City of Grand Prairie, Texas

Airport Master Plan Update

Grand Prairie TEXAS

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In association with:

Texas Department of Transportation, Aviation Division

2013

CDM Smith

Grand Prairie Municipal Airport
Master Plan Update

2013

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Chapter

1

Inventory

This Airport Master Plan defines a concept for development at Grand Prairie Municipal Airport (GPM) over the course of a 20-year planning period and is prepared in collaboration with Airport management, Federal and State agencies, local officials, and interested Airport users. A goal of the study is to identify facility needs and evaluate development alternatives in order to provide guidance for the future development of the Airport. The plan recommends improvements in accordance with specific Federal Aviation Administration (FAA) criteria, taking into consideration anticipated changes in aviation activity trends at the local, regional, and national levels.

The primary objective of this Airport Master Plan is to produce a comprehensive planning guide for the continued development of a safe, efficient, and environmentally compatible aviation facility that meets the goals of the City of Grand Prairie, Airport users and tenants, and the surrounding Airport service area. The plan must also satisfy Federal Aviation Administration (FAA) and Texas Department of Transportation (TxDOT) guidelines for the development of Airport Master Plans and facilities, while incorporating characteristics that are unique to the service area. The study focuses on aeronautical forecasts, need and justification for development, and a staged plan for recommended development. Proposed Airport development must adhere to standards that provide for safe aviation facilities while accommodating future demand. The staged plan typically looks at planning horizons of 0–5 years, 6–10 years, and 11–20 years. The first phase generally addresses existing facility deficiencies or non-compliance to airport design standards. The subsequent phases typically address the facilities and resources needed to accommodate predicted growth based on reasonable assumptions.

The first step in the airport master planning process as outlined in FAA Advisory Circular 150/5070-6A, “Airport Master Plans,” involves gathering information about the airport and its environs. An inventory of current conditions is essential to the success of a master plan, since the information also provides a foundation, or starting point, for subsequent evaluations.

The inventory of existing conditions for the GPM Master Plan Update includes the following information:

- Information pertaining to Airport ownership and management, the general Airport setting, transportation access, the Airport’s relationship to the Federal Airport System, and Airport history

- Population, employment and socioeconomic information for the geographic area
- A review of historic and current Airport activity, including the general types of aircraft using the Airport
- Descriptions of facilities and services now provided at the Airport, including a general description of airside, terminal, landside, and support facilities such as utilities and other infrastructure related amenities
- An overview of the area's airspace, operations management, and meteorological conditions.

The data collected for this portion of the study was gathered through field interviews, research, meetings and telephone conversations from a variety of sources including Airport/City management, Airport tenants and users, area businesses, community organizations, and Airport service providers. The information gathered for this portion of the Master Plan is current as of June 2011. Updated information was gathered throughout the development of the Master Plan and can be found in subsequent chapters.

