water Quality	Plant Communities	Wetlands	Wildlife	Endangered Species	Noise	Light Emissions	Floodplains	Socioeconomic	Hazardous Materials	Environmental Justice	Farmland	Parks and Refuges	Archaeology	Historic Sites
Air Carrier Airports																
George Bush Intercontinental	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓				
William P. Hobby	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓
Reliever Airports																
Texas Gulf Coast Regional	✓	✓	✓	✓	✓				✓				✓		✓	
D.W. Hooks Memorial	✓	✓	✓	✓		✓	✓			✓	✓					
Ellington	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				✓
Houston Southwest	✓	✓	✓	✓	✓		✓			✓		✓			✓	
La Porte Municipal	✓						✓	✓		✓		✓				
Lone Star Executive	✓	✓	✓	✓	✓	✓					✓				✓	
Pearland Regional	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓			✓	
Scholes International	✓	✓	✓	✓	✓	✓			✓		✓	✓		✓	✓	✓
Sugar Land Regional	✓	✓	✓	✓	✓		✓		✓	✓	✓		✓	✓	✓	
West Houston	✓	✓	✓		✓		✓		✓	✓			✓	✓	✓	
Other General Aviation Airports																
Bay City Municipal													✓			
Baytown	✓	✓	✓				✓			✓	✓	✓				
Chambers County	✓	✓	✓	✓					✓				✓		✓	
Cleveland Municipal	✓		✓		✓	✓									✓	
Eagle Lake					✓								✓		✓	
Houston Executive	✓				✓		✓			✓			✓			
Huntsville Municipal			✓													
Liberty Municipal	✓	✓	✓		✓										✓	
Palacios Municipal		✓		✓									✓			
Robert R. Wells, Jr.		✓	✓	✓					✓						✓	
Weiser Airpark	✓						✓			✓						
Wharton Regional		✓	✓	✓	✓				✓				✓		✓	
North Houston Business	✓	✓	✓	✓	✓	✓			✓							
Winnie-Stowell	✓	✓	✓	✓	✓				✓				✓		✓	

Source: Quadrant Consultants

riparian forests, wetlands, endangered species, historic sites, archaeologically significant sites, air quality and water quality. It also considers noise and light emissions, and economic and social impacts to nearby residents and businesses. The master plan recommends projects at an airport that may result in environmental impacts, and indicates what must be done to obtain environmental approval for these projects.

Airport activity typically generates noise and air pollution emissions. Most airport noise results from aircraft taking off, landing or running up their engines on the airport. When airports extend their runways, build new runways or add capacity, they decrease the distance between the noise generation and receivers (homes, businesses or parks near the airport), or increase the number of noise generators, both resulting in increased noise at receivers. Since the noise is generated overhead and up to several miles from the airport property, noise mitigation by physical barrier is impossible. Instead, airports can mitigate noise impacts by publishing departure and arrival flight tracks that avoid receivers, restricting operations at night, adding sound insulation to affected homes and even buying out affected homes.

In contrast, engine run-up areas are intermittent noise sources on the airport property and can be controlled by deflectors and walls between the airport property and the receivers. Noise impacts from engine run-up areas can also be mitigated by restricting run-ups to daylight hours.

Aircraft are also sources of the air pollutants carbon monoxide, volatile organic compounds, nitrogen oxides, particulate matter and lead. At larger airports, motorized service equipment such as tugs and tractors also contribute air pollutants. Fueling operations at airports can also emit volatile hydrocarbons into the atmosphere. Although airports are rarely significant sources of air pollutants, emissions at airports could exacerbate air quality problems in polluted areas. The U.S. Environmental Protection Agency has designated Harris County and seven surrounding counties (Galveston, Brazoria, Fort Bend, Waller, Montgomery, Liberty and Chambers) as not in attainment of the federal standard for ozone. Ozone is harmful to human respiratory systems and is caused by atmospheric reaction of volatile organic compounds and nitrogen oxides with oxygen in sunlight over a large region. Airports can lower their emissions of ozone-forming pollutants by using electric or low-emissions service equipment, encouraging pilots to use aircraft with low-emissions engines and by using vapor-capture technology for fuel transfer and refueling operations.

Environmental compliance is a continuing responsibility of airports. Airports in the ozone non-attainment counties must apply for permits from the TCEQ for all stationary sources (*e.g.*, generators, boilers, incinerators) and limit air pollutant emissions from these sources to permitted levels. Airports in large municipalities such as Houston must comply with the city's Municipal Separate Storm Sewer System discharge permit, and monitor and if necessary limit water pollutants entering the system.

Chapter 13 of this Regional Aviation System Plan presents a list of recommended projects for all system airports, followed by sections for each airport explaining the reasons for the recommendations and their estimated cost. This planning process has identified projects not likely to be feasible due to severe environmental impacts; these projects are not part of the recommended plan. The projects recommended in this study may have environmental impacts that do not appear to be severe, or mitigation of impacts appears to be feasible. Part of the explanation for each airport is a mention of any potential environmental issues associated with development of that airport. This mention is intended only to guide system planning by highlighting some of the

environmental issues that would be studied in detail during project planning. It is not meant to replace the master planning process or required compliance with environmental laws.

Once projects are identified and TxDOT or FAA funding is requested, the FAA must approve an environmental impact assessment under the National Environmental Policy Act of 1969. Major projects that may significantly affect the human environment are required to have an environmental impact statement. This document considers alternative actions to meet the need for the project and assesses and discloses the environmental impacts resulting from the proposed action and alternatives. The environmental impact statement is a public document, and the FAA provides opportunities for public review and input before the project is approved for funding. New runways and runway extensions are examples of projects generally requiring environmental impact statements.

Many types of projects that generally have few environmental impacts are categorically excluded from the requirement to prepare an environmental impact statement. The following categorical exclusions are established by the FAA:

- Runway, taxiway, apron, or loading ramp construction or repair work, including extension, strengthening, reconstruction, resurfacing, marking, grooving, fillets and jet blast facilities, and new heliports on existing airports, except where such action will create environmental impacts off airport property
- Installation or upgrading of airfield lighting systems, including runway end identification lights, visual approach aids, beacons and electrical distribution systems
- Installation of miscellaneous items including segmented circles, wind or landing direction indicators or measuring devices, or fencing
- Construction or expansion of passenger handling facilities
- Construction, relocation or repair of entrance and service roadways
- Grading or removal of obstructions on airport property and erosion control actions with no off-airport impacts
- Landscaping generally, and landscaping or construction of physical barriers to diminish impact of airport blast and noise
- Projects to carry out noise compatibility programs
- Land acquisition and relocation associated with any of the above items
- Federal release of airport land
- Removal of a displaced threshold
- The acquisition of security, safety or snow removal equipment

A project that does not generally require an environmental impact statement and is not categorically excluded from the requirement to prepare an environmental impact statement must have an environmental assessment to determine whether it would have significant impacts. The environmental assessment process is similar to the environmental impact statement process in terms of environmental resources covered, types of analyses and extent of public involvement, and often results in substantial mitigation or avoidance of environmental impact.

Many of the projects recommended by this study would be on the above list of categorical exclusions and are unlikely to cause environmental impacts. Other projects would require either an environmental impact statement or an environmental assessment to determine and disclose their impacts. The FAA will often cover the costs of environmental mitigation of projects it funds.

Projects must also comply with federal and state environmental laws affecting all land development, including laws regulating use of waters of the United States, endangered species, air quality, water quality and cultural resources, and laws regulating the use, storage and disposal of hazardous materials.

When compared to automobiles, airplanes require consumption of a relatively small amount of land surface. Nonetheless, local impacts can still be important. A goal of the RASP is environmentally sensitive development of airports. Projects recommended in this plan should avoid sensitive resources where possible and provide for appropriate mitigation of environmental impacts.

12 AIRPORT ROLES

The 26 system airports each play a unique role in the Houston-Galveston regional aviation system, and any classification system is bound to oversimplify the complex and subtle role each airport fulfills. Nonetheless, the Texas Aviation System Plan (TASP) uses a system to classify roles for general aviation airports, as discussed in Section 2.3 and shown in Table 1 (Texas Airport System Plan Classification System) and Table 2 (Texas Airport System Plan Minimum Design Standards for Airports). Part of the development of an optimal plan for the Houston-Galveston regional aviation system is determining what role each system airport is to have in the system, so appropriate improvements can be determined.

The role of each airport is defined by the population of its service area (the 30-minute drive time area around each airport), the number of annual passenger enplanements, the number and type of based aircraft and annual operations, the airport's location in the region, and its interaction with other airports in the system. This study finds that the TASP roles assigned to the 23 system airports in the TASP and shown in Table 4 are appropriate. Baytown Airport, North Houston Business Airport and Weiser Airpark are privately-owned airports that are not in the TASP. This study classifies these airports with the appropriate TASP roles, based on their characteristics.

The recommended classifications for all system airports are presented in Table 37. As recommended, the Houston-Galveston regional aviation system would have two commercial service airports, ten reliever airports, four business/corporate airports, eight community service airports and two basic service airports. The TASP provides minimum design standards for each airport role, although the airports for which TxDOT itself has designated roles often do not meet TxDOT's minimum criteria for those roles. The criteria that appear to be most important are runway length and extent of parallel taxiway. Other criteria, such as runway width and strength, runway lighting and terminal services, are often not met by TxDOT-classified airports.

This study classifies Baytown Airport as Community Service (CS). Baytown Airport meets the TASP requirements for runway length (4,334 feet) and a partial parallel taxiway. Baytown Airport recently widened its runway to 60 feet and increased its single-wheel weight-bearing capacity to 24,000 pounds. Although the airport does not meet the TASP standards for Business/Corporate (BC) airports, the

Table 37: Roles of System Airports

Airport	NPIAS	TASP	RASP
Air Carrier Airports			
George Bush Intercontinental	P	CMS	CMS
William P. Hobby	P	CMS	CMS
Reliever Airports			
Texas Gulf Coast Regional	R	R	R
David Wayne Hooks Memorial	R	R	R
Ellington	R	R	R
Houston Southwest	R	R	R
La Porte Municipal	R	R	R
Lone Star Executive	R	R	R
Pearland Regional	R	R	R
Scholes International	R	R	R
Sugar Land Regional	R	R	R
West Houston	R	R	R
Other General Aviation Airports			
Bay City Municipal	GA	BC	BC
Baytown	-	-	CS
Chambers County	GA	CS	CS
Cleveland Municipal	GA	CS	CS
Eagle Lake	GA	CS	CS
Houston Executive	-	BC	BC
Huntsville Municipal	GA	BC	BC
Liberty Municipal	GA	CS	CS
Palacios Municipal	GA	CS	CS
Robert R. Wells, Jr.	-	CS	CS
Weiser Airpark	-	-	BS
Wharton Regional	GA	BC	BC
North Houston Business	-	-	CS
Winnie-Stowell	GA	BS	BS

owners plan to extend the runway to 5,400 feet, which would bring it closer to meeting the requirements for this role. The airport is seeking reliever designation from the FAA.

This study classifies North Houston Business Airport as Community Service (CS). With a runway 3,594 feet long and 46 feet wide, North Houston Business Airport does not meet the TASP runway requirements for CS airports, although other TASP airports classified as CS also do not meet this criterion. The runway has an estimated single-wheel weight-bearing capacity of 12,500 pounds, which meets the TASP criterion for CS airports. The airport owner has started work on extending the runway to 5,500 feet and applying to FAA for a published non-precision instrument approach. When these projects are completed, North Houston Business Airport may be eligible for reclassification as a Business/Corporate airport.

This study classifies Weiser Airpark as Basic Service (BS). While its paved runway is 3,455 feet long, which meets the TASP criterion, it is only 40 feet wide, which does not meet the TASP criterion. Its single-wheel weight-bearing capacity is 10,000 pounds, which is adequate for single-engine aircraft, the prevalent aircraft type operating at this airport.

13 The Optimal Plan

The optimal plan is the recommended configuration of the regional aviation system, incorporating all recommended projects to system airports. Recommendations in the optimal plan are sensitive to environmental issues (Chapter 11), the airport's role in the regional aviation system (Chapter 12) and the feasibility of the project.

The optimal system presented here responds to the needs and issues identified in the RASP. It would result in a relatively resilient system that could handle the impacts envisioned in the Plan's scenario analysis. The planning horizon for this study is 2030, which is 20 years from the date of this update of the RASP.

13.1 Optimal Plan Development

The optimal plan is based on the needs and inefficiencies of the regional aviation system. These needs, identified previously, drive the solutions that form the optimal plan. Below is an explanation of the process by which needs are identified and solutions are developed.

13.1.1 Determine Airport Problems

The needs of the regional aviation system are identified throughout this report. Current airport operation and development issues are identified in the airport inventory in Chapter 6. Goals for building a safe, efficient and convenient aviation system are developed from these issues and presented in Section 6.5. The demand forecast and the capacity analysis for each airport highlight needs for additional airside and landside capacity to meet the future demand, discussed in Chapter 9. The need for the system to be prepared for the potential impacts of an unexpected airport closure is presented in the scenario analysis in Chapter 10. All these needs are discussed in detail in the referenced chapters.

While the types of needs vary by airport, some of the same needs are found at many airports in the system. Additional hangar space, a longer runway, stronger runway pavement, removal of obstructions, better security and improved terminal facilities are needed by most airports to meet minimum TASP standards for its system role. The purpose of the optimal plan is for each airport to fulfill its role, while meeting future demand and absorbing the potential impacts of changes to the system. The optimal plan provides balance and efficiency for the aviation system so it will continue to meet the general aviation needs of the region.

13.1.2 Determine Future Airport Shortfalls

Forecast demand will exceed capacity at one reliever airport in the system (David Wayne Hooks Memorial Airport) and forecast demand will reach 80 percent of capacity at two other reliever airports (Ellington Airport and West Houston Airport). These results are documented in Chapter 9. The Houston Airport System predicts both its air carrier airports (George Bush Intercontinental and William P. Hobby) will reach capacity by 2017 to 2019 (Sections 9.10.1 and 9.10.2). HAS is addressing this problem with its master plans and subsequent project planning at those airports, and these issues are not dealt with in this report. The remaining 21 airports are projected to have adequate airside capacity for aircraft operations through 2030.

13.1.3 Determine Needed Reserve Capacity Shortfalls

The scenario analysis (Chapter 10) shows that reserve capacity, in the right locations, can allow the aviation system to recover from an unexpected event like closure of an airport or loss of facilities at several airports due to a hurricane. The potential amount of additional demand from such events is presented in Chapter 10. Having sufficient capacity to handle the increased aircraft operations at other system airports is not enough. The additional capacity must be at airports within an acceptable distance to the affected airport and have adequate accommodations. Furthermore, the receiving airport must be able to handle the displaced aircraft type. This means that airports in the urbanized area, especially those near busy airports, will need projects that increase capacity sooner rather than later.

13.1.4 Identify Projects Still Needed

TxDOT's Aviation Capital Improvement Program (CIP) lists projects to be funded over the next three years by the Texas Aviation Facilities Development Program, which receives block grants from the FAA through its Airport Improvement Program. Projects in the Aviation CIP are first identified in the TASP. Although many of the needs recognized in this study are covered by projects in the TASP, this study identifies other needs that are not addressed. The optimal plan includes both the TASP projects and other projects developed in this study and recommended to meet the remaining needs of the regional system airports.

Since the TASP project list breaks down many projects for one purpose for administrative reasons, this report aggregates multiple related projects into one project listing.

The Houston Airport System (HAS) maintains a list of capital improvement projects planned for construction from 2010 to 2013, and a planning list of projects from 2014 to about 2020. All HAS projects are expected to receive federal grant funds directly from the FAA. HAS cautions that the planning list of mid-term projects is currently in review and will likely change substantially in about a year. This study adopts the HAS project lists into the optimal plan without further recommendations.

13.1.5 Estimate Project Costs

Costs for recommended projects are estimated from similar projects at other airports in the TASP as well as similar projects published in planning reports for other airports, regions or states. If the cost is based on size or number of units, the unit cost is obtained from similar TASP projects of known size, or from unit costs in published reports. The number of units required for the recommended project is multiplied by the unit cost to estimate the recommended project's cost.

Unit costs can vary dramatically for different regions and for different types of construction. For purposes of this study, cost estimates are obtained where possible from similar projects in the TASP, and where these are not available, published costs in other regions are averaged to give a typical unit cost. Some of the unit costs used in this study are apron area at $17.20 per square yard, hangar space at $32.88 per square foot, runway construction at $1,800 per foot for reliever airports and $1,300 per foot for non-reliever airports, and taxiway construction at $20.00 per square foot for reliever airports and $17.50 per square foot for non-reliever airports.

13.2 Components of the Optimal Plan

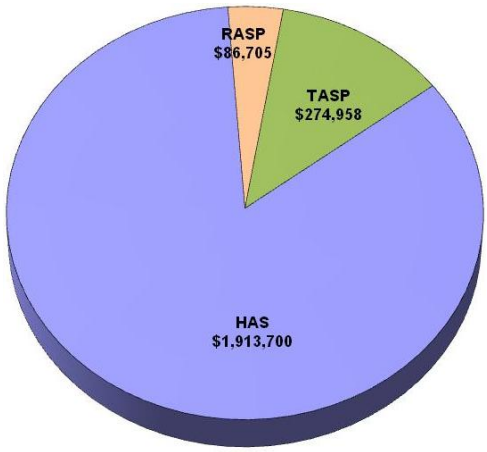
The optimal plan consists of 675 projects that would, over the next 20 years, make the regional aviation system safer, more efficient, better positioned to meet future demand and more resilient to handle unexpected events. Of these 675 projects, 111 are recommended by this study.

The optimal plan does not require a new airport in the Houston-Galveston regional aviation system. It will result in a well-functioning system through improvements at existing airports. Although Chapter 10 indicates that a new airport in the region would benefit the region, the additional capacity needed for future demand and other needs can be obtained from expansions of existing airports at lower cost.

The total cost of the optimal plan is $2.28 billion. This amount includes $87 million for projects recommended by this study, $275 million for TASP projects and $1.91 billion in FAA funding for projects at HAS airports. Figure 30 shows the relative cost of projects recommended in the RASP, TASP projects and HAS projects.

The cost of projects in the optimal plan, grouped by airport role and project purpose, is presented in Table 38. The projects recommended by the RASP are highlighted at the bottom of the table.

Figure 30: Cost of The Optimal Plan by Project Source



Total Cost = $2.28 billion

The components of the optimal plan are presented in Table 39. This table shows the projects in the TASP, planned by HAS and recommended in this study (highlighted, labeled RASP). The projects for each airport in the optimal plan are discussed in Section 13.3.

Table 38: Cost of Projects in the Optimal Plan, by Airport Role and Project Purpose

	Purpose of Project ($000)							
Airport Role	Safety	Preservation	Meet Standards	Facility Upgrade	Capacity Increase	Planning	Misc.	All Project Types
HAS Projects								
Commercial Service	$26,350	$96,300	$163,101	$539,696	$1,015,805	$29,439		**$1,870,691**
Reliever	$9,594	$14,619		$16,696	$2,100			**$43,009**
All Airport Roles, HAS	**$35,944**	**$110,919**	**$163,101**	**$556,392**	**$1,017,905**	**$29,439**		**$1,913,700**
TASP Projects								
Reliever	$10,045	$76,020	$36,523	$27,957	$52,687	$10,144	$24,895	**$238,271**
Business/Corporate	$150	$6,290	$898	$529	$1,760	$150	$983	**$10,760**
Community Service	$311	$17,056	$2,328	$1,670	$1,061	$285	$1,419	**$24,130**
Basic Service		$1,501	$91		$205			**$1,797**
All Airport Roles, TASP	**$10,506**	**$100,867**	**$39,840**	**$30,156**	**$55,713**	**$10,579**	**$27,297**	**$274,958**
Projects Recommended in RASP								
Reliever	$1,370		$4,000	$1,420	$34,020			**$40,810**
Business/Corporate	$2,100			$6,470	$17,550			**$26,120**
Community Service	$855	$160		$5,620	$10,960			**$17,595**
Basic Service		$70		$810	$1,300			**$2,180**
All Airport Roles, RASP	**$4,325**	**$230**	**$4,000**	**$14,570**	**$63,830**			**$86,705**
Total, All Airport Roles	**$50,775**	**$212,016**	**$206,941**	**$600,868**	**$1,137,448**	**$40,018**	**$27,297**	**$2,275,363**

Table 39: Projects in the Optimal Plan, Listed by Airport

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Air Carrier Airports							
George Bush Intercontinental	HAS	Alternative Power Supply	OTHR	PLAN	TERM	0-5	$1,220
George Bush Intercontinental	HAS	Art - Terminal Update	OTHR	STDS	OLSD	0-5	$2,555
George Bush Intercontinental	HAS	CNG Station Fence	OTHR	SAFE	OLSD	0-5	$1,000
George Bush Intercontinental	HAS	Concrete Line Greens Rd Detention Pond	PAVE	UPGR	OLSD	0-5	$250
George Bush Intercontinental	HAS	Consolidated Communication Center	OTHR	UPGR	TERM	0-5	$13,160
George Bush Intercontinental	HAS	Construction Manager - Pre-Const Services	BLDG	PLAN	OLSD	0-5	$479
George Bush Intercontinental	HAS	Design - Communication Center	OTHR	PLAN	OLSD	0-5	$840
George Bush Intercontinental	HAS	Design East Mid-Field TW	PAVE	PLAN	STXY	0-5	$5,450
George Bush Intercontinental	HAS	Drainage Capacity Construction	OTHR	UPGR	OLSD	0-5	$20,600
George Bush Intercontinental	HAS	East Mid-Field TW	PAVE	STDS	STXY	0-5	$57,500
George Bush Intercontinental	HAS	Engrg Svc North Ramp Skinny Oval Infill	PAVE	PLAN	PRWY	0-5	$1,000
George Bush Intercontinental	HAS	Environmental Impact Study	OTHR	PLAN	OLSD	0-5	$2,100
George Bush Intercontinental	HAS	Environmental Lift Stations	OTHR	UPGR	OLSD	0-5	$300
George Bush Intercontinental	HAS	FIS Facility Terrazzo Floors	OTHR	UPGR	OLSD	0-5	$1,200
George Bush Intercontinental	HAS	Flood Control for Will Clayton, JFK, Greens	OTHR	PRSV	OLSD	0-5	$840
George Bush Intercontinental	HAS	Fuel Storage Facility Improvements	OTHR	UPGR	OLSD	0-5	$7,013
George Bush Intercontinental	HAS	Gate A-28 PLB	OTHR	UPGR	OLSD	0-5	$625
George Bush Intercontinental	HAS	GBAS	OTHR	UPGR	OLSD	0-5	$2,500
George Bush Intercontinental	HAS	Grease Lines for Terminals A & C	OTHR	UPGR	OLSD	0-5	$2,800
George Bush Intercontinental	HAS	HVAC Controls - Terminals A, B, C, D & FIS	OTHR	UPGR	OLSD	0-5	$5,000
George Bush Intercontinental	HAS	Inspection, Repairs for All HAS Buildings	BLDG	STDS	OLSD	0-5	$9,000
George Bush Intercontinental	HAS	Large Pumps & Generators for Tug Tunnels	OTHR	UPGR	OLSD	0-5	$18
George Bush Intercontinental	HAS	Inter-Terminal Train - Design	BLDG	PLAN	ENGR	0-5	$800
George Bush Intercontinental	HAS	LA-NE Cargo - 7 Properties	OTHR	CAPT	OLSD	0-5	$75
George Bush Intercontinental	HAS	Lift Station #1 JFK at JFK/Will Clayton	OTHR	UPGR	OLSD	0-5	$2,550
George Bush Intercontinental	HAS	New Electrical Vault at West Side of IAH	LITE	UPGR	PRWY	0-5	$4,950
George Bush Intercontinental	HAS	New HPD Facility Design Update	OTHR	PLAN	OLSD	0-5	$350
George Bush Intercontinental	HAS	New IAH RW EIS Support	PAVE	PLAN	PRWY	0-5	$11,000
George Bush Intercontinental	HAS	Noise Mitigation Program	OTHR	CAPT	ANAS	0-5	$8,094
George Bush Intercontinental	HAS	Parking Improvements at IAH	PAVE	UPGR	OLSD	0-5	$2,000
George Bush Intercontinental	HAS	Pavement Replacement at IAH	PAVE	UPGR	ANAS	0-5	$2,650
George Bush Intercontinental	HAS	Perimeter Security Intrusion Detection	OTHR	SAFE	OLSD	0-5	$520
George Bush Intercontinental	HAS	Phase II& III Expansion Central Plant	OTHR	UPGR	TERM	0-5	$18,300
George Bush Intercontinental	HAS	Pre-Construction Services	OTHR	PLAN	OLSD	0-5	$4,450
George Bush Intercontinental	HAS	Prof Svc - Noise Mitigation Land Acquired	LAND	PLAN	OLSD	0-5	$150
George Bush Intercontinental	HAS	Reconstruct TW	PAVE	STDS	STXY	0-5	$46,700
George Bush Intercontinental	HAS	Rehabilitate & Expand ARFF Station 92	OTHR	SAFE	OLSD	0-5	$4,000
George Bush Intercontinental	HAS	Rehabilitate TW	PAVE	STDS	STXY	0-5	$41,409
George Bush Intercontinental	HAS	Relocate Vehicle Service Road at TW	PAVE	UPGR	STXY	0-5	$518
George Bush Intercontinental	HAS	Replace Existing Incinerator	OTHR	UPGR	OLSD	0-5	$2,000
George Bush Intercontinental	HAS	Replace Public Utility Lines	OTHR	UPGR	OLSD	0-5	$10,800
George Bush Intercontinental	HAS	Roadway Signage	OTHR	STDS	ANAS	0-5	$5,000
George Bush Intercontinental	HAS	TW NA	PAVE	UPGR	STXY	0-5	$1,600
George Bush Intercontinental	HAS	Terminal Update	BLDG	UPGR	TERM	0-5	$163,439
George Bush Intercontinental	HAS	Update Master Plan	OTHR	PLAN	OLSD	0-5	$1,250
George Bush Intercontinental	HAS	Upgrade Lift Station	OTHR	UPGR	OLSD	0-5	$1,415
George Bush Intercontinental	HAS	Volta Road	PAVE	UPGR	OLSD	0-5	$3,750
George Bush Intercontinental	HAS	Weatherproof Terminal D Baggage Makeup	OTHR	UPGR	OLSD	0-5	$250
George Bush Intercontinental	HAS	ASC Renovation	BLDG	UPGR	OLSD	6-10	$12,185
George Bush Intercontinental	HAS	New HPD Facility	BLDG	UPGR	OLSD	6-10	$9,058
George Bush Intercontinental	HAS	Relocate Kenswick Ditch/Holding Pond	OTHR	PRSV	OLSD	6-10	$5,500
George Bush Intercontinental	HAS	Construct GSE in New IAH Cargo Facility	BLDG	UPGR	OLSD	6-10	$500
George Bush Intercontinental	HAS	JFK, Will Clayton, Greens Road Drainage	OTHR	PRSV	OLSD	6-10	$15,810
George Bush Intercontinental	HAS	Land Acquisition	LAND	CAPT	OLSD	6-10	$99,185
George Bush Intercontinental	HAS	Roadway Rehab - Manholes, Utilities	PAVE	UPGR	OLSD	6-10	$13,000
George Bush Intercontinental	HAS	Parking Canopy for City Economy Lot	OTHR	UPGR	OLSD	6-10	$2,010
George Bush Intercontinental	HAS	Pier Improvements To Terminal A	BLDG	PRSV	TERM	6-10	$6,600
George Bush Intercontinental	HAS	Terminal B Expansion	BLDG	CAPT	TERM	6-10	$383,371
George Bush Intercontinental	HAS	Consolidated Communication Center	BLDG	UPGR	OLSD	6-10	$6,000
George Bush Intercontinental	HAS	New IAH Runway, ARFF Per Master Plan	PAVE	CAPT	PRWY	6-10	$169,000
George Bush Intercontinental	HAS	Perimeter Security Intrusion Detection	OTHR	SAFE	OLSD	6-10	$4,680
George Bush Intercontinental	HAS	Remote Security Screening	OTHR	SAFE	OLSD	6-10	$4,000
George Bush Intercontinental	HAS	Future Fuel Farm Expansion	OTHR	UPGR	OLSD	6-10	$18,000
George Bush Intercontinental	HAS	Upgrade Lift Station, Pumps, Generators	OTHR	UPGR	OLSD	6-10	$4,662

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
George Bush Intercontinental	HAS	HAS Training Academy	BLDG	UPGR	OLSD	6-10	$7,000
George Bush Intercontinental	HAS	Inter-Terminal Train	OTHR	CAPT	OLSD	6-10	$29,710
George Bush Intercontinental	HAS	Pavement Replacement at IAH (R&R)	PAVE	UPGR	APRN	6-10	$1,200
George Bush Intercontinental	HAS	New GT Staging Area	OTHR	UPGR	OLSD	6-10	$2,700
George Bush Intercontinental	HAS	Taxiway NA	PAVE	UPGR	STXY	6-10	$14,400
George Bush Intercontinental	HAS	Pier Improvements To Terminal A	BLDG	PRSV	TERM	6-10	$64,400
George Bush Intercontinental	HAS	Terminal D Rehab	BLDG	UPGR	TERM	6-10	$111,632
William P. Hobby	HAS	Demolition of Old SCI Hanger WR2	OTHR	CAPT	OLSD	0-5	$120
William P. Hobby	HAS	Design - Airport Services Complex Upgrade	OTHR	PLAN	OLSD	0-5	$350
William P. Hobby	HAS	Drainage Ditch S of TW K & West of ARFF	OTHR	UPGR	OLSD	0-5	$1,350
William P. Hobby	HAS	Environmental Plume Removal/Clean up	PAVE	SAFE	ENGR	0-5	$3,150
William P. Hobby	HAS	Inclined Driveway for Airfield Sweeper	OTHR	UPGR	OLSD	0-5	$52
William P. Hobby	HAS	Tie Downs for 25 Jet Bridges at Hobby	OTHR	STDS	OLSD	0-5	$250
William P. Hobby	HAS	Land Acquisition for Hobby Expansion	LAND	CAPT	OLSD	0-5	$100
William P. Hobby	HAS	New Airfield & Grounds Building	BLDG	UPGR	TERM	0-5	$2,752
William P. Hobby	HAS	Parking Improvements at Hobby	PAVE	UPGR	OLSD	0-5	$2,000
William P. Hobby	HAS	Pavement Replacement at HOU (R&R)	PAVE	UPGR	OLSD	0-5	$1,100
William P. Hobby	HAS	Preventive Repairs In Parking Garage	PAVE	UPGR	OLSD	0-5	$10,322
William P. Hobby	HAS	Rehabilitate & Expand ARFF Station 81	OTHR	SAFE	OLSD	0-5	$2,000
William P. Hobby	HAS	Replace Existing Incinerator	OTHR	UPGR	OLSD	0-5	$139
William P. Hobby	HAS	Shortening RW 17	PAVE	SAFE	PRWY	0-5	$1,000
William P. Hobby	HAS	TW M3, H2 H and G	PAVE	SAFE	STXY	0-5	$6,000
William P. Hobby	HAS	Temporary FIS at Hobby	OTHR	UPGR	OLSD	0-5	$1
William P. Hobby	HAS	Vehicle Wash Expansion	OTHR	UPGR	OLSD	0-5	$145
William P. Hobby	HAS	Land Acquisition for Hobby Expansion	LAND	CAPT	OLSD	6-10	$1,150
William P. Hobby	HAS	Modify North Vault & Misc Electrical	AAID	UPGR	ANAS	6-10	$11,750
William P. Hobby	HAS	Temporary FIS at Hobby	BLDG	UPGR	OLSD	6-10	$4,500
William P. Hobby	HAS	Hobby Drainage - FEMA	OTHR	PRSV	OLSD	6-10	$3,150
William P. Hobby	HAS	Remove Phone/Utility Poles	OTHR	STDS	OLSD	6-10	$687
William P. Hobby	HAS	Pavement Replacement at HOU (R&R)	PAVE	UPGR	OLSD	6-10	$550
William P. Hobby	HAS	Relocation of Tenants	OTHR	CAPT	OLSD	6-10	$150,000
William P. Hobby	HAS	Master Plan Runway Implementation	PAVE	CAPT	PRWY	6-10	$175,000
William P. Hobby	HAS	Runway 4-22 Reconstruction	PAVE	UPGR	PRWY	6-10	$35,000
Reliever Airports							
Texas Gulf Coast Regional	TASP	Construct Hangar Access TW, Apron	PAVE	CAPT	APRN	0-5	$150
Texas Gulf Coast Regional	TASP	Contingency, Admin RPR	OTHR	PLAN	ENGR	0-5	$1,969
Texas Gulf Coast Regional	TASP	Environmental Review	OTHR	PLAN	ENGR	0-5	$100
Texas Gulf Coast Regional	TASP	MOA with FAA	OTHR	PLAN	ENGR	0-5	$150
Texas Gulf Coast Regional	TASP	Perimeter Security Access	OTHR	SAFE	OLSD	0-5	$43
Texas Gulf Coast Regional	TASP	Construct GA Parking	OTHR	CAPT	OLSD	0-5	$40
Texas Gulf Coast Regional	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	0-5	$244
Texas Gulf Coast Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	0-5	$107
Texas Gulf Coast Regional	TASP	Replace MIRL Fixtures	LITE	RECN	PRWY	0-5	$81
Texas Gulf Coast Regional	TASP	Improve Grade along RW Edge	OTHR	RECN	PRWY	0-5	$34
Texas Gulf Coast Regional	TASP	Reconstruct RW 17/35 Mid Section	PAVE	RECN	PRWY	0-5	$9,710
Texas Gulf Coast Regional	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	0-5	$630
Texas Gulf Coast Regional	TASP	Relocate Localizer RW 35	AAID	STDS	PRWY	0-5	$500
Texas Gulf Coast Regional	TASP	Install Navigation Aids	AAID	UPGR	PRWY	0-5	$183
Texas Gulf Coast Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$400
Texas Gulf Coast Regional	TASP	Construct TW	PAVE	SAFE	STXY	0-5	$507
Texas Gulf Coast Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	0-5	$562
Texas Gulf Coast Regional	TASP	Rehabilitate T-Hangar Access TW	PAVE	PRSV	HANG	6-10	$25
Texas Gulf Coast Regional	TASP	Construct T-Hangar Access TW	PAVE	PRSV	HANG	6-10	$335
Texas Gulf Coast Regional	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	6-10	$12
Texas Gulf Coast Regional	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	6-10	$630
Texas Gulf Coast Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	6-10	$97
Texas Gulf Coast Regional	TASP	Acquire Land	LAND	CAPT	APRN	6-10	$465
Texas Gulf Coast Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$600
Texas Gulf Coast Regional	RASP	Construct Drainage Facilities	OTHR	UPGR	ANAS	6-10	$200
Texas Gulf Coast Regional	TASP	Seal All Asphalt Pavement and Re-Mark	PAVE	PRSV	APRN	11-20	$1,488
Texas Gulf Coast Regional	TASP	Expand Corporate Apron	PAVE	CAPT	APRN	11-20	$470
Texas Gulf Coast Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$400
Texas Gulf Coast Regional	TASP	Construct Corporate Access Road	PAVE	CAPT	OLSD	11-20	$72
Texas Gulf Coast Regional	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	11-20	$12
Texas Gulf Coast Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	11-20	$97
Texas Gulf Coast Regional	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	11-20	$630

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Texas Gulf Coast Regional	TASP	Rehabilitate Parallel TW	PAVE	PRSV	PTXY	11-20	$450
Texas Gulf Coast Regional	TASP	Rehabilitate T-Hangar Access TW	PAVE	PRSV	HANG	11-20	$202
Texas Gulf Coast Regional	RASP	Construct Terminal Buildings	BLDG	UPGR	TERM	11-20	$500
Texas Gulf Coast Regional	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$1,100
Texas Gulf Coast Regional	RASP	Construct Apron	PAVE	CAPT	APRN	11-20	$340
D.W. Hooks Memorial	TASP	Expand Apron	PAVE	CAPT	APRN	0-5	$932
D.W. Hooks Memorial	TASP	Airport Acquisition	LAND	PLAN	OLSD	0-5	$2,000
D.W. Hooks Memorial	TASP	Install Security Fencing	OTHR	SAFE	OLSD	0-5	$128
D.W. Hooks Memorial	TASP	Rehabilitate RW 17R/35L	PAVE	PRSV	PRWY	0-5	$630
D.W. Hooks Memorial	TASP	Install Navigation Aids	AAID	STDS	PRWY	0-5	$273
D.W. Hooks Memorial	TASP	Mark RW 17R/35L	PAVE	PRSV	PRWY	0-5	$46
D.W. Hooks Memorial	TASP	Construct New Parallel TW to RW 17R/35L	PAVE	STDS	PTXY	0-5	$1,430
D.W. Hooks Memorial	TASP	Reconstruct RW 17L/35R	PAVE	RECN	SRWY	0-5	$350
D.W. Hooks Memorial	TASP	Rehabilitate TW and Apron	PAVE	PRSV	STXY	0-5	$3,875
D.W. Hooks Memorial	RASP	Feasibility Study for Straightening and Extending Runway 17L/35R	OTHR	CAPT	AMP	0-5	$200
D.W. Hooks Memorial	RASP	Acquire Land	LAND	CAPT	PRWY	0-5	$2,000
D.W. Hooks Memorial	TASP	Rehabilitate RW 17R/35L	PAVE	PRSV	PRWY	6-10	$756
D.W. Hooks Memorial	TASP	Mark RW 17R/35L	PAVE	PRSV	PRWY	6-10	$46
D.W. Hooks Memorial	TASP	Install MITL to New TW for RW 17R/35L	LITE	UPGR	PTXY	6-10	$113
D.W. Hooks Memorial	TASP	Rehab Partial Parallel TW RW 17R/35L	PAVE	PRSV	PTXY	6-10	$151
D.W. Hooks Memorial	TASP	Construct New Parallel TW to RW 17R/35L	PAVE	STDS	PTXY	6-10	$445
D.W. Hooks Memorial	TASP	Rehabilitate TW and Apron	PAVE	PRSV	STXY	6-10	$4,051
D.W. Hooks Memorial	RASP	Straighten and Extend Runway 17L/35R	PAVE	CAPT	PRWY	6-10	$3,000
D.W. Hooks Memorial	RASP	Reconstruct Runway 17R/35L End	PAVE	UPGR	PRWY	6-10	$720
D.W. Hooks Memorial	RASP	Expand Auto Parking	PAVE	CAPT	OLSD	6-10	$240
D.W. Hooks Memorial	RASP	Rehabilitate Terminal Buildings	BLDG	STDS	TERM	6-10	$500
D.W. Hooks Memorial	RASP	Construct Access Road	PAVE	CAPT	OLSD	6-10	$100
D.W. Hooks Memorial	RASP	Add Hangars	BLDG	CAPT	HANG	6-10	$4,800
D.W. Hooks Memorial	RASP	Construct Apron	PAVE	CAPT	APRN	6-10	$1,230
D.W. Hooks Memorial	TASP	Rehabilitate RW 17R/35L	PAVE	PRSV	PRWY	11-20	$756
D.W. Hooks Memorial	TASP	Mark RW 17R/35L	PAVE	PRSV	PRWY	11-20	$46
D.W. Hooks Memorial	TASP	Rehabilitate Parallel TW for RW 17R/35L	PAVE	PRSV	PTXY	11-20	$220
D.W. Hooks Memorial	TASP	Rehabilitate TW & Apron	PAVE	PRSV	STXY	11-20	$4,051
Ellington	HAS	Air Traffic Control Tower	OTHR	SAFE	ANAS	0-5	$8,594
Ellington	HAS	Bury Overhead Power Lines	OTHR	SAFE	OLSD	0-5	$1,000
Ellington	HAS	Construction of Ellington Bypass	OTHR	PLAN	OLSD	0-5	$900
Ellington	HAS	Extend Challenger to Brantley	OTHR	UPGR	OLSD	0-5	$55
Ellington	HAS	Horsepen Bayou Drainage Improvement	OTHR	UPGR	OLSD	0-5	$700
Ellington	HAS	Pavement Replacement at EFD (R&R)	PAVE	UPGR	OLSD	0-5	$500
Ellington	HAS	Rehab Scholl St (Aerospace to Brantley)	OTHR	UPGR	OLSD	0-5	$400
Ellington	HAS	TW Extension	PAVE	UPGR	STXY	0-5	$2,100
Ellington	HAS	West Side Access Road	PAVE	SAFE	OLSD	0-5	$5,550
Ellington	HAS	Runway 17L/35R Rehab	PAVE	PRSV	PRWY	6-10	$1,319
Ellington	HAS	Extend Challenger To Brantley	PAVE	UPGR	OLSD	6-10	$491
Ellington	HAS	Construction of Ellington Bypass	PAVE	UPGR	OLSD	6-10	$5,100
Ellington	HAS	New Electrical Vault at AOA	AAID	UPGR	ANAS	6-10	$2,750
Ellington	HAS	Grass Island Paving (Business Deal)	PAVE	PRSV	OLSD	6-10	$7,000
Ellington	HAS	Horsepen Bayou Drainage Improvement	OTHR	PRSV	OLSD	6-10	$6,300
Ellington	HAS	Pavement Replacement at EFD (R&R)	PAVE	UPGR	APRN	6-10	$250
Houston Southwest	TASP	Purchase & Demolish Mid-Field Hangar	OTHR	SAFE	ANAS	0-5	$300
Houston Southwest	TASP	Install Segmented Circle	AAID	STDS	ANAS	0-5	$12
Houston Southwest	TASP	Construct Apron	PAVE	CAPT	APRN	0-5	$1,780
Houston Southwest	TASP	Construct 2 Helipads	PAVE	STDS	APRN	0-5	$270
Houston Southwest	TASP	Rehabilitate FBO Apron	PAVE	PRSV	APRN	0-5	$276
Houston Southwest	TASP	Engineering Fees	OTHR	PLAN	ENGR	0-5	$318
Houston Southwest	TASP	Construct New Hangar Access TW	PAVE	CAPT	HANG	0-5	$239
Houston Southwest	TASP	Construct Perimeter Road - E & S Side	OTHR	STDS	OLSD	0-5	$380
Houston Southwest	TASP	Install Security Fencing	OTHR	SAFE	OLSD	0-5	$240
Houston Southwest	TASP	Extend RW 9	PAVE	UPGR	PRWY	0-5	$450
Houston Southwest	TASP	Rehabilitate RW 9/27	PAVE	PRSV	PRWY	0-5	$450
Houston Southwest	TASP	Improve RSA & TW OFA	OTHR	SAFE	PRWY	0-5	$57
Houston Southwest	TASP	Construct Holding Apron RW 9	PAVE	STDS	PRWY	0-5	$59
Houston Southwest	TASP	Relocate Parallel TW, Stub TW	PAVE	STDS	PTXY	0-5	$1,140
Houston Southwest	TASP	Improve TW OFA	OTHR	RECN	PTXY	0-5	$2,286
Houston Southwest	TASP	Construct ATCT	BLDG	SAFE	ANAS	6-10	$2,000

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Houston Southwest	TASP	Construct Apron	PAVE	UPGR	APRN	6-10	$2,660
Houston Southwest	TASP	Engineering/Architectural Fees	BLDG	PLAN	ENGR	6-10	$150
Houston Southwest	TASP	Extend RW & TW 27 End	PAVE	UPGR	PRWY	6-10	$2,250
Houston Southwest	TASP	Rehabilitate RW 9/27	PAVE	PRSV	PRWY	6-10	$450
Houston Southwest	TASP	Mark RW 9/27	PAVE	PRSV	PRWY	6-10	$44
Houston Southwest	TASP	Construct Parallel TW	PAVE	UPGR	PTXY	6-10	$3,040
Houston Southwest	TASP	Rehabilitate & Mark TW	PAVE	PRSV	STXY	6-10	$315
Houston Southwest	TASP	Construct Terminal Building	BLDG	UPGR	TERM	6-10	$1,050
Houston Southwest	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$284
Houston Southwest	TASP	Rehabilitate RW 9-27	PAVE	PRSV	PRWY	11-20	$450
Houston Southwest	TASP	Mark RW 9-27	PAVE	PRSV	PRWY	11-20	$44
Houston Southwest	TASP	Rehabilitate and Mark TW	PAVE	PRSV	STXY	11-20	$648
Houston Southwest	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$4,400
La Porte Municipal	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	0-5	$483
La Porte Municipal	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	0-5	$33
La Porte Municipal	TASP	Install Navigation Aids	AAID	STDS	PRWY	0-5	$370
La Porte Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$190
La Porte Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	0-5	$419
La Porte Municipal	RASP	Install Perimeter Fencing	OTHR	SAFE	OLSD	0-5	$130
La Porte Municipal	TASP	Build Terminal Building Level 2	BLDG	STDS	TERM	6-10	$99
La Porte Municipal	TASP	Construct Auto Parking for South Apron	PAVE	CAPT	OLSD	6-10	$7
La Porte Municipal	TASP	Expand Apron	PAVE	CAPT	APRN	6-10	$385
La Porte Municipal	TASP	Expand Terminal Auto Parking	PAVE	CAPT	TERM	6-10	$18
La Porte Municipal	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	6-10	$33
La Porte Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$367
La Porte Municipal	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	6-10	$483
La Porte Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	6-10	$460
La Porte Municipal	TASP	Construct NW T-Hanger TW	PAVE	CAPT	HANG	11-20	$120
La Porte Municipal	TASP	Expand Auto Parking	PAVE	CAPT	TERM	11-20	$34
La Porte Municipal	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	11-20	$33
La Porte Municipal	TASP	Overlay RW 12/30	PAVE	PRSV	PRWY	11-20	$1,522
La Porte Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$367
La Porte Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	11-20	$460
La Porte Municipal	RASP	Add Hangars	BLDG	SAFE	HANG	11-20	$1,240
La Porte Municipal	RASP	Construct Apron	PAVE	CAPT	APRN	11-20	$190
Lone Star Executive	TASP	Runway and Taxiway Extension	OTHR	RECN	PRWY	0-5	$1,925
Lone Star Executive	TASP	Clear Trees OFZ RW 14	OTHR	UPGR	PRWY	0-5	$150
Lone Star Executive	TASP	Construct Holding Apron	PAVE	UPGR	PTXY	0-5	$170
Lone Star Executive	TASP	Construct Partial Parallel TW, RW 14/32	PAVE	STDS	PTXY	0-5	$1,500
Lone Star Executive	TASP	Environmental Assessment	OTHR	PLAN	AMP	0-5	$75
Lone Star Executive	TASP	Extend MIRL RW 14/32	LITE	UPGR	PRWY	0-5	$86
Lone Star Executive	TASP	Extend RW 14/32	PAVE	UPGR	PRWY	0-5	$5,633
Lone Star Executive	TASP	Install Fencing	OTHR	STDS	PRWY	0-5	$75
Lone Star Executive	TASP	Install MITL	LITE	UPGR	PTXY	0-5	$41
Lone Star Executive	TASP	Install Signage	OTHR	UPGR	PRWY	0-5	$10
Lone Star Executive	TASP	Mark RW 14/32	PAVE	UPGR	PRWY	0-5	$130
Lone Star Executive	TASP	Master Plan Update	OTHR	PLAN	AMP	0-5	$150
Lone Star Executive	TASP	MOA W/ FAA On MALSR	OTHR	PLAN	ENGR	0-5	$200
Lone Star Executive	TASP	Obstruction Evaluation	OTHR	PLAN	AMP	0-5	$150
Lone Star Executive	TASP	On-Airport Road with Security Gates	PAVE	UPGR	OLSD	0-5	$372
Lone Star Executive	TASP	Reconstruct Sections of TW A & D	PAVE	RECN	PTXY	0-5	$1,325
Lone Star Executive	TASP	Relocate Navigation Aids	AAID	UPGR	PRWY	0-5	$760
Lone Star Executive	TASP	Replace LOC, Glide Slope & MALSR	AAID	UPGR	PRWY	0-5	$2,400
Lone Star Executive	TASP	Terminate FM 1484	OTHR	STDS	OLSD	0-5	$20
Lone Star Executive	TASP	Update ALP	OTHR	PLAN	AMP	0-5	$60
Lone Star Executive	TASP	Acquire Land RPZ RW 14/32 Extension	LAND	UPGR	PRWY	6-10	$625
Lone Star Executive	TASP	Clearing & Grubbing	OTHR	RECN	OLSD	6-10	$89
Lone Star Executive	TASP	Construct Road	PAVE	CAPT	OLSD	6-10	$229
Lone Star Executive	TASP	TW A, G - Parallel TW to RW 14/32	PAVE	UPGR	PTXY	6-10	$2,000
Lone Star Executive	TASP	Mark RW 1/19	PAVE	PRSV	SRWY	6-10	$4
Lone Star Executive	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$509
Lone Star Executive	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	6-10	$1,463
Lone Star Executive	TASP	Relocate Localizer, DME and VASI	AAID	UPGR	PRWY	6-10	$160
Lone Star Executive	TASP	TW Improvements	PAVE	PRSV	STXY	6-10	$2,472
Lone Star Executive	RASP	Extend Taxiway along Runway 14/32	PAVE	CAPT	STXY	6-10	$3,000
Lone Star Executive	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	11-20	$116

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Lone Star Executive	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$408
Lone Star Executive	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	11-20	$1,422
Lone Star Executive	TASP	TW Improvements	PAVE	PRSV	STXY	11-20	$2,526
Lone Star Executive	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$2,620
Lone Star Executive	RASP	Construct Apron	PAVE	CAPT	APRN	11-20	$400
Lone Star Executive	RASP	Extend Runway	PAVE	CAPT	PRWY	11-20	$3,000
Pearland Regional	TASP	Construct Perimeter Road	PAVE	UPGR	OLSD	0-5	$1,000
Pearland Regional	TASP	Construct TW and Taxilane	PAVE	CAPT	STXY	0-5	$2,441
Pearland Regional	TASP	Environmental Study South RW Extension	OTHR	PLAN	AMP	0-5	$75
Pearland Regional	TASP	Expand Apron	PAVE	CAPT	APRN	0-5	$50
Pearland Regional	TASP	Extend MIRL	LITE	STDS	PRWY	0-5	$36
Pearland Regional	TASP	Extend RW & TW	PAVE	CAPT	PRWY	0-5	$3,562
Pearland Regional	TASP	Install MITL Parallel TW 14/32	LITE	UPGR	PTXY	0-5	$237
Pearland Regional	TASP	Partial Land Reimbursement	LAND	STDS	OLSD	0-5	$860
Pearland Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$101
Pearland Regional	TASP	Rehabilitate Perimeter Road E of Creek	OTHR	PRSV	OLSD	0-5	$755
Pearland Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	0-5	$6,269
Pearland Regional	TASP	Upgrade Utilities	LITE	RECN	ANAS	0-5	$50
Pearland Regional	TASP	Widen Taxilane C	PAVE	UPGR	STXY	0-5	$270
Pearland Regional	TASP	Expand Apron	PAVE	CAPT	APRN	6-10	$260
Pearland Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$102
Pearland Regional	TASP	Construct Hangar Access TW	PAVE	CAPT	HANG	6-10	$260
Pearland Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	6-10	$32
Pearland Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	6-10	$338
Pearland Regional	TASP	Install PAPI-4 RW 14/32	AAID	STDS	PRWY	6-10	$727
Pearland Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	6-10	$2,772
Pearland Regional	RASP	Add Hangars	BLDG	CAPT	HANG	6-10	$2,060
Pearland Regional	RASP	Construct Apron	PAVE	CAPT	APRN	6-10	$510
Pearland Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$143
Pearland Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	11-20	$32
Pearland Regional	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	11-20	$338
Pearland Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	11-20	$2,812
Pearland Regional	RASP	Construct Terminal Buildings	BLDG	STDS	TERM	11-20	$500
Pearland Regional	RASP	Extend Runway	PAVE	CAPT	PRWY	11-20	$880
Scholes International	TASP	Construct Hangar Access TW	PAVE	UPGR	STXY	0-5	$633
Scholes International	TASP	Contingency/Admin.Fees, RPR	OTHR	PLAN	ENGR	0-5	$404
Scholes International	TASP	Drainage Improvements	OTHR	RECN	ANAS	0-5	$3,000
Scholes International	TASP	Environmental Mitigation	OTHR	PRSV	APRN	0-5	$100
Scholes International	TASP	Extend RW 31	PAVE	UPGR	PRWY	0-5	$1,867
Scholes International	TASP	Install/Replace Signage	OTHR	RECN	ANAS	0-5	$322
Scholes International	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	0-5	$133
Scholes International	TASP	Rehabilitate & Mark TW A	PAVE	PRSV	PTXY	0-5	$2,021
Scholes International	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$810
Scholes International	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	0-5	$1,620
Scholes International	TASP	Relocate Localizer RW 31 End	AAID	UPGR	PRWY	0-5	$600
Scholes International	TASP	Renovate Terminal Building	BLDG	STDS	TERM	0-5	$2,400
Scholes International	TASP	Replace Navigation Aids	AAID	RECN	PRWY	0-5	$752
Scholes International	TASP	Replace PCC Slabs, Clean Joints Taxilane	PAVE	RECN	PTXY	0-5	$1,288
Scholes International	TASP	Replace TW Lights	LITE	RECN	PTXY	0-5	$447
Scholes International	TASP	Replace Windcone	AAID	RECN	ANAS	0-5	$75
Scholes International	TASP	Construct South Hangar Apron	PAVE	CAPT	APRN	6-10	$938
Scholes International	TASP	Drainage Improvements	OTHR	RECN	ANAS	6-10	$3,000
Scholes International	TASP	Expand Main Apron Westward	PAVE	CAPT	APRN	6-10	$933
Scholes International	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	6-10	$133
Scholes International	TASP	Rehabilitate & Mark TW A	PAVE	PRSV	PTXY	6-10	$274
Scholes International	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$810
Scholes International	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	6-10	$1,620
Scholes International	RASP	Add Hangars	BLDG	CAPT	HANG	6-10	$1,440
Scholes International	RASP	Construct Apron	PAVE	CAPT	APRN	6-10	$180
Scholes International	TASP	Relocate MALSR RW 13	AAID	SAFE	PRWY	11-20	$750
Scholes International	TASP	Construct Apron	PAVE	CAPT	APRN	11-20	$2,000
Scholes International	TASP	Construct TW	PAVE	STDS	PTXY	11-20	$9,867
Scholes International	TASP	Expand North Hangar Apron	PAVE	CAPT	APRN	11-20	$960
Scholes International	TASP	Extend RW 13	PAVE	UPGR	PRWY	11-20	$1,067
Scholes International	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	11-20	$133
Scholes International	TASP	Rehabilitate & Mark TW A	PAVE	PRSV	PTXY	11-20	$274