1.1 Airport Background and History

Airport Ownership and Management

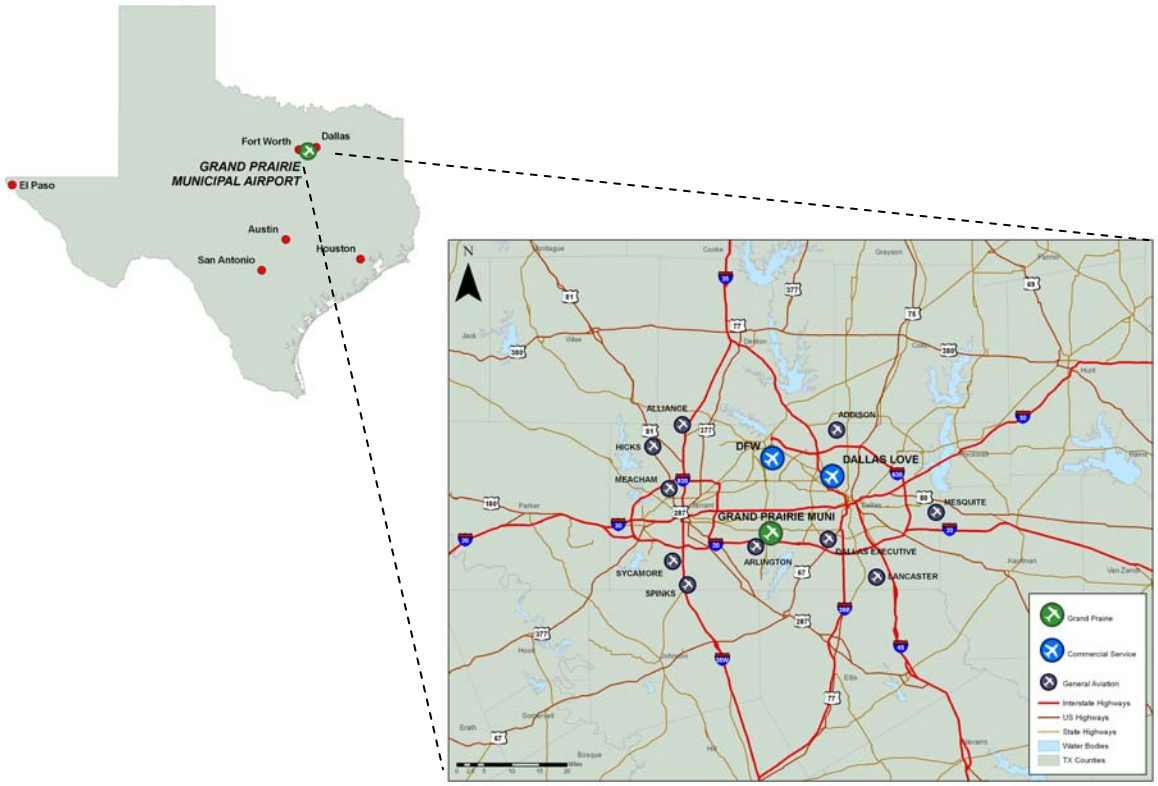
The Airport is owned and operated by the city of Grand Prairie, which is responsible for operating and maintaining the Airport in a safe condition as well as leasing properties within the Airport boundary. Airport management and operations and maintenance staff are available on-site to ensure the safe and effective use of the facility.

Airport Location and Access

The Airport is located on approximately 162 acres of land and sits 588 feet above sea level. Some of the closest major cities to GPM are given below with approximate mileage to each.

- Arlington – 8 miles to the west
- Fort Worth – 22 miles to the west
- Dallas – 25 miles to the northeast