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Scholes International	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$810
Scholes International	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	11-20	$1,620
Sugar Land Regional	TASP	Water and Sewer Improvements	OTHR	CAPT	OLSD	0-5	$1,560
Sugar Land Regional	TASP	Acquire 500 Gallon ARFF Vehicle	OTHR	SAFE	OLSD	0-5	$225
Sugar Land Regional	TASP	Acquire Land	LAND	STDS	PRWY	0-5	$2,072
Sugar Land Regional	TASP	Acquire RW Easement	LAND	STDS	PRWY	0-5	$1,299
Sugar Land Regional	TASP	Construct ARFF Facility	BLDG	SAFE	OLSD	0-5	$150
Sugar Land Regional	TASP	Construct ARFF Road	OTHR	SAFE	OLSD	0-5	$144
Sugar Land Regional	TASP	Construct Drainage Improvements	OTHR	RECN	HANG	0-5	$150
Sugar Land Regional	TASP	Construct General Aviation Apron	PAVE	CAPT	APRN	0-5	$6,880
Sugar Land Regional	TASP	Construct Retaining Wall & Detention Pond	OTHR	STDS	OLSD	0-5	$400
Sugar Land Regional	TASP	Construct TW	PAVE	CAPT	PTXY	0-5	$12,500
Sugar Land Regional	TASP	Install Perimeter Security Fencing	OTHR	SAFE	OLSD	0-5	$1,860
Sugar Land Regional	TASP	Contingency/Admin Fees	OTHR	PLAN	ENGR	0-5	$238
Sugar Land Regional	TASP	Drainage Improvements	OTHR	PRSV	ANAS	0-5	$4,330
Sugar Land Regional	TASP	East Terminal Vault Generator	OTHR	STDS	OLSD	0-5	$103
Sugar Land Regional	TASP	Engineering Design for HIRLs RW 17/35	OTHR	PLAN	ENGR	0-5	$3,575
Sugar Land Regional	TASP	Environmental Study	OTHR	PLAN	ENGR	0-5	$350
Sugar Land Regional	TASP	Expand Apron	PAVE	CAPT	APRN	0-5	$630
Sugar Land Regional	TASP	Fuel Farm Generator	OTHR	STDS	OLSD	0-5	$126
Sugar Land Regional	TASP	Install Navigation Aids	LITE	CAPT	STXY	0-5	$3,006
Sugar Land Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	0-5	$124
Sugar Land Regional	TASP	Relocate Hangar No.3	OTHR	SAFE	HANG	0-5	$1,231
Sugar Land Regional	TASP	Pavement Evaluation RW 17/35, TW F,H	OTHR	PLAN	ENGR	0-5	$150
Sugar Land Regional	TASP	Rehab TW H and Apron	PAVE	PRSV	HANG	0-5	$324
Sugar Land Regional	TASP	Rehabilitate RW 17/35, TW F & H	PAVE	PRSV	PRWY	0-5	$3,000
Sugar Land Regional	TASP	Drainage Engineering Design at TW H	OTHR	PLAN	ENGR	0-5	$30
Sugar Land Regional	TASP	Relocate 3 Hangars	OTHR	SAFE	HANG	0-5	$1,100
Sugar Land Regional	TASP	Relocate Existing Parallel TW F Phase 1	PAVE	STDS	PTXY	0-5	$10,000
Sugar Land Regional	TASP	Relocate Glide Slope, Vault & Wind Sock	AAID	SAFE	ANAS	0-5	$110
Sugar Land Regional	TASP	Replace REIL RW 17/35	LITE	SAFE	ANAS	0-5	$47
Sugar Land Regional	TASP	Terminal Building Generator	BLDG	STDS	TERM	0-5	$326
Sugar Land Regional	TASP	Upgrade Air Traffic Control Tower Radios; Re-Mark RW 17/35 & TW	AAID	SAFE	ANAS	0-5	$167
Sugar Land Regional	TASP	Vegetation Establishment	OTHR	RECN	ANAS	0-5	$11
Sugar Land Regional	TASP	West Vault Generator	AAID	STDS	PRWY	0-5	$96
Sugar Land Regional	TASP	Acquire Land, West Side	LAND	CAPT	OLSD	6-10	$1,110
Sugar Land Regional	TASP	Construct Access Road and Auto Parking	PAVE	CAPT	OLSD	6-10	$309
Sugar Land Regional	TASP	Construct GA Apron, West Side	PAVE	CAPT	APRN	6-10	$1,144
Sugar Land Regional	TASP	Construct GA Terminal Building	BLDG	STDS	TERM	6-10	$296
Sugar Land Regional	TASP	Construct Service Road, West Side	PAVE	CAPT	OLSD	6-10	$0
Sugar Land Regional	TASP	Construct TW	PAVE	CAPT	PTXY	6-10	$4,133
Sugar Land Regional	TASP	Construct West-Side Access Road	OTHR	SAFE	OLSD	6-10	$770
Sugar Land Regional	TASP	Expand Commuter Terminal Building	BLDG	CAPT	TERM	6-10	$197
Sugar Land Regional	TASP	Expand Utilities	OTHR	CAPT	OLSD	6-10	$625
Sugar Land Regional	TASP	Install Navigation Aids	AAID	STDS	PRWY	6-10	$852
Sugar Land Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	6-10	$107
Sugar Land Regional	TASP	Rehabilitate Apron and TW	PAVE	PRSV	APRN	6-10	$537
Sugar Land Regional	TASP	Rehabilitate Hangar Apron	PAVE	PRSV	HANG	6-10	$50
Sugar Land Regional	TASP	Relocate Hangars 18 - 25	BLDG	SAFE	HANG	6-10	$126
Sugar Land Regional	RASP	Build New Parallel Taxiway	PAVE	CAPT	STXY	6-10	$2,000
Sugar Land Regional	RASP	Add Hangars	BLDG	CAPT	HANG	6-10	$2,990
Sugar Land Regional	TASP	Remove T-Hangars 16, 17	BLDG	SAFE	HANG	11-20	$70
Sugar Land Regional	TASP	Expand Terminal	BLDG	CAPT	TERM	11-20	$562
Sugar Land Regional	TASP	Install Fuel Storage Tank	OTHR	CAPT	ANAS	11-20	$90
Sugar Land Regional	TASP	Install Security Fence	OTHR	SAFE	OLSD	11-20	$320
Sugar Land Regional	TASP	Construct Apron	PAVE	CAPT	APRN	11-20	$849
Sugar Land Regional	TASP	Rehabilitate Apron and TW	PAVE	PRSV	APRN	11-20	$368
Sugar Land Regional	TASP	Rehabilitate General Aviation Apron	PAVE	PRSV	APRN	11-20	$273
Sugar Land Regional	TASP	Construct T-Hangar Taxilanes	PAVE	CAPT	HANG	11-20	$288
Sugar Land Regional	TASP	Rehabilitate Hangar Apron	PAVE	PRSV	HANG	11-20	$50
Sugar Land Regional	TASP	Construct GA Access Road & Auto Parking	PAVE	CAPT	OLSD	11-20	$618
Sugar Land Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	11-20	$107
Sugar Land Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	11-20	$601
Sugar Land Regional	TASP	Construct TW	PAVE	CAPT	STXY	11-20	$1,573
West Houston	TASP	Rehabilitate & Mark Apron & Access TW	PAVE	PRSV	APRN	0-5	$242

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
West Houston	TASP	Replace Underground Avgas Fuel Tanks	OTHR	STDS	OLSD	0-5	$90
West Houston	TASP	Overlay RW 15/33	PAVE	PRSV	PRWY	0-5	$424
West Houston	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	0-5	$29
West Houston	TASP	Overlay and Mark TW to RW 15/33	PAVE	PRSV	PTXY	0-5	$274
West Houston	TASP	Seal Joints in Concrete TW & Apron	PAVE	PRSV	PTXY	0-5	$132
West Houston	TASP	Replace Underground Jet Fuel Tanks	OTHR	STDS	ANAS	6-10	$100
West Houston	TASP	Rehabilitate & Mark Apron & TW	PAVE	PRSV	APRN	6-10	$1,075
West Houston	TASP	Rehabilitate RW 15/33	PAVE	PRSV	PRWY	6-10	$270
West Houston	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	6-10	$29
West Houston	TASP	Rehabilitate TW To RW 15/33	PAVE	PRSV	PTXY	6-10	$173
West Houston	RASP	Expand Apron	PAVE	CAPT	APRN	6-10	$340
West Houston	TASP	Seal Joints in Concrete Apron	PAVE	PRSV	APRN	11-20	$36
West Houston	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	11-20	$29
West Houston	TASP	Rehabilitate RW 15/33	PAVE	PRSV	PRWY	11-20	$270
West Houston	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	11-20	$1,102
Other General Aviation Airports							
Bay City Municipal	TASP	Install PAPI-2 RW 31	AAID	STDS	PRWY	0-5	$182
Bay City Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	0-5	$29
Bay City Municipal	TASP	Reconstruct Existing Auto Parking	PAVE	RECN	OLSD	0-5	$56
Bay City Municipal	TASP	Rehabilitate & Mark Parallel TW	PAVE	PRSV	PTXY	0-5	$314
Bay City Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$122
Bay City Municipal	TASP	Rehabilitate Entrance Road	PAVE	PRSV	OLSD	0-5	$7
Bay City Municipal	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	0-5	$345
Bay City Municipal	RASP	Improve Instrument Approach	ILS	UPGR	ANAS	0-5	$500
Bay City Municipal	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	6-10	$30
Bay City Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	6-10	$29
Bay City Municipal	TASP	Rehabilitate & Mark Parallel TW	PAVE	PRSV	PTXY	6-10	$293
Bay City Municipal	TASP	Rehabilitate Center Apron	PAVE	PRSV	APRN	6-10	$122
Bay City Municipal	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	6-10	$345
Bay City Municipal	RASP	Construct New Terminal	BLDG	UPGR	TERM	6-10	$500
Bay City Municipal	TASP	Rehabilitate Center Apron	PAVE	PRSV	APRN	11-20	$122
Bay City Municipal	TASP	Construct Holding Apron	PAVE	CAPT	APRN	11-20	$156
Bay City Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	11-20	$29
Bay City Municipal	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	11-20	$345
Bay City Municipal	TASP	Rehabilitate & Mark Parallel/Stub TW	PAVE	PRSV	PTXY	11-20	$299
Bay City Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$1,650
Bay City Municipal	RASP	Acquire Land and Extend Runway	LAND	CAPT	PRWY	11-20	$1,530
Bay City Municipal	RASP	Construct Apron	PAVE	CAPT	APRN	11-20	$100
Baytown	RASP	Upgrade Parking	PAVE	UPGR	OLSD	0-5	$600
Baytown	RASP	Upgrade Fencing	OTHR	SAFE	OLSD	0-5	$70
Baytown	RASP	Acquire Clear Zones	LAND	SAFE	OLSD	0-5	$500
Baytown	RASP	Install Gateway and Signs	OTHR	SAFE	OLSD	0-5	$100
Baytown	RASP	Extend Runway	PAVE	CAPT	PRWY	6-10	$1,000
Baytown	RASP	Extend Taxiway	PAVE	UPGR	STXY	6-10	$1,000
Baytown	RASP	Rehabilitate and Restripe Runway	PAVE	UPGR	PRWY	6-10	$500
Baytown	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$580
Baytown	RASP	Construct Apron	PAVE	CAPT	APRN	11-20	$50
Chambers County	TASP	Acquire Land	LAND	STDS	SRWY	0-5	$150
Chambers County	TASP	Construct Turnaround RW	PAVE	STDS	PRWY	0-5	$115
Chambers County	TASP	Engineering/Design for RW Extension	OTHR	PLAN	ENGR	0-5	$140
Chambers County	TASP	Engineering/Design for Terminal Building	BLDG	PLAN	ENGR	0-5	$25
Chambers County	TASP	Erosion/Sedimentation Controls	OTHR	STDS	ANAS	0-5	$20
Chambers County	TASP	Extend Partial Parallel TW	PAVE	UPGR	PTXY	0-5	$463
Chambers County	TASP	Extend RW 12/30	PAVE	UPGR	PRWY	0-5	$455
Chambers County	TASP	Install MIRL for RW Extension	LITE	UPGR	PRWY	0-5	$105
Chambers County	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	0-5	$49
Chambers County	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$41
Chambers County	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	0-5	$532
Chambers County	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	0-5	$6,330
Chambers County	TASP	Replace Rotating Beacon	AAID	RECN	ANAS	0-5	$25
Chambers County	TASP	Construct Terminal Building	BLDG	STDS	TERM	0-5	$100
Chambers County	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$41
Chambers County	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	6-10	$24
Chambers County	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	6-10	$200
Chambers County	TASP	Install REIL RW 12/30	LITE	STDS	PRWY	6-10	$207
Chambers County	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	6-10	$175

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Chambers County	RASP	Assess Wetland Issues	OTHR	PRSV	APRN	6-10	$70
Chambers County	RASP	Add Hangars	BLDG	CAPT	HANG	6-10	$310
Chambers County	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$41
Chambers County	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	11-20	$24
Chambers County	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	11-20	$200
Chambers County	TASP	Rehabilitate TW	PAVE	PRSV	STXY	11-20	$116
Cleveland Municipal	TASP	Install Jet A Fuel System	PAVE	STDS	PRWY	0-5	$120
Cleveland Municipal	TASP	Install Security Gate and Fencing	OTHR	SAFE	OLSD	0-5	$15
Cleveland Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	0-5	$34
Cleveland Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$252
Cleveland Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	0-5	$338
Cleveland Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	0-5	$736
Cleveland Municipal	RASP	Install Drainage Facilities	OTHR	UPGR	ANAS	0-5	$120
Cleveland Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$126
Cleveland Municipal	TASP	Expand Apron	PAVE	CAPT	APRN	6-10	$260
Cleveland Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	6-10	$37
Cleveland Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	6-10	$346
Cleveland Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	6-10	$172
Cleveland Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	6-10	$470
Cleveland Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$167
Cleveland Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	11-20	$346
Cleveland Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	11-20	$37
Cleveland Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	11-20	$172
Eagle Lake	TASP	Construct Auto Parking	PAVE	STDS	TERM	0-5	$12
Eagle Lake	TASP	Construct Entrance Road	OTHR	STDS	TERM	0-5	$77
Eagle Lake	TASP	Construct Hangar Access TW	PAVE	CAPT	HANG	0-5	$230
Eagle Lake	TASP	Construct Terminal Building Level 2	BLDG	STDS	TERM	0-5	$138
Eagle Lake	TASP	Install Perimeter Fencing	OTHR	SAFE	OLSD	0-5	$46
Eagle Lake	TASP	Install Security Lighting	LITE	SAFE	OLSD	0-5	$25
Eagle Lake	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	0-5	$20
Eagle Lake	TASP	Reconstruct Apron	PAVE	PRSV	APRN	0-5	$150
Eagle Lake	TASP	Rehabilitate Ag Pad	PAVE	PRSV	STXY	0-5	$115
Eagle Lake	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$30
Eagle Lake	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	0-5	$208
Eagle Lake	RASP	Add Self-Serve Fuel System	OTHR	UPGR	OLSD	0-5	$100
Eagle Lake	RASP	Install AWOS	AWOS	CAPT	ANAS	0-5	$90
Eagle Lake	RASP	Install WAAS Approach	WAAS	CAPT	ANAS	0-5	$10
Eagle Lake	TASP	Construct Partial Parallel TW	PAVE	CAPT	PTXY	6-10	$142
Eagle Lake	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	6-10	$21
Eagle Lake	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$58
Eagle Lake	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	6-10	$213
Eagle Lake	TASP	Rehabilitate Stub TW	PAVE	PRSV	STXY	6-10	$15
Eagle Lake	RASP	Extend and Widen Runway	PAVE	CAPT	PRWY	6-10	$900
Eagle Lake	RASP	Manage Bird Impacts	OTHR	PRSV	PRWY	6-10	$10
Eagle Lake	RASP	Acquire Land	LAND	UPGR	PRWY	6-10	$1,500
Eagle Lake	TASP	Construct Partial Parallel TW	PAVE	SAFE	PTXY	11-20	$78
Eagle Lake	TASP	Expand Apron	PAVE	CAPT	APRN	11-20	$130
Eagle Lake	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	11-20	$21
Eagle Lake	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$58
Eagle Lake	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	11-20	$213
Eagle Lake	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	11-20	$46
Eagle Lake	TASP	Relocate Windcone and Segmented Circle	AAID	SAFE	ANAS	11-20	$5
Houston Executive	RASP	Construct Terminal Bldg & Canopy	BLDG	UPGR	TERM	0-5	$4,000
Houston Executive	RASP	Construct Corporate Hangar	BLDG	CAPT	HANG	0-5	$2,000
Houston Executive	RASP	Construct two 10-unit T-Hangars	BLDG	CAPT	HANG	0-5	$1,000
Houston Executive	RASP	Extend TW to Hangars	PAVE	CAPT	STXY	0-5	$250
Houston Executive	RASP	Extend RW 18-36 and TW 1,200 ft	PAVE	CAPT	PRWY	6-10	$3,800
Houston Executive	RASP	Install RW Centerline MALSR Lighting	AAID	SAFE	PRWY	6-10	$450
Houston Executive	RASP	Construct Mixed Use Hangar	BLDG	CAPT	HANG	6-10	$2,800
Houston Executive	RASP	Construct T-Hangar	BLDG	CAPT	HANG	6-10	$500
Houston Executive	RASP	Construct Air Traffic Control Tower	OTHR	SAFE	ANAS	11-20	$1,500
Huntsville Municipal	TASP	Expand Apron	PAVE	CAPT	APRN	0-5	$432
Huntsville Municipal	TASP	Expand Auto Parking	OTHR	CAPT	OLSD	0-5	$61
Huntsville Municipal	TASP	Improve Drainage along TW & RW	PAVE	RECN	PRWY	0-5	$65
Huntsville Municipal	TASP	Install MALSR RW 18	AAID	STDS	PRWY	0-5	$350
Huntsville Municipal	TASP	Install Security Fencing at Terminal, Gates	OTHR	SAFE	OLSD	0-5	$150

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Huntsville Municipal	TASP	Mark RW 18/36	PAVE	PRSV	PRWY	0-5	$34
Huntsville Municipal	TASP	Reconstruct Auto Parking	OTHR	RECN	OLSD	0-5	$26
Huntsville Municipal	TASP	Rehabilitate Parallel and Cross TW	PAVE	PRSV	PTXY	0-5	$410
Huntsville Municipal	TASP	Rehabilitate RW 18/36	PAVE	PRSV	PRWY	0-5	$450
Huntsville Municipal	TASP	Remodel/Expand Terminal Building	BLDG	RECN	TERM	0-5	$250
Huntsville Municipal	RASP	Acquire Clear Zones	LAND	SAFE	PRWY	0-5	$150
Huntsville Municipal	TASP	Mark RW 18/36	PAVE	PRSV	PRWY	6-10	$34
Huntsville Municipal	TASP	Rehabilitate RW 18/36	PAVE	PRSV	PRWY	6-10	$450
Huntsville Municipal	TASP	Rehabilitate & Mark Parallel TW 18/36	PAVE	PRSV	PTXY	6-10	$216
Huntsville Municipal	RASP	Extend Taxiway	PAVE	UPGR	STXY	6-10	$1,000
Huntsville Municipal	RASP	Extend Runway	PAVE	CAPT	PRWY	6-10	$2,250
Huntsville Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$480
Liberty Municipal	TASP	Add Drainage Improvements	OTHR	RECN	ANAS	0-5	$250
Liberty Municipal	TASP	Construct 10 Unit T-Hangar	BLDG	UPGR	HANG	0-5	$400
Liberty Municipal	TASP	Build East Hangar Access TW, Pavement	PAVE	UPGR	APRN	0-5	$240
Liberty Municipal	TASP	Construct Small Public Terminal Building	BLDG	STDS	TERM	0-5	$20
Liberty Municipal	TASP	Extend Utilities to East Side Public Facility	OTHR	UPGR	TERM	0-5	$5
Liberty Municipal	TASP	Install Fencing	OTHR	RECN	OLSD	0-5	$200
Liberty Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	0-5	$25
Liberty Municipal	TASP	Reconstruct West Apron West Side	PAVE	PRSV	APRN	0-5	$38
Liberty Municipal	TASP	Rehabilitate, Mark Parallel and Cross TW	PAVE	PRSV	PTXY	0-5	$201
Liberty Municipal	TASP	Rehabilitate Aprons	PAVE	PRSV	APRN	0-5	$109
Liberty Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	0-5	$240
Liberty Municipal	TASP	Relocate Electrical Vault	LITE	PRSV	OLSD	0-5	$15
Liberty Municipal	TASP	Relocate Fuel Farm to East Side of Airport	OTHR	UPGR	APRN	0-5	$2
Liberty Municipal	TASP	Replace Rotating Beacon	AAID	RECN	OLSD	0-5	$30
Liberty Municipal	TASP	Terminal Plan Update	OTHR	PLAN	AMP	0-5	$40
Liberty Municipal	TASP	Upgrade Signage	OTHR	STDS	PRWY	0-5	$7
Liberty Municipal	RASP	Repair Base Failure, North End of Runway	PAVE	UPGR	PRWY	0-5	$30
Liberty Municipal	TASP	Install Jet A Fuel System	OTHR	STDS	ANAS	6-10	$100
Liberty Municipal	TASP	Construct Auto Parking	OTHR	STDS	OLSD	6-10	$15
Liberty Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	6-10	$29
Liberty Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	6-10	$257
Liberty Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	6-10	$174
Liberty Municipal	TASP	Rehabilitate Aprons	PAVE	PRSV	APRN	6-10	$81
Liberty Municipal	RASP	Extend Runway	PAVE	CAPT	PRWY	6-10	$1,130
Liberty Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	11-20	$29
Liberty Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	11-20	$257
Liberty Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	11-20	$174
Liberty Municipal	TASP	Rehabilitate Aprons	PAVE	PRSV	APRN	11-20	$81
Liberty Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$230
Liberty Municipal	RASP	Construct Apron	PAVE	CAPT	APRN	11-20	$30
Palacios Municipal	TASP	Airfield Drainage System Repairs	OTHR	RECN	ANAS	0-5	$250
Palacios Municipal	TASP	Electrical Improvements	OTHR	PRSV	OLSD	0-5	$240
Palacios Municipal	TASP	Install Apron Lighting	LITE	SAFE	APRN	0-5	$20
Palacios Municipal	TASP	Install Navigation Aids	AAID	STDS	PRWY	0-5	$1,191
Palacios Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	0-5	$58
Palacios Municipal	TASP	Mark TW	PAVE	PRSV	PTXY	0-5	$7
Palacios Municipal	TASP	Pavement Improvements	OTHR	CAPT	ANAS	0-5	$159
Palacios Municipal	TASP	Reconstruct Existing Auto Parking	PAVE	RECN	TERM	0-5	$23
Palacios Municipal	TASP	Drainage Improvements RW 17/35	OTHR	RECN	SRWY	0-5	$200
Palacios Municipal	TASP	Replace Damaged Concrete on RW 13/31	PAVE	RECN	PRWY	0-5	$285
Palacios Municipal	TASP	Seal PCC Joints on RW 17/35	PAVE	PRSV	OLSD	0-5	$726
Palacios Municipal	TASP	Slab Repairs	PAVE	RECN	ANAS	0-5	$100
Palacios Municipal	RASP	Update Terminal Building	BLDG	UPGR	TERM	0-5	$250
Palacios Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	6-10	$58
Palacios Municipal	TASP	Mark TW	PAVE	PRSV	STXY	6-10	$7
Palacios Municipal	TASP	Seal Joints	PAVE	PRSV	PRWY	6-10	$1,079
Palacios Municipal	RASP	Build New Access Roads	PAVE	UPGR	OLSD	6-10	$330
Palacios Municipal	RASP	Build Parking	PAVE	CAPT	OLSD	6-10	$50
Palacios Municipal	RASP	Manage Bird Impacts	OTHR	PRSV	ANAS	6-10	$10
Palacios Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	6-10	$220
Palacios Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	11-20	$58
Palacios Municipal	TASP	Mark TW	PAVE	PRSV	STXY	11-20	$7
Palacios Municipal	TASP	Seal Joints	PAVE	PRSV	PRWY	11-20	$997
Robert R. Wells, Jr.	TASP	Airport Development Plan	OTHR	PLAN	AMP	0-5	$80