Figure 1-1: State and Regional Map

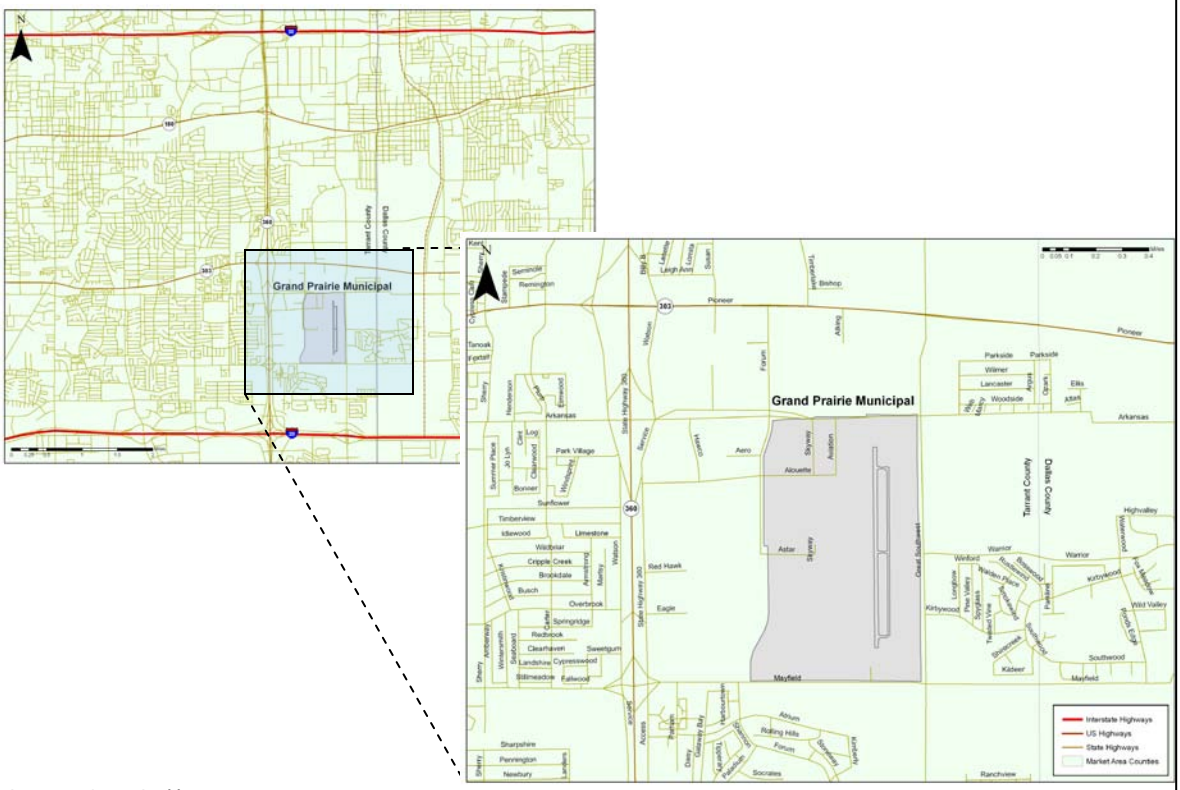


Source: CDM Smith

Grand Prairie Municipal Airport is located 3 miles southwest of the city of Grand Prairie, Texas near the border of Tarrant and Dallas Counties. Owned and operated by the city of Grand Prairie with input from the Airport Advisory Committee, Grand Prairie Municipal Airport's primary function is to support general aviation (GA) activity within the surrounding region. General aviation operations typically consist of private business, corporate, recreational, air taxi, and/or flight training related activity. The Airport is ideally situated within the heart of the Dallas/Ft. Worth Metroplex, almost equidistant from both the Dallas and Ft. Worth city centers.

The Airport has excellent road access via Route 360 running north/south and directly to Dallas/Ft. Worth International Airport (DFW), and through Interstates 20 and 30 running east/west connecting Dallas and Ft. Worth with cities and towns in between. About a mile to the east of the Airport, the recently completed State Highway 161 connects the Airport, area businesses and residents with Interstates 20 and 30. Together, these highways encircle the Airport and provide rapid access to the areas vast highway network. Major highways commonly traveled to access GPM are shown on the **Figure 1-2**.

Figure 1-2: Airport Access Map



Source: CDM Smith

Airport History

Grand Prairie Municipal Airport was relocated from its original location near downtown Grand Prairie, to its existing location three miles southwest of downtown, in 1968. The sale of the original property funded the construction of a 3,400-foot runway. The runway was extended to its current length (4,000 feet) in 1979. In June 1995, privately-contracted Airport Traffic Control Tower (ATCT) services begun, operating during daylight hours only. The tower was donated to the City by American Eurocopter, the U.S. affiliate of the French Aerospatiale helicopter manufacturing company, and is currently operated by Midwest ATC.

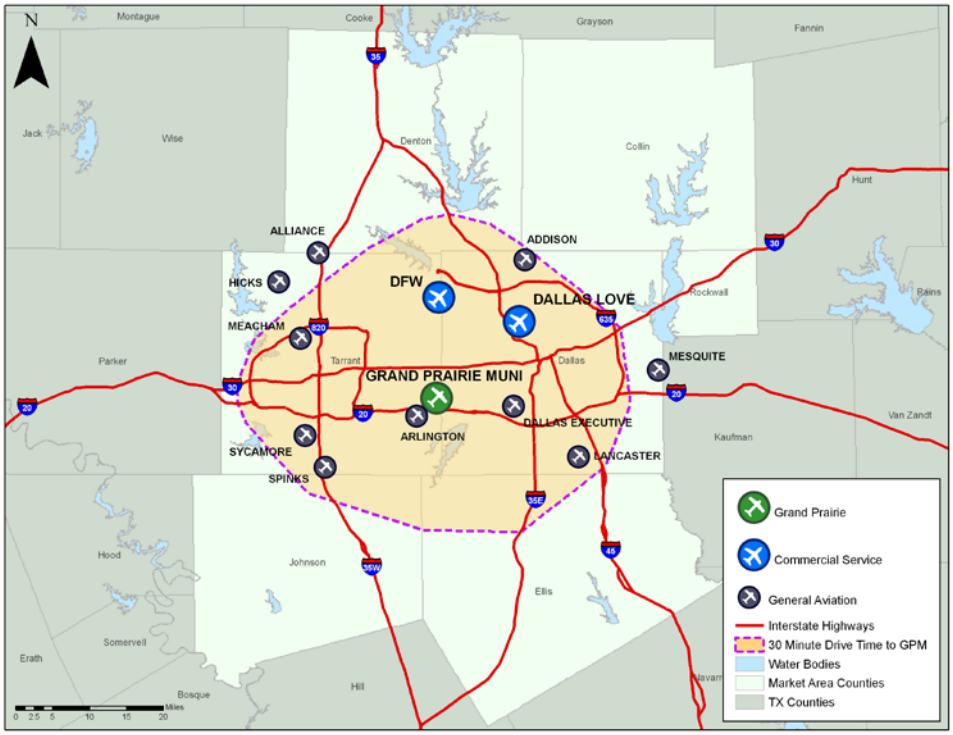
Today, the airport performs an important role in the support and development of the region's growing population and economic base.

Population and Socioeconomic Data

For an airport master plan, socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the geographic area served by the airport. This information is then typically used in forecasting aviation demand. The types of socioeconomic data that are presented include population and employment.

The area served by an airport, from within which most of its users come, is generally referred to as the airport's "Study Area." For the purposes of this report, the primary study area for GPM is defined as the surrounding counties that are within a 30-minute drive time from the Airport using the existing local road network. This defined region encompassing the Dallas/Ft. Worth Metroplex is the theoretical market area for the Airport. **Figure 1-3** illustrates the study area and shows competing airports within the region.

Figure 1-3: Study Area



Source: CDM Smith

Population growth statistics for the study area are presented in **Table 1-1** and are compared to state and national levels. The population in the study area increased from 3,792,641 in 1990 to 6,082,002 in 2009, an average increase of 2.5 percent per year. Each county within the study area has increased in population since 1990 with Collin and Rockwall counties representing the greatest

average percentage increase of 5.9 and 6.2 percent per year, respectively. However, Tarrant and Dallas counties, located closest to GPM, have had significant increases in total population throughout the study area with over 500,000 new residents coming to each county over the past 19 years.

While the study area/Dallas-Ft. Worth Metroplex experienced an annual growth rate of 2.5 percent annually over the past 19 years, the State of Texas experienced a similar growth rate of 2.0 percent annually during this same period. Additionally, the study area and Texas growth rates are both significantly higher than national average.