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Robert R. Wells, Jr.	TASP	Build Terminal Building Level 2	BLDG	STDS	TERM	0-5	$56
Robert R. Wells, Jr.	TASP	Construct Auto Parking	PAVE	CAPT	OLSD	0-5	$15
Robert R. Wells, Jr.	TASP	Construct Hangar Access TW	PAVE	CAPT	HANG	0-5	$125
Robert R. Wells, Jr.	TASP	Install TW Centerline or Edge Reflectors	LITE	SAFE	PTXY	0-5	$122
Robert R. Wells, Jr.	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	0-5	$8
Robert R. Wells, Jr.	TASP	Reconstruct Apron	PAVE	RECN	APRN	0-5	$56
Robert R. Wells, Jr.	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$15
Robert R. Wells, Jr.	TASP	Rehabilitate Partial Parallel TW	PAVE	PRSV	PTXY	0-5	$79
Robert R. Wells, Jr.	TASP	Rehabilitate RW 15/33	PAVE	PRSV	PRWY	0-5	$205
Robert R. Wells, Jr.	RASP	Relocate Beacon	AAID	SAFE	ANAS	0-5	$25
Robert R. Wells, Jr.	RASP	Install Fencing	OTHR	SAFE	OLSD	0-5	$30
Robert R. Wells, Jr.	RASP	Reroute Road	PAVE	UPGR	OLSD	0-5	$140
Robert R. Wells, Jr.	RASP	Install Weather Reporting Station	AWOS	UPGR	ANAS	0-5	$90
Robert R. Wells, Jr.	RASP	Add Hangars	BLDG	CAPT	HANG	0-5	$360
Robert R. Wells, Jr.	TASP	Rehabilitate Partial Parallel TW	PAVE	PRSV	PTXY	6-10	$98
Robert R. Wells, Jr.	RASP	Extend Runway	PAVE	CAPT	PRWY	6-10	$910
Robert R. Wells, Jr.	RASP	Assess Environmental Impact on a Creek	OTHR	PRSV	OLSD	6-10	$70
Robert R. Wells, Jr.	RASP	Instrument Approach Procedures ILS/GPS	ILS	UPGR	PRWY	6-10	$250
Wharton Regional	TASP	Construct TW	PAVE	CAPT	PTXY	0-5	$340
Wharton Regional	TASP	Expand Apron	PAVE	CAPT	APRN	0-5	$334
Wharton Regional	TASP	Expand T-Hangar Auto Parking	PAVE	CAPT	HANG	0-5	$290
Wharton Regional	TASP	Install TW Reflectors	LITE	STDS	PTXY	0-5	$3
Wharton Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	0-5	$31
Wharton Regional	TASP	Reconstruct & Realign Entrance Road	PAVE	RECN	OLSD	0-5	$136
Wharton Regional	TASP	Rehabilitate Apron	PAVE	PRSV	PTXY	0-5	$72
Wharton Regional	TASP	Rehabilitate Parallel & Cross TW	PAVE	UPGR	PTXY	0-5	$129
Wharton Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	0-5	$164
Wharton Regional	TASP	Replace PLASI with PAPI-4 RW 32	AAID	STDS	ANAS	0-5	$363
Wharton Regional	TASP	Upgrade Drainage System	OTHR	UPGR	ANAS	0-5	$400
Wharton Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	6-10	$27
Wharton Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$164
Wharton Regional	TASP	Rehabilitate Parallel & Cross TW	PAVE	PRSV	PTXY	6-10	$250
Wharton Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	6-10	$338
Wharton Regional	TASP	Update Airport Master Plan	OTHR	PLAN	AMP	6-10	$150
Wharton Regional	RASP	Build New Terminal Building	BLDG	UPGR	TERM	6-10	$250
Wharton Regional	RASP	Extend Runway	PAVE	CAPT	PRWY	6-10	$670
Wharton Regional	RASP	Extend Taxiway	PAVE	UPGR	STXY	6-10	$220
Wharton Regional	TASP	Construct Access Road to Corporate Area	OTHR	CAPT	OLSD	11-20	$78
Wharton Regional	TASP	Construct Holding Apron RW 14	PAVE	CAPT	APRN	11-20	$30
Wharton Regional	TASP	Expand Corporate Hangar Access TW	PAVE	CAPT	HANG	11-20	$9
Wharton Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	11-20	$27
Wharton Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$164
Wharton Regional	TASP	Rehabilitate Parallel & Cross TW	PAVE	PRSV	PTXY	11-20	$250
Wharton Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	11-20	$338
Wharton Regional	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$520
North Houston Business	RASP	Add Ramp Space	PAVE	CAPT	APRN	0-5	$10
North Houston Business	RASP	Install PAPI and Runway Lighting	AAID	UPGR	PRWY	0-5	$90
North Houston Business	RASP	Replace Rotating Beacon	AAID	UPGR	PRWY	0-5	$30
North Houston Business	RASP	Install AWOS or ASOS	AWOS	UPGR	ANAS	0-5	$90
North Houston Business	RASP	Expand Fuel Farm	OTHR	UPGR	OLSD	0-5	$30
North Houston Business	RASP	Install Security Fencing	OTHR	SAFE	OLSD	0-5	$130
North Houston Business	RASP	Build Terminal Building	BLDG	UPGR	TERM	6-10	$250
North Houston Business	RASP	Acquire Land	LAND	CAPT	PRWY	6-10	$200
North Houston Business	RASP	Resurface and Widen Taxiway	PAVE	UPGR	STXY	6-10	$20
North Houston Business	RASP	Add Auto Parking	PAVE	CAPT	OLSD	6-10	$30
North Houston Business	RASP	Install Drainage Facilities	OTHR	UPGR	OLSD	6-10	$120
North Houston Business	RASP	Construct New Taxiway	PAVE	CAPT	STXY	11-20	$200
North Houston Business	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$1,580
North Houston Business	RASP	Move Access Road	PAVE	UPGR	OLSD	11-20	$80
North Houston Business	RASP	Construct Apron	PAVE	CAPT	APRN	11-20	$130
North Houston Business	RASP	Extend Runway	PAVE	CAPT	PRWY	11-20	$2,470
Winnie-Stowell	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	0-5	$27
Winnie-Stowell	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	0-5	$100
Winnie-Stowell	TASP	Install PAPI-2 RW 35	AAID	STDS	PRWY	0-5	$91
Winnie-Stowell	TASP	Rehabilitate TW	PAVE	PRSV	STXY	0-5	$60
Winnie-Stowell	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	0-5	$45

Airport	Source	Project Description	Type	Objective	Item	Priority	Cost ($000)
Winnie-Stowell	RASP	Install Runway Lighting	AAID	UPGR	PRWY	0-5	$50
Winnie-Stowell	RASP	Install Signs	OTHR	UPGR	OLSD	0-5	$10
Winnie-Stowell	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	6-10	$89
Winnie-Stowell	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	6-10	$243
Winnie-Stowell	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	6-10	$30
Winnie-Stowell	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	6-10	$151
Winnie-Stowell	RASP	Assess Wetlands Issues	OTHR	PRSV	OLSD	6-10	$70
Winnie-Stowell	RASP	Extend Runway	PAVE	CAPT	PRWY	6-10	$1,170
Winnie-Stowell	RASP	Extend Taxiway	PAVE	UPGR	STXY	6-10	$600
Winnie-Stowell	RASP	Add Terminal Building	BLDG	UPGR	TERM	6-10	$150
Winnie-Stowell	TASP	Expand Aircraft Apron	PAVE	CAPT	APRN	11-20	$175
Winnie-Stowell	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	11-20	$30
Winnie-Stowell	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	11-20	$30
Winnie-Stowell	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	11-20	$89
Winnie-Stowell	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	11-20	$243
Winnie-Stowell	TASP	Rehabilitate TW	PAVE	PRSV	STXY	11-20	$394
Winnie-Stowell	RASP	Add Hangars	BLDG	CAPT	HANG	11-20	$130

Source: HAS = Houston Airport System; TASP = Texas Airport System Plan (includes the TxDOT Airport Capital Improvements Program); RASP = Regional Aviation System Plan for the Houston-Galveston Region (this study)
Type: ILS = Instrument Landing System; GPS = Global Positioning System; AWOS = Automated Weather Observation System; WAAS = Wide Area Augmentation System; BLDG = Building; OTHR = Other; LAND = Land Acquisition or Easement; PAVE = Pavement Rehabilitation, New Construction, etc.; AAID = Approach Aids
Objective: SAFE = Safety; PRSV = Preservation; STDS = Standards; UPGR = Upgrade; PLAN = Planning Study; CAPT = Capacity
Item: HANG = Hangar; APRN = Apron; OLSD = Other Landside Development; TERM = Terminal Building; ENGR = Engineering/Design for Construction; ANAS = Airside Not Area Specific; AMP = Airport Master Plan; PRWY = Primary Runway; STXY = Secondary Taxiway
Priority: 0-5 = 2010 to 2015 (short term); 6-10 = 2016 to 2020 (mid-term); 11-20 = 2021 to 2030 (long term)
Source: TxDOT; HAS; Quadrant Consultants

13.3 The Optimal Plan, by Airport

The following sections describe, for each airport, what projects are recommended for that airport as components of the optimal plan. If a project is not on the TASP list and is recommended by this study, the reasons for making the recommendation for the project are discussed.

13.3.1 George Bush Intercontinental Airport

This study did not develop projects for George Bush Intercontinental Airport, as it is assumed the HAS list of projects is complete for this airport. The cost of projects for George Bush Intercontinental is $1,458.1 million. In addition, the Houston Airport System has allocated $48.9 million for general projects and services for its three airports, of which George Bush Intercontinental would get a larger than proportional share.

Some of the projects listed for George Bush Intercontinental are for new runway and taxiway construction and would be eligible for federal funding. The airport property includes wetlands, water resources, wildlife and forests and is close to neighborhoods that could be affected by airport noise or light emissions. The projects requiring environmental impact assessments would first determine their likely effects on these environmental resources before they receive FAA approval.

13.3.2 William P. Hobby Airport

This study did not develop projects for William P. Hobby Airport, as it is assumed the HAS list of projects is complete for this airport. The cost of projects for Hobby Airport is $412.6 million. In addition, the Houston Airport System has allocated $48.9 million for general projects and services for its three airports, which Hobby Airport would share with the other HAS airports.

Some projects listed for Hobby Airport, including land acquisition and new runway construction, may cause significant environmental impacts. Hobby Airport has several historic sites on the airport property, including the original terminal building and several hangars. In addition, the airport has wetlands on the east side of the property.

13.3.3 Texas Gulf Coast Regional Airport

Texas Gulf Coast Regional Airport has recently reconstructed its runway, and taxiway reconstruction is needed in the short term. The airport manager has indicated potential flooding issues, so new drainage facilities are needed in the mid-term. In the long term, the airport needs upgrading of its terminal building to provide flight planning and restrooms after hours. In addition, the long-term forecast demand will require increasing hangar space to 115,400 sq.ft. and apron area to 108,100 sq.yds. The total cost of projects for Texas Gulf Coast Regional Airport is $23.5 million, of which $21.4 million is for TASP projects and $2.1 million is for projects recommended by this study.

Projects proposed for Texas Gulf Coast Regional Airport on the TASP and recommended in this study are not likely to cause major environmental impacts, although there may be impacts to wetlands by projects developing acquired adjacent land, and drainage projects could affect floodplains. These environmental resources are both covered by environmental compliance regulations requiring the airport to obtain permits or demonstrate no impact to build projects.

13.3.4 David Wayne Hooks Memorial Airport

David Wayne Hooks Memorial Airport is currently at capacity for aviation operations and has an immediate need for additional airside capacity. Although the airport's apron can be expanded in the short term, it will take several years of planning and engineering to construct an additional runway. Currently, Runway 17L/35R is in poor condition and is skewed towards Runway 17R/35L on the south. It is recommended in the short term that the airport study the feasibility of aligning Runway 17L/35R to parallel Runway 17R/35L and increasing its length to 5,000 feet to increase the airport's airside capacity. This would involve relocating about 30 hangars on the south end of the airport to other locations on the airport. Once the feasibility is established, land acquisition should be done in the short term so that the constraints for the new runway can be included in the design.

Measures in the mid-term would increase safety and efficiency and may provide a small increase in capacity. The end of Runway 17R/35L is in poor condition and requires rehabilitation. The terminal buildings are aging and will need upgrading. The access road and parking lot for this busy airport have insufficient capacity and should be expanded. This study also recommends increasing hangar space to 370,800 sq.ft. and apron area to 90,400 sq.yds. in the mid-term. Although David Wayne Hooks Memorial Airport is not forecasted to need this much aircraft storage space until 2030, this study recommends speeding up the acquisition of this storage space to allow better resiliency should another airport close and relocate its aircraft during the planning period. The total cost of projects for David Wayne Hooks Memorial Airport is $33.1 million, of which $20.3 million is for TASP projects and $12.8 million is for projects recommended by this study.

A runway expansion project at D.W. Hooks may be eligible for FAA funding. D.W. Hooks has potential wetland and endangered species issues on or near the airport. Aircraft noise would also be a concern to the residents near the expanded runway.

13.3.5 Ellington Airport

This study did not develop projects for Ellington Airport, as it is assumed the HAS list of projects is complete for this airport. The cost of projects at Ellington Airport is $43 million. In addition, the Houston Airport System has allocated $48.9 million for general projects and services for its three airports, which Ellington Airport would share with the other HAS airports.

The proposed projects at Ellington Airport would all be in the developed area and would not cause environmental impacts other than temporary construction noise and dust.

13.3.6 Houston Southwest Airport

Houston Southwest Airport is acquiring land to the east of the airport for runway expansion, and the TASP includes projects for extending the runway. The TASP also includes several short-term and mid-term projects responding to needs identified in Chapter 5. This study recommends only one project: increasing hangar space to meet future demand for aircraft storage. As discussed in Chapter 9, the airport will need 150,600 sq.ft. of hangar space in the long term. The total cost of projects for Houston Southwest Airport is $26 million, of which $21.6 million is for TASP projects and $4.4 million is for projects recommended by this study.

Runway extension at Houston Southwest Airport would probably be eligible for FAA funding. The project could affect water and wetland resources and may cause noise impacts to nearby homes.

13.3.7 La Porte Municipal Airport

La Porte Municipal Airport is a large open area in an urban setting and needs a perimeter fence in the short term to keep unauthorized people off the airfield. This study also recognizes a need for additional apron area (to 28,400 sq.yds.) and hangar space (to 151,000 sq.ft.) to meet future demand. The total cost of projects for La Porte Municipal Airport is $7.4 million, of which $5.9 million is for TASP projects and $1.5 million is for projects recommended by this study. No environmental impact is likely to be caused by listed or recommended projects.

13.3.8 Lone Star Executive Airport

Lone Star Executive Airport has a TASP project to extend Runway 14/32 from 6,000 to 7,500 feet. The airport has expressed a need for an additional 500 feet, to 8,000 feet length, for operating larger aircraft. This study recommends a mid-term project to complete the parallel taxiway along Runway 14/32 and a long-term project to extend the runway. In addition, this study recommends long-term projects to increase aircraft storage to meet expected future demand. The projects would increase hangar space to 286,600 sq.ft. and apron area to 43,500 sq.yds. The total cost of projects for Lone Star Executive Airport is $36.3 million, of which $27.3 million is for TASP projects and $9 million is for projects recommended by this study.

Lone Star Executive Airport has extensive forests around the airport that would be affected by runway expansion. Water resources, wetlands and endangered species could also be affected.

13.3.9 Pearland Regional Airport

Pearland Regional Airport's future development hinges on extending its main runway from 4,313 feet to 5,011 feet to meet the needs of corporate aircraft. This will be a difficult process as it involves relocating a road and several houses. The TASP includes part of the needed runway

extension in a mid-term project. This study recommends projects for land acquisition in the mid-term and the rest of the runway extension in the long term. It also recommends replacing the aging, small terminal building with more modern and spacious facilities. The study recommends increasing hangar space to 241,400 sq.ft. and apron area to 41,500 sq.yds. in the mid-term. Although Pearland Regional is not forecast to need this much aircraft storage space until 2030, this study recommends speeding up the development of storage space to allow better resiliency should another airport close and its aircraft need relocation during the planning period. The total cost of projects for Pearland Regional Airport is $27.5 million, of which $23.5 million is for TASP projects and $4 million is for projects recommended by this study.

Pearland Regional Airport has recently expanded its property to the south, and the acquired property does not have hazardous contamination. Several sites further to the south may have hazardous materials contaminating soil or groundwater, although these do not appear to pose a hazard to the expanded airport.

13.3.10 Scholes International Airport

Scholes International Airport in Galveston is currently in the process of rebuilding its terminal building and several hangars severely damaged by Hurricane Ike in 2008. The airport has an excellent set of runways built for military purposes over 50 years ago and now need rehabilitation, and the TASP includes mid-term projects to do this. The study recommends only additional hangar space and apron area to meet long-term future demand: to 165,000 sq.ft. of hangar space and to 25,400 sq.yds. of apron area. The total cost of projects for Scholes International Airport is $43.3 million, of which $41.7 million is for TASP projects and $1.6 million is for projects recommended by this study.

The projects listed and recommended for Scholes International Airport would probably have few environmental impacts. The airport borders on a tidal water body and wetlands to the north that would not be affected by these projects.

13.3.11 Sugar Land Regional Airport

Sugar Land Regional Airport has a new terminal and a new taxiway on the south side, opening up areas for hangar development. The TASP has projects to improve drainage, expand the apron, rehabilitate the runway and parallel taxiway, and expand the terminal building. This study recommends a mid-term project to move the parallel taxiway farther from the runway to maintain separation at FAA design standards. This needed project would improve both safety and capacity. Projects to add hangar space and apron area in the mid-term, to 202,400 sq.ft. of hangar space and 27,700 sq.yds. of apron area, are also recommended. Although Sugar Land Regional is not forecast to need this much aircraft storage space until 2030, this study recommends speeding up the development of storage space to allow better resiliency should another airport close and its aircraft need to relocate during the planning period. The total cost of projects for Sugar Land Regional Airport is $77.3 million, of which $72.3 million is for TASP projects and $5 million is for projects recommended by this study.

Sugar Land Regional Airport has famously extended its south taxiway over a water body and wetland area, using pavement on bridges. It is likely that projects in this area would need to follow special procedures to avoid impacts to these features during construction.

13.3.12 West Houston Airport

West Houston Airport cannot extend its runway because of adjacent land uses, even though runway extension would help the airport handle larger aircraft. TASP projects help to preserve this busy airport by providing better navigational aids and rehabilitating the existing runway. The airport has room to build additional apron and hangars, and the TASP has a project to increase apron area to meet future demand for aircraft storage. This study recommends a project to building more hangar space to reach 338,000 sq.ft. The total cost of projects for West Houston Airport is $4.6 million, of which $4.3 million is for TASP projects and $0.3 million is for projects recommended by this study. The projects listed and recommended for West Houston Airport would have minimal environmental impact.

13.3.13 Bay City Municipal Airport

Bay City Municipal Airport currently needs a precision approach on its runway to allow IFR landings to improve safety and increase capacity, and this study recommends adding a LPV project in the short term. In the mid-term, this study also recommends rehabilitating the airport's aging terminal building. This study also recommends long-term projects to meet the airport's need for a longer runway to handle larger aircraft, including the required land acquisition. In the long term, this study recommends building hangars to reach 50,000 sq.ft. of hangar space and apron to reach 5,400 sq.yds. of apron area to meet long-term demand for aircraft storage. The total cost of projects for Bay City Municipal Airport is $7.1 million, of which $2.8 million is for TASP projects and $4.3 million is for projects recommended by this study.

Bay City Municipal Airport is in a highly modified agricultural area. The proposed runway extension would probably cause few environmental impacts.

13.3.14 Baytown Airport

Baytown Airport is a privately-owned airport not in the NPIAS and does not have projects in the TASP. This study recommends additional investment in this airport, which fills an important need for aviation in East Harris County. In the short term, this study recommends several projects to improve the landside facilities at the airport, including providing more auto parking, adding better signs and building a perimeter fence around the airport. In the mid-term, this study recommends expanding the airport's capacity by extending, widening and strengthening the runway, and building a full parallel taxiway. These tasks will require the airport to acquire land west and south of the runway and to relocate a road. In the long term, the airport will need additional hangar and apron area to meet future demand, and this study recommends building additional hangars to bring hangar space to 115,400 sq.ft., and additional apron to bring the apron area to 108,100 sq.yds. The total cost of projects recommended by this study for Baytown Airport is $4.4 million.

Extending the runway at Baytown Airport would involve acquiring residential land, clearing a small wooded area and relocating a road (which would require coordination with the City of Baytown). The airport is not currently eligible to receive federal funds.

13.3.15 Chambers County Airport

Chambers County Airport currently has no terminal building, and this study recommends that one be built in the short term. The TASP has projects for rehabilitating the airport's main runway and parallel taxiway, and since the airport is in an area with many wetlands, this study recommends a wetland assessment to determine any permitting needs before site work begins. There

is a long-term need for additional aircraft storage space, so this study recommends adding hangar space to reach 14,400 sq.ft., and additional apron area to reach 2,400 sq.yds. The total cost of projects for Chambers County Airport is $10 million, of which $9.6 million is for TASP projects and $0.4 million is for projects recommended by this study.

Chamber County Airport has wetlands on and around the airport property, and projects that develop additional land may require permits for water and wetland impacts.

13.3.16 Cleveland Municipal Airport

Cleveland Municipal Airport has identified issues on security and wildlife. This study recommends short-term projects to build a security gate and a perimeter fence to solve these issues. It also recommends a drainage study and additional drainage facilities to alleviate drainage problems in the short term. The TASP includes projects to rehabilitate the runway and taxiway in the mid-term. Long-term demand for aircraft storage space results in a need for 58,800 sq.ft. of hangar space, so this study recommends that additional hangar space be built in the long term. The total cost of projects for Cleveland Municipal Airport is $3.7 million, of which $3.1 million is for TASP projects and $0.6 million is for projects recommended by this study.

Cleveland Municipal Airport is surrounded by forest, pastures and rural homes. The proposed projects for this airport would have only minor environmental impacts.

13.3.17 Eagle Lake Airport

Eagle Lake Airport has a number of expansion needs. The terminal building is small, the 3,800-foot runway has no parallel taxiway, and hangar space is in short supply. The TASP includes projects for expanding the terminal and adding hangars. This study recommends several short-term projects to add AWOS for better flight planning, WAAS capability to improve safety during landings, and a self-service fueling system for the convenience of aircraft owners. The safety and capacity of the airport will improve if a parallel taxiway were built and the runway were extended and widened; this study recommends both as mid-term projects to meet the needs of corporate aircraft. Land acquisition is proposed for runway extension, and there is a project for managing birds, which are very common in Eagle Lake and can be a hazard to aircraft. In the long term, the airport will need additional aircraft storage to meet the future demand, and this study recommends additional hangar space to reach 28,600 sq.ft. and additional apron area to reach 5,600 sq.yds. The total cost of projects for Eagle Lake Airport is $4.7 million, of which $2.1 million is for TASP projects and $2.6 million is for projects recommended by this study.

Eagle Lake Airport is in a major waterfowl flyway, and projects extending the runway would need to ensure that the areas to be acquired do not contain water bodies or wetlands that would attract waterfowl. Most of the land around the airport is pasture, so little environmental impact would result from runway expansion.

13.3.18 Houston Executive Airport

Houston Executive Airport is in the TASP, and TxDOT recently proposed the airport for entry in the NPIAS. Meanwhile, all projects in the optimal plan for Houston Executive Airport are recommendations of this study. The airport has recently built additional hangars to meet the demand for hangar space forecast by this study, as well as facilities to improve drainage from the airfield. The airport has also recently collaborated with Waller County to repair its entrance road. The project list for Houston Executive Airport has been provided by the airport manager. It

includes a new terminal building and arrival canopy in the short term, extending its runway and parallel taxiway by almost 1,200 feet in the mid-term and an air traffic control tower in the long term. Houston Executive plans to construct 120,000 sq.ft. of corporate hangar space and 43,200 sq.ft. of other hangar space in the next 10 years, so corporate hangars and T-hangars, and the accompanying taxiway extensions are part of the short term and mid-term expansion plans. The total cost of projects listed in this study for Houston Executive Airport is $16.3 million.

Houston Executive Airport is not currently eligible for FAA funds. The airport is in major wintering grounds for waterfowl and there is considerable public interest in how the airport coexists with the birds in the Katy Prairie. The airport leases 500 acres of its property for hay production, which discourages the use of airport property by migrating waterfowl. The listed projects would have few environmental impacts.

13.3.19 Huntsville Municipal Airport

Huntsville Municipal Airport is currently at capacity for hangar space, and the airport is planning to build a new T-hangar soon. Other short-term needs are covered by the TASP. This study recommends for safety's sake that the airport quickly acquire the runway protection zone on the north end, as it is currently unprotected and could be encroached by development. The airport has expressed the need to extend its runway and parallel taxiway to 7,000 feet to accommodate government and corporate aircraft, and this study recommends these projects in the mid-term. Additional hangar space will still be needed by 2030 to meet the forecast demand for aircraft storage, and this report recommends increasing hangar space to 43,400 sq.ft. in the long term. The total cost of projects for Huntsville Municipal Airport is $7.7 million, of which $3.8 million is for TASP projects and $3.9 million is for projects recommended by this study.

The projects may be eligible for FAA funding. The north end of the runway at Huntsville Municipal Airport, where expansion is proposed, is forested and contains wildlife and possibly endangered species.

13.3.20 Liberty Municipal Airport

Liberty Municipal Airport received substantial damage from Hurricane Ike in 2008, and major repairs are underway. In August 2010, the Liberty City Council approved several recommendations from the Liberty Community Development Corporation for projects at Liberty Municipal Airport costing $900,000, including building 10 to 20 new hangars, an airport terminal building and a parking lot, and relocating the fuel farm closer to the hangars. The projects will receive 50 percent funding from the Liberty Community Development Corporation and 50 percent funding from the Federal Emergency Management Agency and municipal insurance benefits from Hurricane Ike claims.

The TASP includes several projects to replace damaged facilities on the airfield. In the short term, the airport needs to repair base failure on north end of the runway for the safety of aircraft. In the mid-term, there is a need to extend the runway to accommodate larger aircraft and add hangar space (to 17,200 sq.ft.) for the expected demand for aircraft storage. Additional apron space (to 2,800 sq.yds.) for tie-downs and itinerant aircraft will be needed in the long term. The total cost of projects for Liberty Municipal Airport is $4.4 million, of which $3 million is for TASP projects and $1.4 million is for projects recommended by this study.

A runway expansion project at Liberty Municipal Airport could affect forested land on and near the airport property, and wetlands on some of the adjacent parcels. Projects involving buildings on acquired land may require permits for water and wetland impacts.

13.3.21 Palacios Municipal Airport

Palacios Municipal Airport benefits from its expansive runways, taxiways and apron area, although it lacks a modern terminal and two of the three runways are in need of repair. Runway 13/31 serves as the primary runway. The TASP includes projects for runway and taxiway repair and this study recommends building a new terminal in the short term. Additional parking and a better access road are also mid-term needs. Since Palacios is in a bird flyway and bird management is an issue at the airport, this study recommends an assessment of potential bird mitigation strategies for aircraft safety. Finally, the forecast shows a future demand for additional hangar space (18,200 sq.ft. will be needed) and apron area (3,300 sq.yds. will be needed), and this study recommends projects to increase hangar and apron space. The total cost of projects for Palacios Municipal Airport is $6.3 million, of which $5.5 million is for TASP projects and $0.8 million is for projects recommended by this study.