Table 1-1: Population Growth Statistics

Area	1990	2000	2009	CAGR[1]
Study Area				
Collin County	266,856	500,162	791,631	5.9%
Dallas County	1,863,546	2,225,371	2,451,730	1.5%
Denton County	276,436	438,994	658,616	4.7%
Ellis County	85,407	112,394	151,737	3.1%
Johnson County	97,258	127,978	156,997	2.6%
Rockwall County	25,918	43,880	81,391	6.2%
Tarrant County	1,177,220	1,454,402	1,789,900	2.2%
Study Area	**3,792,641**	**4,903,181**	**6,082,002**	2.5%
State of Texas	**17,056,755**	**20,945,963**	**24,782,302**	2.0%
United States	**249,622,814**	**282,171,957**	**307,006,550**	1.1%

Source: 1990, 2000, and 2009 data from U.S. Census
[1] CAGR = Compound Annual Growth Rate 1990-2009

Employment growth indicators for the period 1990 to 2009 in the study area are presented in **Table 1-2**. Employment has grown at an average rate of 0.7 percent over the previous nine years, while personal income has grown 4.7 percent during that same period. Averages from 2007 to 2010 are also presented to show the impact of the recent economic recession on the study area.

Table 1-2: Regional Economic Trends

Year	Metroplex Employment	Metroplex Personal Income ($ thousands)
2000	2,600,283	170,022,693
2001	2,612,075	175,822,574
2002	2,603,746	177,794,509
2003	2,600,529	182,644,518
2004	2,666,217	195,051,746
2005	2,697,697	210,937,893
2006	2,752,290	228,917,441
2007	2,789,036	243,966,066
2008	2,800,282	262,932,786
2009	2,757,271	257,119,025
Metroplex CAGR		
2000 - 2009	0.7%	4.7%
2007 - 2009	-0.6%	2.7%
Texas CAGR		
2000 - 2009	1.7%	5.4%
2007 - 2009	0.1%	4.0%
U.S. CAGR		
2000 - 2009	0.6%	4.0%
2007 - 2009	-0.4%	1.1%

Source: Employment - U.S. Bureau of Labor Statistics. Earnings – U.S. Bureau of Economic Analysis
2010 Census employment data not available as of May 2011

Table 1-3 lists top ten employers in the city of Grand Prairie. The presence of large manufacturing operations like Lockheed Martin, Poly-America, and Bell Helicopter Industries helps to balance the large number of employees working in government, education, and healthcare. Some of the area's employers rely on the Airport for business and have aircraft based at GPM. Additionally, area businesses routinely charter aircraft, ship and receive supplies and products, as well as have customers and suppliers who arrive via the Airport.

Table 1-3: Major Employers

Employer	Industry	Number of Employees
Grand Prairie Independent School District	Administration of Education Programs	3300
Lockheed Martin Missiles and Fire Control	Research and Development of Aerospace Systems	2800
Poly-America Inc.	Unsupported Plastics Film and Sheet Manufacturing	1300
Bell Helicopter-Textron	Aircraft Manufacturing	1300
Lone Star Park at Grand Prairie	Racetracks	1200
City of Grand Prairie	Public Administration	1100
Triumph Aerostructures - Vought Aircraft Division	Aircraft Engine and Engine Parts Manufacturing	700
Siemens Energy & Automation, Inc.	Switchgear and Switchboard Apparatus Manufacturing	500
Hanson Pipe & Products, Inc.	Concrete Pipe Manufacturing	500
Wal-Mart	Warehouse Clubs and Superstores	500
American Eurocopter	Aircraft Manufacturing	500
Arnold Transportation Services	General Freight Trucking	400
SAIA Motor Freight Line Inc.	General Freight Trucking, Long-Distance, Truckload	400
Turbomeca Engine Corp.	Aircraft Engine and Engine Parts Manufacturing	400
Pollock Paper Distributors	Corrugated and Solid Fiber Box Manufacturing	300
Steelcase Inc.	Office Furniture Manufacturing	300
Printpak	Unsupported Plastics Packaging Film and Sheet Manufacturing	300
Hampson Texstars	Aerospace Product and Parts Manufacturing	300
Texas Department of Health and Human Services	Administration of Human Resource Programs	300

Source: http://www.gptx.org/index.aspx?page=48

1.2 Historic and Current Aviation Activity

Based on airport records, GPM currently has 236 based aircraft, including 198 single engine and 18 multi-engine aircraft. The majority of single-engine aircraft are owned by private citizens and businesses who store their aircraft in T-hangars at the Airport. **Table 1-4** shows that up until 2008, when the recession began, the number of based aircraft remained constant for the previous eight years. It has since recovered slightly from the decline of based aircraft in 2008.