Other than the bird issue noted above, projects at Palacios Municipal Airport are not likely to cause significant environmental impacts.

13.3.22 Robert R. Wells, Jr. Airport

Robert R. Wells, Jr. Airport is owned by Colorado County and serves the aviation needs of the entire county. The airport manager's office, which serves as the terminal building, will be replaced under a TASP project. This study recommends enhancing aviation safety in the short term by upgrading navigational aids, adding a weather station, and installing perimeter fencing around the airport. In the mid-term, the airport needs to extend its 3,088-foot runway to allow government and corporate aircraft to use the airport. To accommodate aircraft during IFR conditions, a GPS approach will be needed in the mid-term. The entrance road will also need to be relocated to the new terminal building. Finally, the long-term need for additional aircraft storage space should be met with new hangars (to reach 23,200 sq.ft.). (On request from the Colorado County judge, this project has been moved to short term.) The total cost of projects for Robert R. Wells, Jr. Airport is $2.7 million, of which $0.8 million is for TASP projects and $1.9 million is for projects recommended by this study.

The airport is adjacent to forested areas and a creek. Extending the runway over the creek would probably require a permit for impacts to a water body.

13.3.23 Weiser Airpark

Weiser Airpark is surrounded by developed land and is unable to expand. This study does not identify a need at the airport that can be met other than by expansion, so no project is proposed for Weiser Airpark.

13.3.24 Wharton Regional Airport

Wharton Regional Airport has recently improved its airside facilities and airfield drainage, and the TASP includes a drainage project. The airport now has 24-hour fueling capability for Avgas and will replace the Jet A tank with one that has 24-hour overwing and single-point fueling capability by the end of 2010. The airport also needs a new terminal to replace its small, aging

building; this study recommends this as a mid-term project. The airport would like to extend its runway and parallel taxiway by 500 feet to accommodate larger aircraft; and this study recommends this in the mid-term. In the long term, the airport will need additional hangar space to meet the demand for aircraft storage, and this study recommends adding hangars to reach 82,600 sq.ft. of total hangar space. The total cost of projects for Wharton Regional Airport is $5.7 million, of which $4 million is for TASP projects and $1.7 million is for projects recommended by this study.

Wharton Regional Airport is surrounded by pasture and grassland. Extension of the runway is not likely to cause significant impacts.

13.3.25 North Houston Business Airport

North Houston Business Airport, which is not listed in the TASP or the NPIAS, has recently expanded under new ownership. As there is no project for North Houston Business Airport in the TASP, the airport's needs identified in this study are addressed by this study's recommended projects. The airport's current needs are for more ramp space for aircraft storage, and installation of a perimeter fence, runway lighting, navigational aids and a weather station for the safety of air travel. In addition, the airport's new fuel farm still needs to be expanded, and more auto parking must be provided. In the mid-term, the airport needs a permanent terminal building to replace the small temporary one, and its 3,600-foot runway and parallel taxiway need to be extended to 5,500 feet to handle larger aircraft. The runway extension also requires land acquisition to the south, and drainage facilities to keep the airfield free of standing water. In addition, this study recommends resurfacing and widening the taxiways on the airfield, and moving the access road to the new terminal location. New hangars (to reach 78,600 sq.ft. of hangar space) and more apron area (to reach 9,700 sq.yds.) will be needed over the long term to meet the expected need for aircraft storage. The total cost of projects recommended by this study for North Houston Business Airport is $5.5 million.

North Houston Business Airport is not currently eligible for federal funds. However, surrounding lands are forested and may contain waters, wetlands and endangered species. Land development projects may require permits for impacts to waters or wetlands, or may need to locate and avoid endangered species.

13.3.26 Winnie-Stowell Airport

Winnie-Stowell Airport is unattended and has no terminal building, so there is a need for a terminal building at the airport; this study places that project in the mid-term. Better signs can be built in the short term and will make it easier for users to find the airport. The airport has identified a need for better runway lighting. There is also a need identified to extend the runway from 3,600 feet to 4,500 feet to accommodate aircraft operations more safely. Land acquisitions and a wetland study would be needed to expand the airport. To meet the expected future demand for aircraft storage space, it is recommended that additional hangars be built to reach 15,800 sq.ft. of total hangar space in the long term. The total cost of projects for Winnie-Stowell Airport is $4 million, of which $1.8 million is for TASP projects and $2.2 million is for projects recommended by this study.

Winnie-Stowell Airport is in an agricultural area with little remaining forest. There is a stream on the south end of the runway, and projects to extend the runway and taxiway that build on waters or wetlands on airport land or land to be acquired would require a permit for water or wetland impacts.

14 DEVELOPMENT PRIORITIES

The list of projects in the optimal plan (Table 39), including projects in the TASP and projects recommended in this study, includes a priority level: short term (2010 to 2015), mid-term (2016 to 2020), and long term (2021 to 2030). TASP project priority levels are assigned by TxDOT. Projects recommended in this study are assigned priority levels based on urgency of need and the time normally required to complete the project. Short-term projects are done quickly and respond to urgent needs; mid-term projects respond to urgent needs and take more time to complete, or respond to less urgent needs; and long-term projects respond to longer-term needs. The assignment of priority levels to recommended projects at each airport is discussed in Section 13.3.

The total cost of projects in the optimal plan, grouped by airport and by priority level, is shown in Table 40. There are many resources available to airport owners for funding for airport projects, including federal grants, state grants, municipal and private bonds, user fees, tenant fees and special-district revenues. The following sections describe funding sources for airports in the Houston-Galveston region.

Table 40: Cost of Projects in the Optimal Plan, by Airport and Priority Level

	HAS and TASP Projects ($000)				Projects in RASP ($000)				
Airport	0-5	6-10	11-20	Total	0-5	6-10	11-20	Total	All Projects
Air Carrier Airports									
George Bush Intercontinental	$473,470	$984,603		$1,458,073				$0	**$1,458,073**
William P. Hobby	$30,831	$381,787		$412,618				$0	**$412,618**
Reliever Airports									
Texas Gulf Coast Regional	$15,410	$2,164	$3,821	$21,395		$200	$1,940	$2,140	**$23,535**
D.W. Hooks Memorial	$9,664	$5,562	$5,073	$20,299	$2,200	$10,590		$12,790	**$33,089**
Ellington	$19,799	$23,210		$43,009				$0	**$43,009**
Houston Southwest	$8,257	$11,959	$1,426	$21,642			$4,400	$4,400	**$26,042**
La Porte Municipal	$1,495	$1,852	$2,536	$5,883	$130		$1,430	$1,560	**$7,443**
Lone Star Executive	$15,232	$7,551	$4,472	$27,255		$3,000	$6,020	$9,020	**$36,275**
Pearland Regional	$15,706	$4,491	$3,325	$23,522		$2,570	$1,380	$3,950	**$27,472**
Scholes International	$16,472	$7,708	$17,481	$41,661		$1,620		$1,620	**$43,281**
Sugar Land Regional	$56,314	$10,256	$5,769	$72,339		$4,990		$4,990	**$77,329**
West Houston	$1,191	$1,647	$1,437	$4,275		$340		$340	**$4,615**
Other General Aviation Airports									
Bay City Municipal	$1,055	$819	$951	$2,825	$500	$500	$3,280	$4,280	**$7,105**
Baytown				$0	$1,270	$2,500	$630	$4,400	**$4,400**
Chambers County	$8,550	$647	$381	$9,578		$380		$380	**$9,958**
Cleveland Municipal	$1,495	$941	$722	$3,158	$120	$470		$590	**$3,748**
Eagle Lake	$1,051	$449	$551	$2,051	$200	$2,410		$2,610	**$4,661**
Houston Executive				$0	$7,250	$7,550	$1,500	$16,300	**$16,300**
Huntsville Municipal	$2,228	$700	$920	$3,848	$150	$3,250	$480	$3,880	**$7,728**
Liberty Municipal	$1,822	$656	$541	$3,018	$30	$1,130	$260	$1,420	**$4,439**
Palacios Municipal	$3,259	$1,144	$1,062	$5,465	$250	$610		$860	**$6,325**
Robert R. Wells, Jr.	$761	$98		$859	$645	$1,230		$1,875	**$2,734**
Weiser Airpark				$0				$0	**$0**
Wharton Regional	$2,262	$929	$896	$4,087		$1,140	$520	$1,660	**$5,747**
North Houston Business				$0	$380	$620	$4,460	$5,460	**$5,460**
Winnie-Stowell	$323	$513	$961	$1,796	$60	$1,190	$130	$2,180	**$3,977**
Total	**$686,647**	**$1,449,686**	**$52,325**	**$2,188,658**	**$13,185**	**$47,090**	**$26,430**	**$86,705**	**$2,275,363**

Priority: 0-5 = 2010 to 2015 (short term); 6-10 = 2016 to 2020 (mid-term); 11-20 = 2021 to 2030 (long term).

14.1 FAA Airport Improvement Program Grants

The most common source of aid for publicly-owned airports is the FAA Airport Improvement Program (AIP). The AIP began after World War II to promote civil airport development. The AIP provides matching grants to public-use airports in the NPIAS, which includes publicly-owned airports and privately-owned designated reliever airports of national importance. AIP funds come from the Airport and Airway Trust Fund, which receives aviation-generated tax revenues such as airline ticket taxes and aviation fuel taxes. The program currently provides for 95 percent federal funding and 5 percent local funding for eligible airport projects. However, the program's authorization expired on September 30, 2007, and Congress has authorized interim funding only. Further authorization by Congress will be required to continue the AIP after the interim funding expires.

AIP funds are apportioned by formula each year to specific airports and states. In 2003, 20 percent of the $3.3 billion in AIP funds were allocated to state block grants, including the Texas block grant program. Much of the remaining funds were allocated to commercial service airports (49 percent) and military airports (1 percent). The remaining 30 percent went to reliever and other general aviation projects, discretionary funding projects and carryover funds.

Projects eligible to receive AIP funds include those that improve airport safety, increase capacity, improve security and maintain environmental quality. Typical AIP-funded projects are new runway or taxiway construction, runway or taxiway rehabilitation, airfield signs, navigational aids and Airport Layout Plans (ALP). The FAA imposes obligations on airports accepting AIP funds to assure the airport is operated and maintained for public use in a safe and serviceable condition, hazards to airspace are mitigated, and airport revenue is used properly.

Air traffic control towers can be funded under either the AIP or the FAA's Facilities & Equipment Program, which provides funding to build FAA-operated facilities on airports. To qualify for funding, the owner of a publicly-owned or designated reliever airport in the NPIAS must show that the benefits of a control tower exceed the costs, using an FAA-issued calculation procedure.

Eligible non-primary airports may receive FAA grant funding of up to 80 percent to build hangars and associated access pavement (75 percent if just the hangar itself). The hangar location must be on the approved ALP, and the applicant must provide contracts and lease agreements showing that the hangar will have occupants and indicating the hangar lease and rate structure. The applicant must have made adequate provisions for financing airfield projects currently required before requesting hangar funding.

Similarly, eligible non-primary airports without a fuel dispensing system can apply for FAA grant funding to receive a 75 percent grant to build one, once the applicant has secured funding for higher-priority airfield facilities. The proposed site must also be located on an approved ALP, and the sponsor must show compliance with fuel rate and flowage fee standards.

14.2 Texas Aviation Grants

Texas began administering FAA funds for non-reliever general aviation airports through block grants in 1993, for reliever airports in 1997, and for non-primary commercial service airports in 2002. As one of ten states receiving block grants from FAA, Texas has greater discretion and flexibility in selecting and administering projects.

The TASP notes that the sponsor's share of project costs for both federal and state grants is typically ten percent of all eligible project costs. Faced with competing financial needs and limited sources of revenue, many sponsors are unable to raise ten percent of the cost of requested airport projects. The result is that grant money is not always allocated to worthy aviation projects. It is a goal of this study to determine which projects should be funded in the short term, mid-term and long term, so sponsors can plan with enough time and agency support to be ready to provide their local participation funding for worthy projects at their airports.

Another TxDOT funding program is the Routine Airport Maintenance Program (RAMP). The RAMP provides 50 percent matching funds, up to $50,000 per year, for basic maintenance at participating publicly-owned airports in the TASP.

The Adopt-an-Airport Program lets the public participate in the beautification and maintenance of Texas airports. Publicly-owned airports listed in the TASP are eligible to participate in this program.

TxDOT also participates in two specialized funding programs. One program, which started in 1997, provides 75 percent federal funds to install Automated Weather Observing Systems. Another TxDOT program, the Airport Terminal Grant Program, provides 50 percent matching funds up to $500,000 for building or remodeling terminal buildings and up to $100,000 for landside parking and entrance roads. To be eligible for the Airport Terminal Grant Program, the airport must have a full-time on-site manager, sell fuel and meet requirements for based aircraft and transient traffic.

14.3 Airport Self-Funding

Owners of publicly- or privately-owned airports may use airport-generated income and retained earnings as a funding source for projects. Self-funding may be applied to airport projects not eligible for FAA or TxDOT grants or to the local matching share for FAA or TxDOT grants. This is often the simplest and most economical means of raising local funds because it does not incur interest costs.

14.4 Private Investment in Airports

Private sector investment is an important funding source for some airport projects. Some airport owners and tenants enter into loan agreements with private commercial lending institutions or insurance companies for the funds to develop airport-related facilities. If the project involves private development on public land, these financing options may be difficult and expensive to obtain because the borrower can encumber only the improvements as loan collateral, not the land itself.

Table 41 is a full list of the optimal plan components presented in Table 39, grouped by priority level and then by airport.

Table 41: Projects in the Optimal Plan, Listed by Priority Level

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
Short-Term Projects (2010-2015)							
0-5	George Bush Intercontinental	HAS	Alternative Power Supply	OTHR	PLAN	TERM	$1,220
0-5	George Bush Intercontinental	HAS	Art - Terminal Update	OTHR	STDS	OLSD	$2,555
0-5	George Bush Intercontinental	HAS	CNG Station Fence	OTHR	SAFE	OLSD	$1,000
0-5	George Bush Intercontinental	HAS	Concrete Line Greens Rd Detention Pond	PAVE	UPGR	OLSD	$250
0-5	George Bush Intercontinental	HAS	Consolidated Communication Center	OTHR	UPGR	TERM	$13,160
0-5	George Bush Intercontinental	HAS	Construction Manager - Pre-Const Services	BLDG	PLAN	OLSD	$479
0-5	George Bush Intercontinental	HAS	Design - Communication Center	OTHR	PLAN	OLSD	$840
0-5	George Bush Intercontinental	HAS	Design East Mid-Field TW	PAVE	PLAN	STXY	$5,450
0-5	George Bush Intercontinental	HAS	Drainage Capacity Construction	OTHR	UPGR	OLSD	$20,600
0-5	George Bush Intercontinental	HAS	East Mid-Field TW	PAVE	STDS	STXY	$57,500
0-5	George Bush Intercontinental	HAS	Engrg Svc North Ramp Skinny Oval Infill	PAVE	PLAN	PRWY	$1,000
0-5	George Bush Intercontinental	HAS	Environmental Impact Study	OTHR	PLAN	OLSD	$2,100
0-5	George Bush Intercontinental	HAS	Environmental Lift Stations	OTHR	UPGR	OLSD	$300
0-5	George Bush Intercontinental	HAS	FIS Facility Terrazzo Floors	OTHR	UPGR	OLSD	$1,200
0-5	George Bush Intercontinental	HAS	Flood Control for Will Clayton, JFK, Greens	OTHR	PRSV	OLSD	$840
0-5	George Bush Intercontinental	HAS	Fuel Storage Facility Improvements	OTHR	UPGR	OLSD	$7,013
0-5	George Bush Intercontinental	HAS	Gate A-28 PLB	OTHR	UPGR	OLSD	$625
0-5	George Bush Intercontinental	HAS	GBAS	OTHR	UPGR	OLSD	$2,500
0-5	George Bush Intercontinental	HAS	Grease Lines for Terminals A & C	OTHR	UPGR	OLSD	$2,800
0-5	George Bush Intercontinental	HAS	HVAC Controls - Terminals A, B, C, D & FIS	OTHR	UPGR	OLSD	$5,000
0-5	George Bush Intercontinental	HAS	Inspection, Repairs for All HAS Buildings	BLDG	STDS	OLSD	$9,000
0-5	George Bush Intercontinental	HAS	Large Pumps & Generators for Tug Tunnels	OTHR	UPGR	OLSD	$18
0-5	George Bush Intercontinental	HAS	Inter-Terminal Train - Design	BLDG	PLAN	ENGR	$800
0-5	George Bush Intercontinental	HAS	LA-NE Cargo - 7 Properties	OTHR	CAPT	OLSD	$75
0-5	George Bush Intercontinental	HAS	Lift Station #1 JFK at JFK/Will Clayton	OTHR	UPGR	OLSD	$2,550
0-5	George Bush Intercontinental	HAS	New Electrical Vault at West Side of IAH	LITE	UPGR	PRWY	$4,950
0-5	George Bush Intercontinental	HAS	New HPD Facility Design Update	OTHR	PLAN	OLSD	$350
0-5	George Bush Intercontinental	HAS	New IAH RW EIS Support	PAVE	PLAN	PRWY	$11,000
0-5	George Bush Intercontinental	HAS	Noise Mitigation Program	OTHR	CAPT	ANAS	$8,094
0-5	George Bush Intercontinental	HAS	Parking Improvements at IAH	PAVE	UPGR	OLSD	$2,000
0-5	George Bush Intercontinental	HAS	Pavement Replacement at IAH	PAVE	UPGR	ANAS	$2,650
0-5	George Bush Intercontinental	HAS	Perimeter Security Intrusion Detection	OTHR	SAFE	OLSD	$520
0-5	George Bush Intercontinental	HAS	Phase II& III Expansion Central Plant	OTHR	UPGR	TERM	$18,300
0-5	George Bush Intercontinental	HAS	Pre-Construction Services	OTHR	PLAN	OLSD	$4,450
0-5	George Bush Intercontinental	HAS	Prof Svc - Noise Mitigation Land Acquired	LAND	PLAN	OLSD	$150
0-5	George Bush Intercontinental	HAS	Reconstruct TW	PAVE	STDS	STXY	$46,700
0-5	George Bush Intercontinental	HAS	Rehabilitate & Expand ARFF Station 92	OTHR	SAFE	OLSD	$4,000
0-5	George Bush Intercontinental	HAS	Rehabilitate TW	PAVE	STDS	STXY	$41,409
0-5	George Bush Intercontinental	HAS	Relocate Vehicle Service Road at TW	PAVE	UPGR	STXY	$518
0-5	George Bush Intercontinental	HAS	Replace Existing Incinerator	OTHR	UPGR	OLSD	$2,000
0-5	George Bush Intercontinental	HAS	Replace Public Utility Lines	OTHR	UPGR	OLSD	$10,800
0-5	George Bush Intercontinental	HAS	Roadway Signage	OTHR	STDS	ANAS	$5,000
0-5	George Bush Intercontinental	HAS	TW NA	PAVE	UPGR	STXY	$1,600
0-5	George Bush Intercontinental	HAS	Terminal Update	BLDG	UPGR	TERM	$163,439
0-5	George Bush Intercontinental	HAS	Update Master Plan	OTHR	PLAN	OLSD	$1,250
0-5	George Bush Intercontinental	HAS	Upgrade Lift Station	OTHR	UPGR	OLSD	$1,415
0-5	George Bush Intercontinental	HAS	Volta Road	PAVE	UPGR	OLSD	$3,750
0-5	George Bush Intercontinental	HAS	Weatherproof Terminal D Baggage Makeup	OTHR	UPGR	OLSD	$250
0-5	William P. Hobby	HAS	Demolition of Old SCI Hanger WR2	OTHR	CAPT	OLSD	$120
0-5	William P. Hobby	HAS	Design - Airport Services Complex Upgrade	OTHR	PLAN	OLSD	$350
0-5	William P. Hobby	HAS	Drainage Ditch S of TW K & West of ARFF	OTHR	UPGR	OLSD	$1,350
0-5	William P. Hobby	HAS	Environmental Plume Removal/Clean up	PAVE	SAFE	ENGR	$3,150
0-5	William P. Hobby	HAS	Inclined Driveway for Airfield Sweeper	OTHR	UPGR	OLSD	$52
0-5	William P. Hobby	HAS	Tie Downs for 25 Jet Bridges at Hobby	OTHR	STDS	OLSD	$250
0-5	William P. Hobby	HAS	Land Acquisition for Hobby Expansion	LAND	CAPT	OLSD	$100
0-5	William P. Hobby	HAS	New Airfield & Grounds Building	BLDG	UPGR	TERM	$2,752
0-5	William P. Hobby	HAS	Parking Improvements at Hobby	PAVE	UPGR	OLSD	$2,000
0-5	William P. Hobby	HAS	Pavement Replacement at HOU (R&R)	PAVE	UPGR	OLSD	$1,100
0-5	William P. Hobby	HAS	Preventive Repairs In Parking Garage	PAVE	UPGR	OLSD	$10,322
0-5	William P. Hobby	HAS	Rehabilitate & Expand ARFF Station 81	OTHR	SAFE	OLSD	$2,000
0-5	William P. Hobby	HAS	Replace Existing Incinerator	OTHR	UPGR	OLSD	$139
0-5	William P. Hobby	HAS	Shortening RW 17	PAVE	SAFE	PRWY	$1,000

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
0-5	William P. Hobby	HAS	TW M3, H2 H and G	PAVE	SAFE	STXY	$6,000
0-5	William P. Hobby	HAS	Temporary FIS at Hobby	OTHR	UPGR	OLSD	$1
0-5	William P. Hobby	HAS	Vehicle Wash Expansion	OTHR	UPGR	OLSD	$145
0-5	Texas Gulf Coast Regional	TASP	Construct Hangar Access TW, Apron	PAVE	CAPT	APRN	$150
0-5	Texas Gulf Coast Regional	TASP	Contingency, Admin RPR	OTHR	PLAN	ENGR	$1,969
0-5	Texas Gulf Coast Regional	TASP	Environmental Review	OTHR	PLAN	ENGR	$100
0-5	Texas Gulf Coast Regional	TASP	MOA with FAA	OTHR	PLAN	ENGR	$150
0-5	Texas Gulf Coast Regional	TASP	Perimeter Security Access	OTHR	SAFE	OLSD	$43
0-5	Texas Gulf Coast Regional	TASP	Construct GA Parking	OTHR	CAPT	OLSD	$40
0-5	Texas Gulf Coast Regional	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	$244
0-5	Texas Gulf Coast Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$107
0-5	Texas Gulf Coast Regional	TASP	Replace MIRL Fixtures	LITE	RECN	PRWY	$81
0-5	Texas Gulf Coast Regional	TASP	Improve Grade along RW Edge	OTHR	RECN	PRWY	$34
0-5	Texas Gulf Coast Regional	TASP	Reconstruct RW 17/35 Mid Section	PAVE	RECN	PRWY	$9,710
0-5	Texas Gulf Coast Regional	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	$630
0-5	Texas Gulf Coast Regional	TASP	Relocate Localizer RW 35	AAID	STDS	PRWY	$500
0-5	Texas Gulf Coast Regional	TASP	Install Navigation Aids	AAID	UPGR	PRWY	$183
0-5	Texas Gulf Coast Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$400
0-5	Texas Gulf Coast Regional	TASP	Construct TW	PAVE	SAFE	STXY	$507
0-5	Texas Gulf Coast Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$562
0-5	D.W. Hooks Memorial	TASP	Expand Apron	PAVE	CAPT	APRN	$932
0-5	D.W. Hooks Memorial	TASP	Airport Acquisition	LAND	PLAN	OLSD	$2,000
0-5	D.W. Hooks Memorial	TASP	Install Security Fencing	OTHR	SAFE	OLSD	$128
0-5	D.W. Hooks Memorial	TASP	Rehabilitate RW 17R/35L	PAVE	PRSV	PRWY	$630
0-5	D.W. Hooks Memorial	TASP	Install Navigation Aids	AAID	STDS	PRWY	$273
0-5	D.W. Hooks Memorial	TASP	Mark RW 17R/35L	PAVE	PRSV	PRWY	$46
0-5	D.W. Hooks Memorial	TASP	Construct New Parallel TW to RW 17R/35L	PAVE	STDS	PTXY	$1,430
0-5	D.W. Hooks Memorial	TASP	Reconstruct RW 17L/35R	PAVE	RECN	SRWY	$350
0-5	D.W. Hooks Memorial	TASP	Rehabilitate TW and Apron	PAVE	PRSV	STXY	$3,875
0-5	D.W. Hooks Memorial	RASP	Feasibility Study for Straightening and Extending Runway 17L/35R	OTHR	CAPT	AMP	$200†
0-5	D.W. Hooks Memorial	RASP	Acquire Land	LAND	CAPT	PRWY	$2,000
0-5	Ellington	HAS	Air Traffic Control Tower	OTHR	SAFE	ANAS	$8,594
0-5	Ellington	HAS	Bury Overhead Power Lines	OTHR	SAFE	OLSD	$1,000
0-5	Ellington	HAS	Construction of Ellington Bypass	OTHR	PLAN	OLSD	$900
0-5	Ellington	HAS	Extend Challenger to Brantley	OTHR	UPGR	OLSD	$55
0-5	Ellington	HAS	Horsepen Bayou Drainage Improvement	OTHR	UPGR	OLSD	$700
0-5	Ellington	HAS	Pavement Replacement at EFD (R&R)	PAVE	UPGR	OLSD	$500
0-5	Ellington	HAS	Rehab Scholl St (Aerospace to Brantley)	OTHR	UPGR	OLSD	$400
0-5	Ellington	HAS	TW Extension	PAVE	UPGR	STXY	$2,100
0-5	Ellington	HAS	West Side Access Road	PAVE	SAFE	OLSD	$5,550
0-5	Houston Southwest	TASP	Purchase & Demolish Mid-Field Hangar	OTHR	SAFE	ANAS	$300
0-5	Houston Southwest	TASP	Install Segmented Circle	AAID	STDS	ANAS	$12
0-5	Houston Southwest	TASP	Construct Apron	PAVE	CAPT	APRN	$1,780
0-5	Houston Southwest	TASP	Construct 2 Helipads	PAVE	STDS	APRN	$270
0-5	Houston Southwest	TASP	Rehabilitate FBO Apron	PAVE	PRSV	APRN	$276
0-5	Houston Southwest	TASP	Engineering Fees	OTHR	PLAN	ENGR	$318
0-5	Houston Southwest	TASP	Construct New Hangar Access TW	PAVE	CAPT	HANG	$239
0-5	Houston Southwest	TASP	Construct Perimeter Road - E & S Side	OTHR	STDS	OLSD	$380
0-5	Houston Southwest	TASP	Install Security Fencing	OTHR	SAFE	OLSD	$240
0-5	Houston Southwest	TASP	Extend RW 9	PAVE	UPGR	PRWY	$450
0-5	Houston Southwest	TASP	Rehabilitate RW 9/27	PAVE	PRSV	PRWY	$450
0-5	Houston Southwest	TASP	Improve RSA & TW OFA	OTHR	SAFE	PRWY	$57
0-5	Houston Southwest	TASP	Construct Holding Apron RW 9	PAVE	STDS	PRWY	$59
0-5	Houston Southwest	TASP	Relocate Parallel TW, Stub TW	PAVE	STDS	PTXY	$1,140
0-5	Houston Southwest	TASP	Improve TW OFA	OTHR	RECN	PTXY	$2,286
0-5	La Porte Municipal	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	$483
0-5	La Porte Municipal	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	$33
0-5	La Porte Municipal	TASP	Install Navigation Aids	AAID	STDS	PRWY	$370
0-5	La Porte Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$190
0-5	La Porte Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$419
0-5	La Porte Municipal	RASP	Install Perimeter Fencing	OTHR	SAFE	OLSD	$130†
0-5	Lone Star Executive	TASP	Runway and Taxiway Extension	OTHR	RECN	PRWY	$1,925
0-5	Lone Star Executive	TASP	Clear Trees OFZ RW 14	OTHR	UPGR	PRWY	$150

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
0-5	Lone Star Executive	TASP	Construct Holding Apron	PAVE	UPGR	PTXY	$170
0-5	Lone Star Executive	TASP	Construct Partial Parallel TW, RW 14/32	PAVE	STDS	PTXY	$1,500
0-5	Lone Star Executive	TASP	Environmental Assessment	OTHR	PLAN	AMP	$75
0-5	Lone Star Executive	TASP	Extend MIRL RW 14/32	LITE	UPGR	PRWY	$86
0-5	Lone Star Executive	TASP	Extend RW 14/32	PAVE	UPGR	PRWY	$5,633
0-5	Lone Star Executive	TASP	Install Fencing	OTHR	STDS	PRWY	$75
0-5	Lone Star Executive	TASP	Install MITL	LITE	UPGR	PTXY	$41
0-5	Lone Star Executive	TASP	Install Signage	OTHR	UPGR	PRWY	$10
0-5	Lone Star Executive	TASP	Mark RW 14/32	PAVE	UPGR	PRWY	$130
0-5	Lone Star Executive	TASP	Master Plan Update	OTHR	PLAN	AMP	$150
0-5	Lone Star Executive	TASP	MOA W/ FAA On MALSR	OTHR	PLAN	ENGR	$200
0-5	Lone Star Executive	TASP	Obstruction Evaluation	OTHR	PLAN	AMP	$150
0-5	Lone Star Executive	TASP	On-Airport Road with Security Gates	PAVE	UPGR	OLSD	$372
0-5	Lone Star Executive	TASP	Reconstruct Sections of TW A & D	PAVE	RECN	PTXY	$1,325
0-5	Lone Star Executive	TASP	Relocate Navigation Aids	AAID	UPGR	PRWY	$760
0-5	Lone Star Executive	TASP	Replace LOC, Glide Slope & MALSR	AAID	UPGR	PRWY	$2,400
0-5	Lone Star Executive	TASP	Terminate FM 1484	OTHR	STDS	OLSD	$20
0-5	Lone Star Executive	TASP	Update ALP	OTHR	PLAN	AMP	$60
0-5	Pearland Regional	TASP	Construct Perimeter Road	PAVE	UPGR	OLSD	$1,000
0-5	Pearland Regional	TASP	Construct TW and Taxilane	PAVE	CAPT	STXY	$2,441
0-5	Pearland Regional	TASP	Environmental Study South RW Extension	OTHR	PLAN	AMP	$75
0-5	Pearland Regional	TASP	Expand Apron	PAVE	CAPT	APRN	$50
0-5	Pearland Regional	TASP	Extend MIRL	LITE	STDS	PRWY	$36
0-5	Pearland Regional	TASP	Extend RW & TW	PAVE	CAPT	PRWY	$3,562
0-5	Pearland Regional	TASP	Install MITL Parallel TW 14/32	LITE	UPGR	PTXY	$237
0-5	Pearland Regional	TASP	Partial Land Reimbursement	LAND	STDS	OLSD	$860
0-5	Pearland Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$101
0-5	Pearland Regional	TASP	Rehabilitate Perimeter Road E of Creek	OTHR	PRSV	OLSD	$755
0-5	Pearland Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$6,269
0-5	Pearland Regional	TASP	Upgrade Utilities	LITE	RECN	ANAS	$50
0-5	Pearland Regional	TASP	Widen Taxilane C	PAVE	UPGR	STXY	$270
0-5	Scholes International	TASP	Construct Hangar Access TW	PAVE	UPGR	STXY	$633
0-5	Scholes International	TASP	Contingency/Admin.Fees, RPR	OTHR	PLAN	ENGR	$404
0-5	Scholes International	TASP	Drainage Improvements	OTHR	RECN	ANAS	$3,000
0-5	Scholes International	TASP	Environmental Mitigation	OTHR	PRSV	APRN	$100
0-5	Scholes International	TASP	Extend RW 31	PAVE	UPGR	PRWY	$1,867
0-5	Scholes International	TASP	Install/Replace Signage	OTHR	RECN	ANAS	$322
0-5	Scholes International	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$133
0-5	Scholes International	TASP	Rehabilitate & Mark TW A	PAVE	PRSV	PTXY	$2,021
0-5	Scholes International	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$810
0-5	Scholes International	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	$1,620
0-5	Scholes International	TASP	Relocate Localizer RW 31 End	AAID	UPGR	PRWY	$600
0-5	Scholes International	TASP	Renovate Terminal Building	BLDG	STDS	TERM	$2,400
0-5	Scholes International	TASP	Replace Navigation Aids	AAID	RECN	PRWY	$752
0-5	Scholes International	TASP	Replace PCC Slabs, Clean Joints Taxilane	PAVE	RECN	PTXY	$1,288
0-5	Scholes International	TASP	Replace TW Lights	LITE	RECN	PTXY	$447
0-5	Scholes International	TASP	Replace Windcone	AAID	RECN	ANAS	$75
0-5	Sugar Land Regional	TASP	Water and Sewer Improvements	OTHR	CAPT	OLSD	$1,560
0-5	Sugar Land Regional	TASP	Acquire 500 Gallon ARFF Vehicle	OTHR	SAFE	OLSD	$225
0-5	Sugar Land Regional	TASP	Acquire Land	LAND	STDS	PRWY	$2,072
0-5	Sugar Land Regional	TASP	Acquire RW Easement	LAND	STDS	PRWY	$1,299
0-5	Sugar Land Regional	TASP	Construct ARFF Facility	BLDG	SAFE	OLSD	$150
0-5	Sugar Land Regional	TASP	Construct ARFF Road	OTHR	SAFE	OLSD	$144
0-5	Sugar Land Regional	TASP	Construct Drainage Improvements	OTHR	RECN	HANG	$150
0-5	Sugar Land Regional	TASP	Construct General Aviation Apron	PAVE	CAPT	APRN	$6,880
0-5	Sugar Land Regional	TASP	Construct Retaining Wall & Detention Pond	OTHR	STDS	OLSD	$400
0-5	Sugar Land Regional	TASP	Construct TW	PAVE	CAPT	PTXY	$12,500
0-5	Sugar Land Regional	TASP	Install Perimeter Security Fencing	OTHR	SAFE	OLSD	$1,860
0-5	Sugar Land Regional	TASP	Contingency/Admin Fees	OTHR	PLAN	ENGR	$238
0-5	Sugar Land Regional	TASP	Drainage Improvements	OTHR	PRSV	ANAS	$4,330
0-5	Sugar Land Regional	TASP	East Terminal Vault Generator	OTHR	STDS	OLSD	$103
0-5	Sugar Land Regional	TASP	Engineering Design for HIRLs RW 17/35	OTHR	PLAN	ENGR	$3,575
0-5	Sugar Land Regional	TASP	Environmental Study	OTHR	PLAN	ENGR	$350
0-5	Sugar Land Regional	TASP	Expand Apron	PAVE	CAPT	APRN	$630

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
0-5	Sugar Land Regional	TASP	Fuel Farm Generator	OTHR	STDS	OLSD	$126
0-5	Sugar Land Regional	TASP	Install Navigation Aids	LITE	CAPT	STXY	$3,006
0-5	Sugar Land Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$124
0-5	Sugar Land Regional	TASP	Relocate Hangar No.3	OTHR	SAFE	HANG	$1,231
0-5	Sugar Land Regional	TASP	Pavement Evaluation RW 17/35, TW F,H	OTHR	PLAN	ENGR	$150
0-5	Sugar Land Regional	TASP	Rehab TW H and Apron	PAVE	PRSV	HANG	$324
0-5	Sugar Land Regional	TASP	Rehabilitate RW 17/35, TW F & H	PAVE	PRSV	PRWY	$3,000
0-5	Sugar Land Regional	TASP	Drainage Engineering Design at TW H	OTHR	PLAN	ENGR	$30
0-5	Sugar Land Regional	TASP	Relocate 3 Hangars	OTHR	SAFE	HANG	$1,100
0-5	Sugar Land Regional	TASP	Relocate Existing Parallel TW F Phase 1	PAVE	STDS	PTXY	$10,000
0-5	Sugar Land Regional	TASP	Relocate Glide Slope, Vault & Wind Sock	AAID	SAFE	ANAS	$110
0-5	Sugar Land Regional	TASP	Replace REIL RW 17/35	LITE	SAFE	ANAS	$47
0-5	Sugar Land Regional	TASP	Terminal Building Generator	BLDG	STDS	TERM	$326
0-5	Sugar Land Regional	TASP	Upgrade Air Traffic Control Tower Radios; Re-Mark RW 17/35 & TW	AAID	SAFE	ANAS	$167
0-5	Sugar Land Regional	TASP	Vegetation Establishment	OTHR	RECN	ANAS	$11
0-5	Sugar Land Regional	TASP	West Vault Generator	AAID	STDS	PRWY	$96
0-5	West Houston	TASP	Rehabilitate & Mark Apron & Access TW	PAVE	PRSV	APRN	$242
0-5	West Houston	TASP	Replace Underground Avgas Fuel Tanks	OTHR	STDS	OLSD	$90
0-5	West Houston	TASP	Overlay RW 15/33	PAVE	PRSV	PRWY	$424
0-5	West Houston	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	$29
0-5	West Houston	TASP	Overlay and Mark TW to RW 15/33	PAVE	PRSV	PTXY	$274
0-5	West Houston	TASP	Seal Joints in Concrete TW & Apron	PAVE	PRSV	PTXY	$132
0-5	Bay City Municipal	TASP	Install PAPI-2 RW 31	AAID	STDS	PRWY	$182
0-5	Bay City Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$29
0-5	Bay City Municipal	TASP	Reconstruct Existing Auto Parking	PAVE	RECN	OLSD	$56
0-5	Bay City Municipal	TASP	Rehabilitate & Mark Parallel TW	PAVE	PRSV	PTXY	$314
0-5	Bay City Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$122
0-5	Bay City Municipal	TASP	Rehabilitate Entrance Road	PAVE	PRSV	OLSD	$7
0-5	Bay City Municipal	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	$345
0-5	Bay City Municipal	RASP	Improve Instrument Approach	ILS	UPGR	ANAS	$500†
0-5	Baytown	RASP	Upgrade Parking	PAVE	UPGR	OLSD	$600
0-5	Baytown	RASP	Upgrade Fencing	OTHR	SAFE	OLSD	$70
0-5	Baytown	RASP	Acquire Clear Zones	LAND	SAFE	OLSD	$500
0-5	Baytown	RASP	Install Gateway and Signs	OTHR	SAFE	OLSD	$100
0-5	Chambers County	TASP	Acquire Land	LAND	STDS	SRWY	$150
0-5	Chambers County	TASP	Construct Turnaround RW	PAVE	STDS	PRWY	$115
0-5	Chambers County	TASP	Engineering/Design for RW Extension	OTHR	PLAN	ENGR	$140
0-5	Chambers County	TASP	Engineering/Design for Terminal Building	BLDG	PLAN	ENGR	$25
0-5	Chambers County	TASP	Erosion/Sedimentation Controls	OTHR	STDS	ANAS	$20
0-5	Chambers County	TASP	Extend Partial Parallel TW	PAVE	UPGR	PTXY	$463
0-5	Chambers County	TASP	Extend RW 12/30	PAVE	UPGR	PRWY	$455
0-5	Chambers County	TASP	Install MIRL for RW Extension	LITE	UPGR	PRWY	$105
0-5	Chambers County	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	$49
0-5	Chambers County	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$41
0-5	Chambers County	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	$532
0-5	Chambers County	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$6,330
0-5	Chambers County	TASP	Replace Rotating Beacon	AAID	RECN	ANAS	$25
0-5	Chambers County	TASP	Construct Terminal Building	BLDG	STDS	TERM	$100
0-5	Cleveland Municipal	TASP	Install Jet A Fuel System	PAVE	STDS	PRWY	$120
0-5	Cleveland Municipal	TASP	Install Security Gate and Fencing	OTHR	SAFE	OLSD	$15
0-5	Cleveland Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	$34
0-5	Cleveland Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$252
0-5	Cleveland Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	$338
0-5	Cleveland Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$736
0-5	Cleveland Municipal	RASP	Install Drainage Facilities	OTHR	UPGR	ANAS	$120†
0-5	Eagle Lake	TASP	Construct Auto Parking	PAVE	STDS	TERM	$12
0-5	Eagle Lake	TASP	Construct Entrance Road	OTHR	STDS	TERM	$77
0-5	Eagle Lake	TASP	Construct Hangar Access TW	PAVE	CAPT	HANG	$230
0-5	Eagle Lake	TASP	Construct Terminal Building Level 2	BLDG	STDS	TERM	$138
0-5	Eagle Lake	TASP	Install Perimeter Fencing	OTHR	SAFE	OLSD	$46
0-5	Eagle Lake	TASP	Install Security Lighting	LITE	SAFE	OLSD	$25
0-5	Eagle Lake	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$20
0-5	Eagle Lake	TASP	Reconstruct Apron	PAVE	PRSV	APRN	$150

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
0-5	Eagle Lake	TASP	Rehabilitate Ag Pad	PAVE	PRSV	STXY	$115
0-5	Eagle Lake	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$30
0-5	Eagle Lake	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	$208
0-5	Eagle Lake	RASP	Add Self-Serve Fuel System	OTHR	UPGR	OLSD	$100
0-5	Eagle Lake	RASP	Install AWOS	AWOS	CAPT	ANAS	$90†
0-5	Eagle Lake	RASP	Install WAAS Approach	WAAS	CAPT	ANAS	$10†
0-5	Houston Executive	RASP	Construct Terminal Building	BLDG	UPGR	TERM	$4,000
0-5	Houston Executive	RASP	Construct Corporate Hangar	BLDG	CAPT	HANG	$2,000
0-5	Houston Executive	RASP	Construct two 10-unit T-Hangars	BLDG	CAPT	HANG	$1,000
0-5	Houston Executive	RASP	Extend TW to Hangars	PAVE	CAPT	STXY	$250†
0-5	Huntsville Municipal	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	$61
0-5	Huntsville Municipal	TASP	Install Security Fencing at Terminal, Gates	OTHR	SAFE	OLSD	$150
0-5	Huntsville Municipal	TASP	Install MALSR Runway 18	AAID	SAFE	PRWY	$350
0-5	Huntsville Municipal	TASP	Expand Apron	PAVE	CAPT	APRN	$432
0-5	Huntsville Municipal	TASP	Improve Drainage along TW & RW	PAVE	RECN	PRWY	$65
0-5	Huntsville Municipal	TASP	Mark RW 18/36	PAVE	PRSV	PRWY	$34
0-5	Huntsville Municipal	TASP	Reconstruct Auto Parking	OTHR	RECN	OLSD	$26
0-5	Huntsville Municipal	TASP	Rehabilitate Parallel and Cross TW	PAVE	PRSV	PTXY	$410
0-5	Huntsville Municipal	TASP	Rehabilitate RW 18/36	PAVE	PRSV	PRWY	$450
0-5	Huntsville Municipal	TASP	Remodel/Expand Terminal Building	BLDG	RECN	TERM	$250
0-5	Huntsville Municipal	RASP	Acquire Clear Zones	LAND	SAFE	PRWY	$150†
0-5	Liberty Municipal	TASP	Add Drainage Improvements	OTHR	RECN	ANAS	$250
0-5	Liberty Municipal	TASP	Construct 10 Unit T-Hangar	BLDG	UPGR	HANG	$400
0-5	Liberty Municipal	TASP	Build East Hangar Access TW, Pavement	PAVE	UPGR	APRN	$240
0-5	Liberty Municipal	TASP	Construct Small Public Terminal Building	BLDG	STDS	TERM	$20
0-5	Liberty Municipal	TASP	Extend Utilities to East Side Public Facility	OTHR	UPGR	TERM	$5
0-5	Liberty Municipal	TASP	Install Fencing	OTHR	RECN	OLSD	$200
0-5	Liberty Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	$25
0-5	Liberty Municipal	TASP	Reconstruct West Apron West Side	PAVE	PRSV	APRN	$38
0-5	Liberty Municipal	TASP	Rehabilitate, Mark Parallel and Cross TW	PAVE	PRSV	PTXY	$201
0-5	Liberty Municipal	TASP	Rehabilitate Aprons	PAVE	PRSV	APRN	$109
0-5	Liberty Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	$240
0-5	Liberty Municipal	TASP	Relocate Electrical Vault	LITE	PRSV	OLSD	$15
0-5	Liberty Municipal	TASP	Relocate Fuel Farm to East Side of Airport	OTHR	UPGR	APRN	$2
0-5	Liberty Municipal	TASP	Replace Rotating Beacon	AAID	RECN	OLSD	$30
0-5	Liberty Municipal	TASP	Terminal Plan Update	OTHR	PLAN	AMP	$40
0-5	Liberty Municipal	TASP	Upgrade Signage	OTHR	STDS	PRWY	$7
0-5	Liberty Municipal	RASP	Repair Base Failure, North End of Runway	PAVE	UPGR	PRWY	$30†
0-5	Palacios Municipal	TASP	Airfield Drainage System Repairs	OTHR	RECN	ANAS	$250
0-5	Palacios Municipal	TASP	Electrical Improvements	OTHR	PRSV	OLSD	$240
0-5	Palacios Municipal	TASP	Install Apron Lighting	LITE	SAFE	APRN	$20
0-5	Palacios Municipal	TASP	Install Navigation Aids	AAID	STDS	PRWY	$1,191
0-5	Palacios Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$58
0-5	Palacios Municipal	TASP	Mark TW	PAVE	PRSV	PTXY	$7
0-5	Palacios Municipal	TASP	Pavement Improvements	OTHR	CAPT	ANAS	$159
0-5	Palacios Municipal	TASP	Reconstruct Existing Auto Parking	PAVE	RECN	TERM	$23
0-5	Palacios Municipal	TASP	Drainage Improvements RW 17/35	OTHR	RECN	SRWY	$200
0-5	Palacios Municipal	TASP	Replace Damaged Concrete on RW 13/31	PAVE	RECN	PRWY	$285
0-5	Palacios Municipal	TASP	Seal PCC Joints on RW 17/35	PAVE	PRSV	OLSD	$726
0-5	Palacios Municipal	TASP	Slab Repairs	PAVE	RECN	ANAS	$100
0-5	Palacios Municipal	RASP	Update Terminal Building	BLDG	UPGR	TERM	$250
0-5	Robert R. Wells, Jr.	TASP	Airport Development Plan	OTHR	PLAN	AMP	$80
0-5	Robert R. Wells, Jr.	TASP	Build Terminal Building Level 2	BLDG	STDS	TERM	$56
0-5	Robert R. Wells, Jr.	TASP	Construct Auto Parking	PAVE	CAPT	OLSD	$15
0-5	Robert R. Wells, Jr.	TASP	Construct Hangar Access TW	PAVE	CAPT	HANG	$125
0-5	Robert R. Wells, Jr.	TASP	Install TW Centerline or Edge Reflectors	LITE	SAFE	PTXY	$122
0-5	Robert R. Wells, Jr.	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	$8
0-5	Robert R. Wells, Jr.	TASP	Reconstruct Apron	PAVE	RECN	APRN	$56
0-5	Robert R. Wells, Jr.	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$15
0-5	Robert R. Wells, Jr.	TASP	Rehabilitate Partial Parallel TW	PAVE	PRSV	PTXY	$79
0-5	Robert R. Wells, Jr.	TASP	Rehabilitate RW 15/33	PAVE	PRSV	PRWY	$205
0-5	Robert R. Wells, Jr.	RASP	Relocate Beacon	AAID	SAFE	ANAS	$25†
0-5	Robert R. Wells, Jr.	RASP	Install Fencing	OTHR	SAFE	OLSD	$30
0-5	Robert R. Wells, Jr.	RASP	Reroute Road	PAVE	UPGR	OLSD	$140

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
0-5	Robert R. Wells, Jr.	RASP	Install Weather Reporting Station	AWOS	UPGR	ANAS	$90
0-5	Robert R. Wells, Jr.	RASP	Add Hangars	BLDG	CAPT	HANG	$360
0-5	Wharton Regional	TASP	Construct TW	PAVE	CAPT	PTXY	$340
0-5	Wharton Regional	TASP	Expand Apron	PAVE	CAPT	APRN	$334
0-5	Wharton Regional	TASP	Expand T-Hangar Auto Parking	PAVE	CAPT	HANG	$290
0-5	Wharton Regional	TASP	Install TW Reflectors	LITE	STDS	PTXY	$3
0-5	Wharton Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	$31
0-5	Wharton Regional	TASP	Reconstruct & Realign Entrance Road	PAVE	RECN	OLSD	$136
0-5	Wharton Regional	TASP	Rehabilitate Apron	PAVE	PRSV	PTXY	$72
0-5	Wharton Regional	TASP	Rehabilitate Parallel & Cross TW	PAVE	UPGR	PTXY	$129
0-5	Wharton Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	$164
0-5	Wharton Regional	TASP	Replace PLASI with PAPI-4 RW 32	AAID	STDS	ANAS	$363
0-5	Wharton Regional	TASP	Upgrade Drainage System	OTHR	UPGR	ANAS	$400
0-5	North Houston Business	RASP	Add Ramp Space	PAVE	CAPT	APRN	$10
0-5	North Houston Business	RASP	Install PAPI and Runway Lighting	AAID	UPGR	PRWY	$90†
0-5	North Houston Business	RASP	Replace Rotating Beacon	AAID	UPGR	PRWY	$30†
0-5	North Houston Business	RASP	Install AWOS or ASOS	AWOS	UPGR	ANAS	$90
0-5	North Houston Business	RASP	Expand Fuel Farm	OTHR	UPGR	OLSD	$30
0-5	North Houston Business	RASP	Install Security Fencing	OTHR	SAFE	OLSD	$130
0-5	Winnie-Stowell	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$27
0-5	Winnie-Stowell	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	$100
0-5	Winnie-Stowell	TASP	Install PAPI-2 RW 35	AAID	STDS	PRWY	$91
0-5	Winnie-Stowell	TASP	Rehabilitate TW	PAVE	PRSV	STXY	$60
0-5	Winnie-Stowell	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$45
0-5	Winnie-Stowell	RASP	Install Runway Lighting	AAID	UPGR	PRWY	$50†
0-5	Winnie-Stowell	RASP	Install Signs	OTHR	UPGR	OLSD	$10
Mid-Term Projects (2016-2020)							
6-10	George Bush Intercontinental	HAS	ASC Renovation	BLDG	UPGR	OLSD	$12,185
6-10	George Bush Intercontinental	HAS	New HPD Facility	BLDG	UPGR	OLSD	$9,058
6-10	George Bush Intercontinental	HAS	Relocate Kenswick Ditch/Holding Pond	OTHR	PRSV	OLSD	$5,500
6-10	George Bush Intercontinental	HAS	Construct GSE in New IAH Cargo Facility	BLDG	UPGR	OLSD	$500
6-10	George Bush Intercontinental	HAS	JFK, Will Clayton, Greens Road Drainage	OTHR	PRSV	OLSD	$15,810
6-10	George Bush Intercontinental	HAS	Land Acquisition	LAND	CAPT	OLSD	$99,185
6-10	George Bush Intercontinental	HAS	Roadway Rehab - Manholes, Utilities	PAVE	UPGR	OLSD	$13,000
6-10	George Bush Intercontinental	HAS	Parking Canopy for City Economy Lot	OTHR	UPGR	OLSD	$2,010
6-10	George Bush Intercontinental	HAS	Pier Improvements To Terminal A	BLDG	PRSV	TERM	$6,600
6-10	George Bush Intercontinental	HAS	Terminal B Expansion	BLDG	CAPT	TERM	$383,371
6-10	George Bush Intercontinental	HAS	Consolidated Communication Center	BLDG	UPGR	OLSD	$6,000
6-10	George Bush Intercontinental	HAS	New IAH Runway, ARFF Per Master Plan	PAVE	CAPT	PRWY	$169,000
6-10	George Bush Intercontinental	HAS	Perimeter Security Intrusion Detection	OTHR	SAFE	OLSD	$4,680
6-10	George Bush Intercontinental	HAS	Remote Security Screening	OTHR	SAFE	OLSD	$4,000
6-10	George Bush Intercontinental	HAS	Future Fuel Farm Expansion	OTHR	UPGR	OLSD	$18,000
6-10	George Bush Intercontinental	HAS	Upgrade Lift Station, Pumps, Generators	OTHR	UPGR	OLSD	$4,662
6-10	George Bush Intercontinental	HAS	HAS Training Academy	BLDG	UPGR	OLSD	$7,000
6-10	George Bush Intercontinental	HAS	Inter-Terminal Train	OTHR	CAPT	OLSD	$29,710
6-10	George Bush Intercontinental	HAS	Pavement Replacement at IAH (R&R)	PAVE	UPGR	APRN	$1,200
6-10	George Bush Intercontinental	HAS	New GT Staging Area	OTHR	UPGR	OLSD	$2,700
6-10	George Bush Intercontinental	HAS	Taxiway NA	PAVE	UPGR	STXY	$14,400
6-10	George Bush Intercontinental	HAS	Pier Improvements To Terminal A	BLDG	PRSV	TERM	$64,400
6-10	George Bush Intercontinental	HAS	Terminal D Rehab	BLDG	UPGR	TERM	$111,632
6-10	William P. Hobby	HAS	Land Acquisition for Hobby Expansion	LAND	CAPT	OLSD	$1,150
6-10	William P. Hobby	HAS	Modify North Vault & Misc Electrical	AAID	UPGR	ANAS	$11,750
6-10	William P. Hobby	HAS	Temporary FIS at Hobby	BLDG	UPGR	OLSD	$4,500
6-10	William P. Hobby	HAS	Hobby Drainage - FEMA	OTHR	PRSV	OLSD	$3,150
6-10	William P. Hobby	HAS	Remove Phone/Utility Poles	OTHR	STDS	OLSD	$687
6-10	William P. Hobby	HAS	Pavement Replacement at HOU (R&R)	PAVE	UPGR	OLSD	$550
6-10	William P. Hobby	HAS	Relocation of Tenants	OTHR	CAPT	OLSD	$150,000
6-10	William P. Hobby	HAS	Master Plan Runway Implementation	PAVE	CAPT	PRWY	$175,000
6-10	William P. Hobby	HAS	Runway 4-22 Reconstruction	PAVE	UPGR	PRWY	$35,000
6-10	Texas Gulf Coast Regional	TASP	Rehabilitate T-Hangar Access TW	PAVE	PRSV	HANG	$25
6-10	Texas Gulf Coast Regional	TASP	Construct T-Hangar Access TW	PAVE	PRSV	HANG	$335
6-10	Texas Gulf Coast Regional	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	$12
6-10	Texas Gulf Coast Regional	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	$630
6-10	Texas Gulf Coast Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$97