Table 1-4: Historic Based Aircraft

Year	Single Engine	Multi-Engine	Helicopter	Jet	Total
2000	236	17	34	0	287
2001	236	17	34	0	287
2002	236	17	34	0	287
2003	236	17	34	0	287
2004	236	17	34	0	287
2005	236	17	34	0	287
2006	236	17	34	0	287
2007	236	17	34	0	287
2008	177	19	2	1	199
2009	177	19	2	1	199
2010	198	18	20	0	236
2011	198	18	20	0	236
CAGR 2000 - 2010	-1.7%	0.6%	-5.2%	100.0%	-1.9%

Source: Airport records, FAA TAF

Historic Aviation Activity

Historical accounting of annual aircraft operations (takeoffs and landings) often provides a basis for forecasting future activity trends. Aircraft operations data can be broken down into four general categories: air carrier, air taxi/commuter, general aviation and military. Historic and existing operations in these categories are presented in **Table 1-5**.

Table 1-5: Historic Aviation Activity

	General Aviation		Military				
Year	Itinerant	Local	Itinerant	Local	Air Taxi	Air Carrier	Total
2000	43,466	44,776	7	96	0	0	88,345
2001	37,062	45,897	44	404	0	0	83,407
2002	34,442	50,591	102	34	21	0	85,190
2003	30,476	47,249	84	28	0	0	77,837
2004	28,268	38,742	136	32	13	0	67,191
2005	26,872	33,629	118	60	12	0	60,691
2006	26,724	35,244	56	22	81	0	62,127
2007	28,870	58,770	87	26	52	0	87,805
2008	33,103	67,711	52	56	156	72	101,150
2009	56,182	93,681	240	154	313	0	150,570
2010	30,095	50,182	129	82	168	0	80,656
CAGR							
2000 - 2009	2.9%	8.5%	48.1%	5.4%	100.0%		6.1%
2000 - 2010	-3.6%	1.1%	33.8%	-1.6%	100.0%		-0.9%

Source: Airport records, FAA TAF

As shown in the table above, there is a dramatic difference in operations recorded for the Airport in 2009 versus 2010. The CAGR from 2000 to 2009 versus 2000 to 2010 illustrates the significant impact this has on measuring growths rates over a determined period of time. More importantly, however, is the explanation of why operations fell so dramatically from 2009 to 2010. Based on discussions with airport management, the primary rational for this is related to sources used for the data. The 2000 to 2009 data was collected from the FAA Terminal Area Forecast. The 2010 operations data was collected directly from the Airport and ATCT records. It is estimated that night operations represent 15 percent of total operations. More discussion on the disparity between yearly data and how this impacts forecasting airport activity will be presented in the next chapter.

Military and Air Taxi Activity

While the majority of operations at GPM are related to general aviation, it can be assumed that there have been, and will continue to be, a relatively small number of military and air taxi operations at the Airport. The percentage of these flights at GPM is very small and inconsequential for forecasting purposes. Generally, military, air taxi and air carrier operations at general aviation airports like GPM are not a separate category in measuring airport activity and are absorbed into other categories depending on their nature.

1.3 Airport Facilities

Grand Prairie Municipal Airport can be divided into several distinct areas. The airfield area consists of the parts of the Airport that accommodate the movement of aircraft. This includes runways, taxiways and aprons as well as the navigational and communication equipment designed to facilitate aircraft operations. Terminal/Landside facilities include the terminal building, hangars and other structural development as well as auto parking, access, and other facilities. In addition, there are support-related facilities at the Airport such as Airport management and operations facilities.