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
6-10	Texas Gulf Coast Regional	TASP	Acquire Land	LAND	CAPT	APRN	$465
6-10	Texas Gulf Coast Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$600
6-10	Texas Gulf Coast Regional	RASP	Construct Drainage Facilities	OTHR	UPGR	ANAS	$200†
6-10	D.W. Hooks Memorial	TASP	Rehabilitate RW 17R/35L	PAVE	PRSV	PRWY	$756
6-10	D.W. Hooks Memorial	TASP	Mark RW 17R/35L	PAVE	PRSV	PRWY	$46
6-10	D.W. Hooks Memorial	TASP	Install MITL to New TW for RW 17R/35L	LITE	UPGR	PTXY	$113
6-10	D.W. Hooks Memorial	TASP	Rehab Partial Parallel TW RW 17R/35L	PAVE	PRSV	PTXY	$151
6-10	D.W. Hooks Memorial	TASP	Construct New Parallel TW to RW 17R/35L	PAVE	STDS	PTXY	$445
6-10	D.W. Hooks Memorial	TASP	Rehabilitate TW and Apron	PAVE	PRSV	STXY	$4,051
6-10	D.W. Hooks Memorial	RASP	Straighten and Extend Runway 17L/35R	PAVE	CAPT	PRWY	$3,000†
6-10	D.W. Hooks Memorial	RASP	Reconstruct Runway 17R/35L End	PAVE	UPGR	PRWY	$720†
6-10	D.W. Hooks Memorial	RASP	Expand Auto Parking	PAVE	CAPT	OLSD	$240
6-10	D.W. Hooks Memorial	RASP	Rehabilitate Terminal Buildings	BLDG	STDS	TERM	$500
6-10	D.W. Hooks Memorial	RASP	Construct Access Road	PAVE	CAPT	OLSD	$100†
6-10	D.W. Hooks Memorial	RASP	Add Hangars	BLDG	CAPT	HANG	$4,800
6-10	D.W. Hooks Memorial	RASP	Construct Apron	PAVE	CAPT	APRN	$1,230†
6-10	Ellington	HAS	Runway 17L/35R Rehab	PAVE	PRSV	PRWY	$1,319
6-10	Ellington	HAS	Extend Challenger To Brantley	PAVE	UPGR	OLSD	$491
6-10	Ellington	HAS	Construction of Ellington Bypass	PAVE	UPGR	OLSD	$5,100
6-10	Ellington	HAS	New Electrical Vault at AOA	AAID	UPGR	ANAS	$2,750
6-10	Ellington	HAS	Grass Island Paving (Business Deal)	PAVE	PRSV	OLSD	$7,000
6-10	Ellington	HAS	Horsepen Bayou Drainage Improvement	OTHR	PRSV	OLSD	$6,300
6-10	Ellington	HAS	Pavement Replacement at EFD (R&R)	PAVE	UPGR	APRN	$250
6-10	Houston Southwest	TASP	Construct ATCT	BLDG	SAFE	ANAS	$2,000
6-10	Houston Southwest	TASP	Construct Apron	PAVE	UPGR	APRN	$2,660
6-10	Houston Southwest	TASP	Engineering/Architectural Fees	BLDG	PLAN	ENGR	$150
6-10	Houston Southwest	TASP	Extend RW & TW 27 End	PAVE	UPGR	PRWY	$2,250
6-10	Houston Southwest	TASP	Rehabilitate RW 9/27	PAVE	PRSV	PRWY	$450
6-10	Houston Southwest	TASP	Mark RW 9/27	PAVE	PRSV	PRWY	$44
6-10	Houston Southwest	TASP	Construct Parallel TW	PAVE	UPGR	PTXY	$3,040
6-10	Houston Southwest	TASP	Rehabilitate & Mark TW	PAVE	PRSV	STXY	$315
6-10	Houston Southwest	TASP	Construct Terminal Building	BLDG	UPGR	TERM	$1,050
6-10	La Porte Municipal	TASP	Build Terminal Building Level 2	BLDG	STDS	TERM	$99
6-10	La Porte Municipal	TASP	Construct Auto Parking for South Apron	PAVE	CAPT	OLSD	$7
6-10	La Porte Municipal	TASP	Expand Apron	PAVE	CAPT	APRN	$385
6-10	La Porte Municipal	TASP	Expand Terminal Auto Parking	PAVE	CAPT	TERM	$18
6-10	La Porte Municipal	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	$33
6-10	La Porte Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$367
6-10	La Porte Municipal	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	$483
6-10	La Porte Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$460
6-10	Lone Star Executive	TASP	Acquire Land RPZ RW 14/32 Extension	LAND	UPGR	PRWY	$625
6-10	Lone Star Executive	TASP	Clearing & Grubbing	OTHR	RECN	OLSD	$89
6-10	Lone Star Executive	TASP	Construct Road	PAVE	CAPT	OLSD	$229
6-10	Lone Star Executive	TASP	TW A, G - Parallel TW to RW 14/32	PAVE	UPGR	PTXY	$2,000
6-10	Lone Star Executive	TASP	Mark RW 1/19	PAVE	PRSV	SRWY	$4
6-10	Lone Star Executive	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$509
6-10	Lone Star Executive	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	$1,463
6-10	Lone Star Executive	TASP	Relocate Localizer, DME and VASI	AAID	UPGR	PRWY	$160
6-10	Lone Star Executive	TASP	TW Improvements	PAVE	PRSV	STXY	$2,472
6-10	Lone Star Executive	RASP	Extend Taxiway along Runway 14/32	PAVE	CAPT	STXY	$3,000†
6-10	Pearland Regional	TASP	Expand Apron	PAVE	CAPT	APRN	$260
6-10	Pearland Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$102
6-10	Pearland Regional	TASP	Construct Hangar Access TW	PAVE	CAPT	HANG	$260
6-10	Pearland Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	$32
6-10	Pearland Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	$338
6-10	Pearland Regional	TASP	Install PAPI-4 RW 14/32	AAID	STDS	PRWY	$727
6-10	Pearland Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$2,772
6-10	Pearland Regional	RASP	Add Hangars	BLDG	CAPT	HANG	$2,060
6-10	Pearland Regional	RASP	Construct Apron	PAVE	CAPT	APRN	$510†
6-10	Scholes International	TASP	Construct South Hangar Apron	PAVE	CAPT	APRN	$938
6-10	Scholes International	TASP	Drainage Improvements	OTHR	RECN	ANAS	$3,000
6-10	Scholes International	TASP	Expand Main Apron Westward	PAVE	CAPT	APRN	$933
6-10	Scholes International	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$133
6-10	Scholes International	TASP	Rehabilitate & Mark TW A	PAVE	PRSV	PTXY	$274

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
6-10	Scholes International	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$810
6-10	Scholes International	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	$1,620
6-10	Scholes International	RASP	Add Hangars	BLDG	CAPT	HANG	$1,440
6-10	Scholes International	RASP	Construct Apron	PAVE	CAPT	APRN	$180†
6-10	Sugar Land Regional	TASP	Acquire Land, West Side	LAND	CAPT	OLSD	$1,110
6-10	Sugar Land Regional	TASP	Construct Access Road and Auto Parking	PAVE	CAPT	OLSD	$309
6-10	Sugar Land Regional	TASP	Construct GA Apron, West Side	PAVE	CAPT	APRN	$1,144
6-10	Sugar Land Regional	TASP	Construct GA Terminal Building	BLDG	STDS	TERM	$296
6-10	Sugar Land Regional	TASP	Construct Service Road, West Side	PAVE	CAPT	OLSD	$0
6-10	Sugar Land Regional	TASP	Construct TW	PAVE	CAPT	PTXY	$4,133
6-10	Sugar Land Regional	TASP	Construct West-Side Access Road	OTHR	SAFE	OLSD	$770
6-10	Sugar Land Regional	TASP	Expand Commuter Terminal Building	BLDG	CAPT	TERM	$197
6-10	Sugar Land Regional	TASP	Expand Utilities	OTHR	CAPT	OLSD	$625
6-10	Sugar Land Regional	TASP	Install Navigation Aids	AAID	STDS	PRWY	$852
6-10	Sugar Land Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$107
6-10	Sugar Land Regional	TASP	Rehabilitate Apron and TW	PAVE	PRSV	APRN	$537
6-10	Sugar Land Regional	TASP	Rehabilitate Hangar Apron	PAVE	PRSV	HANG	$50
6-10	Sugar Land Regional	TASP	Relocate Hangars 18 - 25	BLDG	SAFE	HANG	$126
6-10	Sugar Land Regional	RASP	Build New Parallel Taxiway	PAVE	CAPT	STXY	$2,000†
6-10	Sugar Land Regional	RASP	Add Hangars	BLDG	CAPT	HANG	$2,990
6-10	West Houston	TASP	Replace Underground Jet Fuel Tanks	OTHR	STDS	ANAS	$100
6-10	West Houston	TASP	Rehabilitate & Mark Apron & TW	PAVE	PRSV	APRN	$1,075
6-10	West Houston	TASP	Rehabilitate RW 15/33	PAVE	PRSV	PRWY	$270
6-10	West Houston	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	$29
6-10	West Houston	TASP	Rehabilitate TW To RW 15/33	PAVE	PRSV	PTXY	$173
6-10	West Houston	RASP	Expand Apron	PAVE	CAPT	APRN	$340†
6-10	Bay City Municipal	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	$30
6-10	Bay City Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$29
6-10	Bay City Municipal	TASP	Rehabilitate & Mark Parallel TW	PAVE	PRSV	PTXY	$293
6-10	Bay City Municipal	TASP	Rehabilitate Center Apron	PAVE	PRSV	APRN	$122
6-10	Bay City Municipal	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	$345
6-10	Bay City Municipal	RASP	Construct New Terminal	BLDG	UPGR	TERM	$500
6-10	Baytown	RASP	Extend Runway	PAVE	CAPT	PRWY	$1,000
6-10	Baytown	RASP	Extend Taxiway	PAVE	UPGR	STXY	$1,000
6-10	Baytown	RASP	Rehabilitate and Restripe Runway	PAVE	UPGR	PRWY	$500
6-10	Chambers County	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$41
6-10	Chambers County	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	$24
6-10	Chambers County	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	$200
6-10	Chambers County	TASP	Install REIL RW 12/30	LITE	STDS	PRWY	$207
6-10	Chambers County	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$175
6-10	Chambers County	RASP	Assess Wetland Issues	OTHR	PRSV	APRN	$70†
6-10	Chambers County	RASP	Add Hangars	BLDG	CAPT	HANG	$310
6-10	Cleveland Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$126
6-10	Cleveland Municipal	TASP	Expand Apron	PAVE	CAPT	APRN	$260
6-10	Cleveland Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	$37
6-10	Cleveland Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	$346
6-10	Cleveland Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	$172
6-10	Cleveland Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	$470
6-10	Eagle Lake	TASP	Construct Partial Parallel TW	PAVE	CAPT	PTXY	$142
6-10	Eagle Lake	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$21
6-10	Eagle Lake	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$58
6-10	Eagle Lake	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	$213
6-10	Eagle Lake	TASP	Rehabilitate Stub TW	PAVE	PRSV	STXY	$15
6-10	Eagle Lake	RASP	Extend and Widen Runway	PAVE	CAPT	PRWY	$900†
6-10	Eagle Lake	RASP	Manage Bird Impacts	OTHR	PRSV	PRWY	$10†
6-10	Eagle Lake	RASP	Acquire Land	LAND	UPGR	PRWY	$1,500
6-10	Houston Executive	RASP	Extend RW 18-36 and TW 1,200 ft	PAVE	CAPT	PRWY	$3,800†
6-10	Houston Executive	RASP	Install RW Centerline MALSR Lighting	AAID	SAFE	PRWY	$450†
6-10	Houston Executive	RASP	Construct Mixed Use Hangar	BLDG	CAPT	HANG	$2,800
6-10	Houston Executive	RASP	Construct T-Hangar	BLDG	CAPT	HANG	$500
6-10	Huntsville Municipal	TASP	Mark RW 18/36	PAVE	PRSV	PRWY	$34
6-10	Huntsville Municipal	TASP	Rehabilitate RW 18/36	PAVE	PRSV	PRWY	$450
6-10	Huntsville Municipal	TASP	Rehabilitate & Mark Parallel TW 18/36	PAVE	PRSV	PTXY	$216
6-10	Huntsville Municipal	RASP	Extend Taxiway	PAVE	UPGR	STXY	$1,000†

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
6-10	Huntsville Municipal	RASP	Extend Runway	PAVE	CAPT	PRWY	$2,250†
6-10	Liberty Municipal	TASP	Install Jet A Fuel System	OTHR	STDS	ANAS	$100
6-10	Liberty Municipal	TASP	Construct Auto Parking	OTHR	STDS	OLSD	$15
6-10	Liberty Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	$29
6-10	Liberty Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	$257
6-10	Liberty Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	$174
6-10	Liberty Municipal	TASP	Rehabilitate Aprons	PAVE	PRSV	APRN	$81
6-10	Liberty Municipal	RASP	Extend Runway	PAVE	CAPT	PRWY	$1,130†
6-10	Palacios Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$58
6-10	Palacios Municipal	TASP	Mark TW	PAVE	PRSV	STXY	$7
6-10	Palacios Municipal	TASP	Seal Joints	PAVE	PRSV	PRWY	$1,079
6-10	Palacios Municipal	RASP	Build New Access Roads	PAVE	UPGR	OLSD	$330†
6-10	Palacios Municipal	RASP	Build Parking	PAVE	CAPT	OLSD	$50
6-10	Palacios Municipal	RASP	Manage Bird Impacts	OTHR	PRSV	ANAS	$10†
6-10	Palacios Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	$220
6-10	Robert R. Wells, Jr.	TASP	Rehabilitate Partial Parallel TW	PAVE	PRSV	PTXY	$98
6-10	Robert R. Wells, Jr.	RASP	Extend Runway	PAVE	CAPT	PRWY	$910
6-10	Robert R. Wells, Jr.	RASP	Assess Environmental Impact on a Creek	OTHR	PRSV	OLSD	$70
6-10	Robert R. Wells, Jr.	RASP	Instrument Approach Procedures ILS/GPS	ILS	UPGR	PRWY	$250
6-10	Wharton Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	$27
6-10	Wharton Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$164
6-10	Wharton Regional	TASP	Rehabilitate Parallel & Cross TW	PAVE	PRSV	PTXY	$250
6-10	Wharton Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	$338
6-10	Wharton Regional	TASP	Update Airport Master Plan	OTHR	PLAN	AMP	$150
6-10	Wharton Regional	RASP	Build New Terminal Building	BLDG	UPGR	TERM	$250
6-10	Wharton Regional	RASP	Extend Runway	PAVE	CAPT	PRWY	$670†
6-10	Wharton Regional	RASP	Extend Taxiway	PAVE	UPGR	STXY	$220
6-10	North Houston Business	RASP	Build Terminal Building	BLDG	UPGR	TERM	$250
6-10	North Houston Business	RASP	Acquire Land	LAND	CAPT	PRWY	$200
6-10	North Houston Business	RASP	Resurface and Widen Taxiway	PAVE	UPGR	STXY	$20
6-10	North Houston Business	RASP	Add Auto Parking	PAVE	CAPT	OLSD	$30
6-10	North Houston Business	RASP	Install Drainage Facilities	OTHR	UPGR	OLSD	$120
6-10	Winnie-Stowell	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$89
6-10	Winnie-Stowell	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	$243
6-10	Winnie-Stowell	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$30
6-10	Winnie-Stowell	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$151
6-10	Winnie-Stowell	RASP	Assess Wetlands Issues	OTHR	PRSV	OLSD	$70†
6-10	Winnie-Stowell	RASP	Extend Runway	PAVE	CAPT	PRWY	$1,170†
6-10	Winnie-Stowell	RASP	Extend Taxiway	PAVE	UPGR	STXY	$600†
6-10	Winnie-Stowell	RASP	Add Terminal Building	BLDG	UPGR	TERM	$150
Long-Term Projects (2021-2030)							
11-20	Texas Gulf Coast Regional	TASP	Seal All Asphalt Pavement and Re-Mark	PAVE	PRSV	APRN	$1,488
11-20	Texas Gulf Coast Regional	TASP	Expand Corporate Apron	PAVE	CAPT	APRN	$470
11-20	Texas Gulf Coast Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$400
11-20	Texas Gulf Coast Regional	TASP	Construct Corporate Access Road	PAVE	CAPT	OLSD	$72
11-20	Texas Gulf Coast Regional	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	$12
11-20	Texas Gulf Coast Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$97
11-20	Texas Gulf Coast Regional	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	$630
11-20	Texas Gulf Coast Regional	TASP	Rehabilitate Parallel TW	PAVE	PRSV	PTXY	$450
11-20	Texas Gulf Coast Regional	TASP	Rehabilitate T-Hangar Access TW	PAVE	PRSV	HANG	$202
11-20	Texas Gulf Coast Regional	RASP	Construct Terminal Buildings	BLDG	UPGR	TERM	$500
11-20	Texas Gulf Coast Regional	RASP	Add Hangars	BLDG	CAPT	HANG	$1,100
11-20	Texas Gulf Coast Regional	RASP	Construct Apron	PAVE	CAPT	APRN	$340†
11-20	D.W. Hooks Memorial	TASP	Rehabilitate RW 17R/35L	PAVE	PRSV	PRWY	$756
11-20	D.W. Hooks Memorial	TASP	Mark RW 17R/35L	PAVE	PRSV	PRWY	$46
11-20	D.W. Hooks Memorial	TASP	Rehabilitate Parallel TW for RW 17R/35L	PAVE	PRSV	PTXY	$220
11-20	D.W. Hooks Memorial	TASP	Rehabilitate TW & Apron	PAVE	PRSV	STXY	$4,051
11-20	Houston Southwest	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$284
11-20	Houston Southwest	TASP	Rehabilitate RW 9/27	PAVE	PRSV	PRWY	$450
11-20	Houston Southwest	TASP	Mark RW 9/27	PAVE	PRSV	PRWY	$44
11-20	Houston Southwest	TASP	Rehabilitate and Mark TW	PAVE	PRSV	STXY	$648
11-20	Houston Southwest	RASP	Add Hangars	BLDG	CAPT	HANG	$4,400
11-20	La Porte Municipal	TASP	Construct NW T-Hanger TW	PAVE	CAPT	HANG	$120
11-20	La Porte Municipal	TASP	Expand Auto Parking	PAVE	CAPT	TERM	$34

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
11-20	La Porte Municipal	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	$33
11-20	La Porte Municipal	TASP	Overlay RW 12/30	PAVE	PRSV	PRWY	$1,522
11-20	La Porte Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$367
11-20	La Porte Municipal	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$460
11-20	La Porte Municipal	RASP	Add Hangars	BLDG	SAFE	HANG	$1,240
11-20	La Porte Municipal	RASP	Construct Apron	PAVE	CAPT	APRN	$190†
11-20	Lone Star Executive	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	$116
11-20	Lone Star Executive	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$408
11-20	Lone Star Executive	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	$1,422
11-20	Lone Star Executive	TASP	TW Improvements	PAVE	PRSV	STXY	$2,526
11-20	Lone Star Executive	RASP	Add Hangars	BLDG	CAPT	HANG	$2,620
11-20	Lone Star Executive	RASP	Construct Apron	PAVE	CAPT	APRN	$400†
11-20	Lone Star Executive	RASP	Extend Runway	PAVE	CAPT	PRWY	$3,000†
11-20	Pearland Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$143
11-20	Pearland Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	$32
11-20	Pearland Regional	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	$338
11-20	Pearland Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$2,812
11-20	Pearland Regional	RASP	Construct Terminal Buildings	BLDG	STDS	TERM	$500
11-20	Pearland Regional	RASP	Extend Runway	PAVE	CAPT	PRWY	$880†
11-20	Scholes International	TASP	Relocate MALSR RW 13	AAID	SAFE	PRWY	$750
11-20	Scholes International	TASP	Construct Apron	PAVE	CAPT	APRN	$2,000
11-20	Scholes International	TASP	Construct TW	PAVE	STDS	PTXY	$9,867
11-20	Scholes International	TASP	Expand North Hangar Apron	PAVE	CAPT	APRN	$960
11-20	Scholes International	TASP	Extend RW 13	PAVE	UPGR	PRWY	$1,067
11-20	Scholes International	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$133
11-20	Scholes International	TASP	Rehabilitate & Mark TW A	PAVE	PRSV	PTXY	$274
11-20	Scholes International	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$810
11-20	Scholes International	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	$1,620
11-20	Sugar Land Regional	TASP	Remove T-Hangars 16, 17	BLDG	SAFE	HANG	$70
11-20	Sugar Land Regional	TASP	Expand Terminal	BLDG	CAPT	TERM	$562
11-20	Sugar Land Regional	TASP	Install Fuel Storage Tank	OTHR	CAPT	ANAS	$90
11-20	Sugar Land Regional	TASP	Install Security Fence	OTHR	SAFE	OLSD	$320
11-20	Sugar Land Regional	TASP	Construct Apron	PAVE	CAPT	APRN	$849
11-20	Sugar Land Regional	TASP	Rehabilitate Apron and TW	PAVE	PRSV	APRN	$368
11-20	Sugar Land Regional	TASP	Rehabilitate General Aviation Apron	PAVE	PRSV	APRN	$273
11-20	Sugar Land Regional	TASP	Construct T-Hangar Taxilanes	PAVE	CAPT	HANG	$288
11-20	Sugar Land Regional	TASP	Rehabilitate Hangar Apron	PAVE	PRSV	HANG	$50
11-20	Sugar Land Regional	TASP	Construct GA Access Road & Auto Parking	PAVE	CAPT	OLSD	$618
11-20	Sugar Land Regional	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$107
11-20	Sugar Land Regional	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$601
11-20	Sugar Land Regional	TASP	Construct TW	PAVE	CAPT	STXY	$1,573
11-20	West Houston	TASP	Seal Joints in Concrete Apron	PAVE	PRSV	APRN	$36
11-20	West Houston	TASP	Mark RW 15/33	PAVE	PRSV	PRWY	$29
11-20	West Houston	TASP	Rehabilitate RW 15/33	PAVE	PRSV	PRWY	$270
11-20	West Houston	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$1,102
11-20	Bay City Municipal	TASP	Rehabilitate Center Apron	PAVE	PRSV	APRN	$122
11-20	Bay City Municipal	TASP	Construct Holding Apron	PAVE	CAPT	APRN	$156
11-20	Bay City Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$29
11-20	Bay City Municipal	TASP	Rehabilitate RW 13/31	PAVE	PRSV	PRWY	$345
11-20	Bay City Municipal	TASP	Rehabilitate & Mark Parallel/Stub TW	PAVE	PRSV	PTXY	$299
11-20	Bay City Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	$1,650
11-20	Bay City Municipal	RASP	Acquire Land and Extend Runway	LAND	CAPT	PRWY	$1,530†
11-20	Bay City Municipal	RASP	Construct Apron	PAVE	CAPT	APRN	$100†
11-20	Baytown	RASP	Add Hangars	BLDG	CAPT	HANG	$580
11-20	Baytown	RASP	Construct Apron	PAVE	CAPT	APRN	$50
11-20	Chambers County	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$41
11-20	Chambers County	TASP	Mark RW 12/30	PAVE	PRSV	PRWY	$24
11-20	Chambers County	TASP	Rehabilitate RW 12/30	PAVE	PRSV	PRWY	$200
11-20	Chambers County	TASP	Rehabilitate TW	PAVE	PRSV	STXY	$116
11-20	Cleveland Municipal	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$167
11-20	Cleveland Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	$346
11-20	Cleveland Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	$37
11-20	Cleveland Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	$172
11-20	Eagle Lake	TASP	Construct Partial Parallel TW	PAVE	SAFE	PTXY	$78

Priority	Airport	Source	Project Description	Type	Objective	Item	Cost ($000)
11-20	Eagle Lake	TASP	Expand Apron	PAVE	CAPT	APRN	$130
11-20	Eagle Lake	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$21
11-20	Eagle Lake	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$58
11-20	Eagle Lake	TASP	Rehabilitate RW	PAVE	PRSV	PRWY	$213
11-20	Eagle Lake	TASP	Rehabilitate TW	PAVE	PRSV	PTXY	$46
11-20	Eagle Lake	TASP	Relocate Windcone and Segmented Circle	AAID	SAFE	ANAS	$5
11-20	Houston Executive	RASP	Construct Air Traffic Control Tower	OTHR	SAFE	ANAS	$1,500†
11-20	Huntsville Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	$480
11-20	Liberty Municipal	TASP	Mark RW 16/34	PAVE	PRSV	PRWY	$29
11-20	Liberty Municipal	TASP	Rehabilitate RW 16/34	PAVE	PRSV	PRWY	$257
11-20	Liberty Municipal	TASP	Rehabilitate and Mark TW	PAVE	PRSV	PTXY	$174
11-20	Liberty Municipal	TASP	Rehabilitate Aprons	PAVE	PRSV	APRN	$81
11-20	Liberty Municipal	RASP	Add Hangars	BLDG	CAPT	HANG	$230
11-20	Liberty Municipal	RASP	Construct Apron	PAVE	CAPT	APRN	$30†
11-20	Palacios Municipal	TASP	Mark RW 13/31	PAVE	PRSV	PRWY	$58
11-20	Palacios Municipal	TASP	Mark TW	PAVE	PRSV	STXY	$7
11-20	Palacios Municipal	TASP	Seal Joints	PAVE	PRSV	PRWY	$997
11-20	Wharton Regional	TASP	Construct Access Road to Corporate Area	OTHR	CAPT	OLSD	$78
11-20	Wharton Regional	TASP	Construct Holding Apron RW 14	PAVE	CAPT	APRN	$30
11-20	Wharton Regional	TASP	Expand Corporate Hangar Access TW	PAVE	CAPT	HANG	$9
11-20	Wharton Regional	TASP	Mark RW 14/32	PAVE	PRSV	PRWY	$27
11-20	Wharton Regional	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$164
11-20	Wharton Regional	TASP	Rehabilitate Parallel & Cross TW	PAVE	PRSV	PTXY	$250
11-20	Wharton Regional	TASP	Rehabilitate RW 14/32	PAVE	PRSV	PRWY	$338
11-20	Wharton Regional	RASP	Add Hangars	BLDG	CAPT	HANG	$520
11-20	North Houston Business	RASP	Construct New Taxiway	PAVE	CAPT	STXY	$200
11-20	North Houston Business	RASP	Add Hangars	BLDG	CAPT	HANG	$1,580
11-20	North Houston Business	RASP	Move Access Road	PAVE	UPGR	OLSD	$80
11-20	North Houston Business	RASP	Construct Apron	PAVE	CAPT	APRN	$130
11-20	North Houston Business	RASP	Extend Runway	PAVE	CAPT	PRWY	$2,470
11-20	Winnie-Stowell	TASP	Expand Aircraft Apron	PAVE	CAPT	APRN	$175
11-20	Winnie-Stowell	TASP	Expand Auto Parking	PAVE	CAPT	OLSD	$30
11-20	Winnie-Stowell	TASP	Mark RW 17/35	PAVE	PRSV	PRWY	$30
11-20	Winnie-Stowell	TASP	Rehabilitate Apron	PAVE	PRSV	APRN	$89
11-20	Winnie-Stowell	TASP	Rehabilitate RW 17/35	PAVE	PRSV	PRWY	$243
11-20	Winnie-Stowell	TASP	Rehabilitate TW	PAVE	PRSV	STXY	$394
11-20	Winnie-Stowell	RASP	Add Hangars	BLDG	CAPT	HANG	$130

Priority: 0-5 = 2010 to 2015 (short term); 6-10 = 2016 to 2020 (mid-term); 11-20 = 2021 to 2030 (long term)
Source: HAS = Houston Airport System; TASP = Texas Airport System Plan (includes the TxDOT Airport Capital Improvements Program); RASP = Regional Aviation System Plan for the Houston-Galveston Region (this study)
Type: ILS = Instrument Landing System; GPS = Global Positioning System; AWOS = Automated Weather Observation System; WAAS = Wide Area Augmentation System; BLDG = Building; OTHR = Other; LAND = Land Acquisition or Easement; PAVE = Pavement Rehabilitation, New Construction, etc.; AAID = Approach Aids
Objective: SAFE = Safety; PRSV = Preservation; STDS = Standards; UPGR = Upgrade; PLAN = Planning Study; CAPT = Capacity
Item: HANG = Hangar; APRN = Apron; OLSD = Other Landside Development; TERM = Terminal Building; ENGR = Engineering/Design for Construction; ANAS = Airside Not Area Specific; AMP = Airport Master Plan; PRWY = Primary Runway; STXY = Secondary Taxiway
† = RASP recommended project may be eligible for AIP funding
Source: TxDOT; HAS; Quadrant Consultants

15 Aviation Policy Recommendations

The regional aviation system was developed under existing FAA and TxDOT policies that have changed little over the years. Part of this study is to identify potential changes in policies that would improve aviation in the Houston-Galveston region. These recommended policy changes would help establish a balanced system of general aviation, reliever and commercial airports in the region by supporting preservation of system airports, enhancement of safety and operational efficiency, and maximization of aviation opportunities in local communities and in the region. These policies are consistent with the FAA's goal of ensuring aviation in the United States is as safe and efficient as possible, and with TxDOT's goal of providing adequate access by air to the population and economic activity centers of the state.

The following sections discuss policy aspects of airport project development. Policy changes are recommended where warranted.

15.1 Airport Grant Revenue Sources

The FAA provides the money for Texas CIP projects under a Block Grant agreement between TxDOT and the FAA. These grants provide only part of the funds needed for projects at Texas airports, including airports in the Houston-Galveston region. Consequently, many worthy projects go unfunded for years.

This plan recommends that aviation-related sales tax revenues in Texas be dedicated to aviation projects, supplementing the FAA block grant funds. This measure would return a substantial amount of funds to benefit aviation users, allow many currently unfunded projects in the Texas CIP to be completed, and enhance aviation safety and efficiency in Texas.

15.2 Airport Safety and Security

Safety and security projects protect human life, and this study includes cost-effective safety measures commensurate with each airport's role and level of activity. Many of the projects required by Federal regulations, airport certification procedures and design standards are for safety and security. Projects in the Safety category include obstruction lighting and removal, acquisition of fire and rescue equipment, and improvements to runway safety areas. Security projects include perimeter fencing and surveillance systems. Since these projects already have the highest priority, no change in policy is required.

15.3 Airfield Capacity

Airfield capacity projects are needed at airports with current or projected capacity shortfalls. Projects are proposed to reduce delay, accommodate more passengers and cargo, or store more aircraft on the airport. Current FAA and TxDOT policy encourages all airports under public ownership, and all reliever airports regardless of ownership, to obtain grants to meet current and projected capacity needs. Privately-owned reliever airports must accept a contractual obligation to keep the airport open for long-term public use if they accept public grant funds. FAA and TxDOT grants are not available to private owners of general aviation airports not designated reliever airports.

This study recommends that FAA and TxDOT change their policies to allow privately-owned public-use airports recognized as system airports in an approved regional aviation system plan to receive grant funds for projects that preserve the airport and meet capacity shortfalls identified in system plans, providing the airport owner enters into a durable obligation to keep the airport open for long-term public use.

15.4 Standards

Standards projects allow airports to meet FAA design criteria. Many commercial-service airports were designed more than 50 years ago to serve relatively small and slow aircraft; they now need to be modified to accommodate the larger and faster turboprop and jet aircraft in today's commercial fleet. Similarly, standards projects are needed at general aviation airports to accommodate the airport's current design aircraft (generally the largest aircraft normally expected to use the airport), if the airport had been designed and built for smaller aircraft. Typical standards projects include lengthening and strengthening runways and taxiways, and increasing separation between runways, taxiways and buildings. Otherwise, airports may be required to limit fuel or passenger loads on some aircraft. In addition, the FAA is currently issuing new standards for precision approach procedures, such as a Lateral Precision performance with Vertical guidance (LPV) using FAA's wide area augmentation system (WAAS).

This study recommends that FAA and TxDOT mandate that airports submit electronic Airport Layout Plans (eALP) with new or updated Airport Master Plans. These electronic ALPs would include aerial surveys to form the basis of new precision approach procedures.

15.5 Reconstruction

Reconstruction projects replace or rehabilitate airport pavement, lighting systems and other facilities reaching the end of their functionality. Failure to replace deteriorating pavement increases airport maintenance costs and can result in potholes and loose debris that can damage landing gear, aircraft propellers and engines. Airfield lighting cables and fixtures deteriorate with age, resulting in dim or unreliable airfield lighting that can jeopardize safety for night and inclement weather operations. The TxDOT Routine Airport Maintenance Program (RAMP) provides grants to publicly-owned and designated reliever airports for normal airport maintenance. Larger rehabilitation projects are funded through the FAA's Airport Improvements Program (AIP) and TxDOT's Capital Improvements Program (CIP). However, neither RAMP grants nor AIP and CIP grants are available to privately-owned airports unless they are designated relievers.

This study recommends that the TxDOT RAMP program be extended to include privately-owned public-use airports recognized as system airports in an approved regional aviation system plan, providing the airport owner enters into a durable obligation to keep the airport open for long-term public use. The study also recommends extension of the AIP and CIP grant program to include these airports (see Section 15.3).

15.6 No Policy Recommendation Warranted

15.6.1 Terminal Buildings

General aviation airports with increasing aviation activity may need to build new or expanded terminal facilities. TxDOT aid, up to about 50 percent of total project cost, is available to assist publicly-owned and reliever airports with their terminal projects. These grants only apply to the

public-use parts of the terminal and not to revenue-generating areas used exclusively by a single tenant or by concessions, such as gift shops and restaurants. While grants are not available to privately-owned airports not designated relievers, the need for such grants to these airports in the Houston-Galveston area is insufficient to warrant a change in policy.

15.6.2 Surface Access

Surface access projects help intermodal mobility and include new and rehabilitated roadways and transit facilities at airports, curbside improvements and on-airport parking lots. Surface access projects at publicly-owned and designated reliever airports are eligible for FAA AIP grants and TxDOT CIP grants. FAA policy is to encourage intermodal transportation projects at airports to increase passenger options to access airports from public transportation and alternative modes of transportation. While grants are not available to privately-owned airports not designated relievers, the need for such grants to these airports in the Houston-Galveston area is insufficient to warrant a change in policy.

15.6.3 Environmental Impacts

The FAA requires an environmental impact statement for any airport project that may significantly affect the quality of the human environment. This statement is available to the public and describes the purpose and need for the project, alternatives to the proposed project, the affected environment, likely environmental impacts of the proposed project, and measures to avoid or mitigate environmental impacts. For smaller projects that may not have significant impacts, the FAA often requires an environmental assessment, which is also available to the public, to determine if significant impacts would occur. Thus, FAA grants are contingent on the project disclosing its environmental impacts in a public process. The TxDOT CIP is funded with federal block-grant money, and projects using TxDOT CIP funds must follow the same environmental impact assessment process as for FAA AIP grants.

There are also FAA and TxDOT grants available for environmental mitigation at airports, such as noise mitigation or total buyout of affected homes, wildlife management on airfields, water pollution prevention systems and light emission reduction.

Privately-owned airports not designated relievers do not receive federal grants and are not required to prepare environmental impact assessments or mitigate environmental impacts from their airports. Nevertheless, these airports are required to comply with environmental laws that apply to all property owners, including obtaining permits for discharging air and water pollution from point sources, filling wetlands and waters, and preventing and cleaning up spills of toxic substances. This study does not find that a policy change is needed to help prevent environmental impacts by system airports.

16 Recommended NPIAS and TASP Changes

The optimal plan described in the preceding chapters constitutes a set of recommendations from the RASP to include projects from this study in the FAA's Airport Improvement Program or the Texas Airport Capital Improvement Plan, to the extent these programs allow funding to the airports for which projects are recommended. Privately-owned airports other than relievers are not eligible for federal or state funds, so these projects are recommended to the airport owners.

16.1 NPIAS Recommendations

All but five system airports are in the NPIAS. The five airports not in the NPIAS are Baytown Airport, Houston Executive Airport, R.R. Wells, Jr. Airport, Weiser Airpark and North Houston Business Airport.

Currently, no airport is eligible to be added to the NPIAS for the following reasons:

- ***Not Reliever eligible.*** The criteria for reliever airports are at least 100 based aircraft and at least 25,000 annual itinerant operations. None of the five airports not currently listed in the NPIAS is forecast to have this level of activity in the next five years, although major infrastructure improvements have occurred recently at Baytown, Houston Executive and North Houston Business Airport.
- ***Private ownership.*** Baytown Airport, Houston Executive Airport, Weiser Airpark and North Houston Business Airport are privately owned and are not eligible for inclusion in the NPIAS.

However, three of these privately-owned airports may be eligible for inclusion in the NPIAS in the mid-term:

- ***Baytown Airport*** has recently reconstructed and widened its runway, renovated and built several hangars, and built a terminal building suitable for corporate aviation. The airport has discussed plans for acquiring land on the south end and west side of the runway to extend it to 5,400 feet and build a full parallel taxiway, add hangars and taxiways, and widen its parking lot. The runway extension will require the collaboration of the City of Baytown to relocate East Cedar Bayou-Lynchburg Road. In addition, the City of Baytown is planning to provide protective zoning around the Baytown Airport. If growth in based aircraft and itinerant operations occur above the forecast levels, it is possible Baytown Airport would reach the FAA criteria for reliever designation.
- ***Houston Executive Airport*** is a new airport that has not reached the FAA criteria for based aircraft or annual itinerant operations at reliever airports. The TASP classifies it as Business/Corporate and indicates that it is in the Reliever functional category. The airport may reach FAA reliever criteria in the mid-term if growth in based aircraft and itinerant operations occur above the forecast levels. It does not meet the FAA reliever criterion that it be at least 20 miles from another NPIAS airport (it is closer than 20 miles to West Houston Airport), although FAA may choose to waive this criterion because Houston Executive Airport is able to accommodate larger corporate jets than West Houston Airport.
- ***North Houston Business Airport*** is recently under new ownership and has embarked on a major capital improvement program, including repaving the runway and lengthening, widening and strengthening it in the process, improving airport drainage and adding self-serve fueling facilities. Other projects, recommended in this study, would bring the airport to the

Business/Corporate level and would increase based aircraft and aviation operations, perhaps to FAA reliever criteria. The airport is less than 20 miles from George Bush Intercontinental Airport and D.W. Hooks Memorial Airport and it is limited in its airspace by the Class B airspace for George Bush Intercontinental, so it would require an FAA waiver to be eligible for reliever designation.

16.2 TASP Recommendations

TxDOT has published eligibility standards for airports to be listed in the TASP. All commercial service and reliever airports in the NPIAS are automatically listed in the TASP. Existing general aviation airports not classified as relievers must meet the following criteria to be listed in the TASP:

- Serve a community located beyond a 25-mile driving distance (average 30-minute ground travel time) from the nearest existing or planned TASP airport, or provide needed capacity within a metropolitan statistical area
- Be capable of being economically developed to the standards applicable to the role identified for the airport, and
- Be publicly owned or suitable for public acquisition, which would be preferable to replacing the airport with a new airport on a different site

The TASP also classifies airports according to their role in meeting airport system goals and objectives. The TASP classification of airport roles differs from that of the NPIAS. While the NPIAS classification is on a national, or macro, scale, TASP airports are classified on a more local, or micro scale, according to their role in meeting the goals and objectives. The four general aviation airport roles in the TASP classification are discussed in detail in Chapter 12.

All but three system airports are in the TASP. The three airports not in the TASP are Baytown Airport, Weiser Airpark and North Houston Business Airport. This plan recommends adding Baytown Airport and North Houston Business Airport to the TASP for the following reasons:

- ***Baytown Airport***, as a Community Service (CS) airport. Baytown Airport meets the TASP criterion for this classification. It adds aviation capacity to the Houston metropolitan area; it is located within a 25-mile and 30-minute drive of two reliever airports (Ellington and La Porte) of which one (Ellington Airport) is forecast to be over 60 percent of its capacity in 10 years; it has more than 20 based aircraft (58, of which 1 is a jet) and more than 6,000 annual operations (9,600 in 2008); and it accommodates single-engine and light twin aircraft as well as turboprop and business jets. Baytown's economic development potential is high. The airport has already built a corporate terminal building and has made other substantial landside and airside improvement. It is strategically located in a major industrial and commercial center on the east side of the Houston metropolitan area. Its owners have expressed a desire to continue to expand the airport's facilities.
- ***North Houston Business Airport***, as a Community Service (CS) airport. North Houston Business Airport meets the TASP criterion for this classification by adding capacity in the Houston metropolitan area; it is located within a 25-mile and 30-minute drive of one commercial airport (George Bush Intercontinental) and two reliever airports (David Wayne Hooks Memorial and Lone Star Executive), of which one (D.W. Hooks) is forecast to be over 60 percent of its capacity in 10 years; it has more than 20 based aircraft (56) and more than 6,000 annual operations (10,000 in 2008); and it accommodates single-engine and light twin

aircraft operations. North Houston Business Airport has high potential for economic development under its new ownership. The airport has recently extended and rebuilt its runway and improved its drainage, and its owner has expressed a desire to capture more of the corporate aviation and flight training markets.

17 Public Involvement

The Regional Aviation System Plan benefits from extensive public involvement. The goal of the RASP is to allow every airport and every community with an airport to contribute to the study. A comprehensive Public Involvement Plan was established to encourage collaborative, transparent, accessible and meaningful dialogue, and input by stakeholders and the interested public. The Regional Aviation System Plan used several methods to engage the public:

- ***Information forums*** were held at the beginning of the study at three locations around the Houston-Galveston region. Information was provided on the mission and the methods to be used by the RASP study.
- ***Focus groups*** were conducted throughout the 13-county Houston-Galveston region with more than 200 stakeholders and citizens interested in the 26 system airports.
- ***RASP Steering Committee***, consisting of airport managers, aviation agencies and aviation associations, met regularly during the course of the study. The planning staff presented findings at the meetings, and committee members were given drafts of technical memoranda and reports to review and provide their input.
- ***Newsletters*** were issued twice to a wide mailing list of interested people, news media, association groups and elected officials to keep them informed about the progress of the study and to advise them of upcoming meetings.
- ***Public meetings*** were held twice during the course of the study. Each time, three meetings were held on successive nights at convenient locations around the Houston-Galveston region. These meetings were advertised in the Newsletters and the *Houston Chronicle.*
- ***Electronic media and email*** provided information to a wide audience. The Houston-Galveston Area Council posted planning documents on its Aviation web site (http://www.h-gac.com/tag/plans_program/aviation/default.aspx) during the course of the study. The web site includes the names and email addresses of contacts for the study.

The key elements in the public involvement process are:

- ***Public Outreach.*** Starting in mid-December 2008 and ending in March 2009, the team solicited and obtained feedback from interested citizens and groups, public officials, Chambers of Commerce and airport users. Focus group meetings with 26 community stakeholders, totaling over 200 people, were held throughout the Houston-Galveston region. These meetings covered their perceptions and opinions about the economic, land use, impacts and vision of the airport in their communities. Table 42 lists the communities in which focus group meetings were held.

  In addition, a comprehensive database and mailing list of over 300 stakeholders, community leaders, airport managers and interested citizens was developed for mailing newsletters and other project information during the study.

- ***Airport Contacts***. Direct interviews and discussions were held with the owners and operators of the 26 system airports in the Houston-Galveston region. These discussions often included airport tenants and aircraft owners.

- ***Information Dissemination***. Three Users' Forums were held to introduce airport owners, managers and tenants to the study's goals and methods. These meetings were preceded by press releases, emails and information on the H-GAC web site.

Table 42: Airport Stakeholder Focus Group Meetings

Focus Group	Date	Location	Airports
Katy Chamber of Commerce	December 16, 2008	Katy	Houston Executive, West Houston
Conroe Chamber of Commerce	December 17, 2008	Conroe	Lone Star Executive
Waller County Chamber of Commerce	January 13, 2009	Hempstead	Houston Executive
Pearland Economic Dev. Council	January 14, 2009	Pearland	Pearland Regional
Fort Bend Chamber of Commerce	January 14, 2009	Sugar Land	Sugar Land Regional
Wharton Chamber of Commerce	January 28, 2009	Wharton	Wharton Regional
Bay City Chamber of Commerce	January 28, 2009	Bay City	Bay City Municipal
Palacios Chamber of Commerce	January 28, 2009	Palacios	Palacios Municipal
Bellville Chamber of Commerce	January 29, 2009	Bellville	Grawunder Field
Columbus Chamber of Commerce	January 29, 2009	Columbus	Robert R. Wells
Angleton Chamber of Commerce	January 30, 2009	Angleton	Texas Gulf Coast Regional
Fort Bend Chamber of Commerce	January 30, 2009	Sugar Land	Houston Southwest
La Porte Chamber of Commerce	February 3, 2009	La Porte	La Porte Municipal
West Houston Association	February 4, 2009	Houston	Sugar Land Regional, Houston Executive, Houston Southwest
Galveston Chamber of Commerce	February 4, 2009	Galveston	Scholes International
Baytown Chamber of Commerce	February 17, 2009	Baytown	Baytown
Winnie Chamber of Commerce	February 17, 2009	Winnie	Winnie-Stowell
East Montgomery County Chamber of Commerce	February 18, 2009	Porter	North Houston Business
Cleveland Chamber of Commerce	February 18, 2009	Cleveland	Cleveland Municipal
Greater Tomball Chamber of Commerce	February 19, 2009	Tomball	David Wayne Hooks Memorial
Huntsville Chamber of Commerce	February 19, 2009	Huntsville	Huntsville Municipal
Eagle Lake Chamber of Commerce	March 4, 2009	Eagle Lake	Eagle Lake
Liberty/Dayton Chamber of Commerce	March 5, 2009	Liberty	Liberty Municipal
Anahuac Chamber of Commerce	March 5, 2009	Anahuac	Chambers County

Part of the information dissemination included reaching out through two series of public meetings (three meetings in each series). The first group was held in the fall of 2009, when the Phase 1 Draft Report was released, covering the public outreach effort and the airport facilities and service profiles of each of the 26 airports in the region.

The second series of public meetings held in October 2010, followed the release of this Phase II Draft Report that focuses on the airport inventories, aviation system issues and goals and the aviation forecasts, capacity assessment, scenario assessment, environmental issues, the airport roles, the optimal plan and development priorities.

- ***Steering Committee Support***. The H-GAC RASP Steering Committee (Table 44), consisting of airport managers, aviation agency managers and members of aviation-related organizations, met four times over the course of the two-year study. The members have

Table 43: Public Meetings on the RASP

Date	Location
Users' Forums	
December 16, 2008	Katy Chamber of Commerce, Katy
December 16, 2008	Conroe Chamber of Commerce , Conroe
December 17, 2008	Pearland Chamber of Commerce, Pearland
Public Meetings	
September 14, 2009	Montgomery County Public Library, Conroe
September 15, 2009	Houston-Galveston Area Council, Houston
September 16, 2009	Ft .Bend Chamber of Commerce, Sugar Land
October 26, 2010	Lone Star Convention Center, Conroe
October 27, 2010	Sugar Land Regional Airport, Sugar Land
October 28, 2010	Hobby Airport 1940 Air Terminal Museum, Houston

Table 44: Members of the RASP Steering Committee

David Allen Airport Manager Wharton Regional Airport	Hud Hopkins Airport Manager Sholes International Airport
Jeff Bilyeu Airport Manager Texas Gulf Coast Regional Airport	Scott Gallagher Manager, Planning/Programs TxDOT Aviation
Don Brandon Airport Manager Chambers County Airport	Avon Moore Airport Superintendent City of Liberty
Charles Danley Aviation Manager Baytown Airport	Carlos Ortiz Assistant Director, Planning & Programming Houston Airport System
Shelly deZevallos SW Region Representative Aircraft Owners and Pilots Association	Andrew Perry Airport Manager Houston Executive Airport
Len Franklin Airport Manager Houston Southwest Airport	Andy Rivera Airport Manager Pearland Regional Airport
Wade Gillaspie Airport Manager Huntsville Municipal Airport	Theresa Rodriguez Manager, Transportation Infrastructure Greater Houston Partnership
Ben Guttery Texas Airport District Office Director FAA Southwest Region	Phillip Savko Airport Manager Sugar Land Regional Airport
Stephen Hadley SW Region Representative National Business Aviation Association	Scott Smith Airport Manager Lone Star Executive Airport

considerable aviation expertise and experience in the Houston-Galveston region. They provided guidance to H-GAC planners and consultants throughout the study.

The RASP public involvement process identified and contacted the communities affected by the plan, informed communities and stakeholders of the need for the RASP study through focus groups, newsletters, forums and public meetings, and involved stakeholders in the planning process. As a result, the public has had many opportunities to learn about and provide input to the RASP study and help set directions and priorities for the future Houston-Galveston regional aviation system.

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Glossary

Air Carrier ..... Aviation by a commercial public carrier on scheduled routes
ASOS..... Automated Surface Observation System
ASV ..... Annual Service Volume
ATCT ..... Air Traffic Control Tower
Avgas..... Aviation gasoline, the fuel for many reciprocating aircraft engines
AWOS..... Automated Weather Observation System
CIP..... Capital Improvement Program
DME..... Distance Measuring Equipment, a navigational aid for landing
FAA..... Federal Aviation Administration of the U.S. Department of Transportation
FBO ..... Fixed Base Operator, an airport tenant providing fuel, storage or other aviation services
General Aviation..... Aviation other than air carrier or military
Glider ..... Engineless fixed-wing aircraft that is towed up, and then flown
GPS ..... Global Positioning System, a satellite-based navigational aid for finding location
Helicopter..... Powered rotor-wing aircraft
H-GAC ..... Houston-Galveston Area Council, the regional planning agency of the Houston-Galveston region
ILS ..... Instrument Landing System, electronic navigational aids for landing
Jet A..... Jet Aviation fuel (kerosene), the fuel for most jet and turboprop aircraft and helicopters
LOC ..... Localizer, a navigational aid for direction finding
LPV..... Lateral Precision performance with Vertical guidance, a more precise GPS satellite-based navigational aid
Mogas..... Motor vehicle (automobile) gasoline
NDB ..... Non-Directional Beacon, a navigational aid for direction finding
NPIAS..... National Plan of Integrated Airport Systems
PAPI..... Precision Approach Path Indicator, a navigational aid for landing
RAMP ..... Routine Airport Maintenance Program, an airport grant program of the Texas Department of Transportation
RASP..... Regional Aviation System Plan (this study)
REIL..... Runway End Identification Lights, a navigational aid for landing
RNAV ..... En Route Area Navigation, a technique for navigation
SC..... Segmented Circle, a navigational aid for direction finding
TASP ..... Texas Airport System Plan
T-hangar ..... Hangar divided into T-shaped units that fit one fixed-wing airplane each
TRACON..... Terminal Radar Approach Control
TSA..... Transportation Security Administration of the U.S. Department of Homel- and Security
Turboprop ..... Piston aircraft engine with turbocharged air intake driving a propeller
TxDOT ..... Texas Department of Transportation
Ultralight..... A small powered aircraft with empty weight under 254 pounds and top speed at most 55 knots (64 mph)

VASI..... Visual Approach Slope Indicator, a navigational aid for landing
VHF ..... Very High Frequency (radio signal)
VOR..... VHF Omni-directional Range, a navigational aid for direction finding