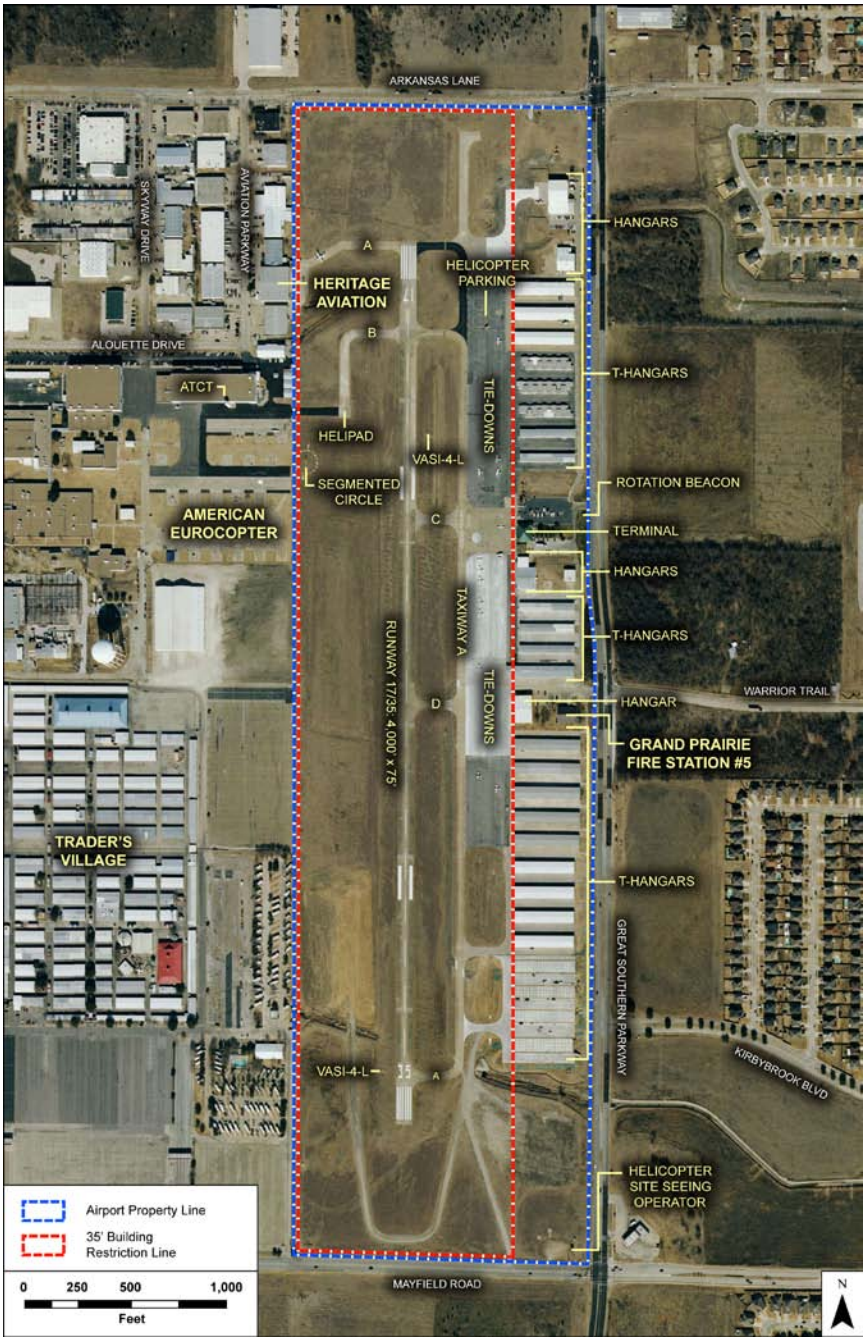
Figure 1-4: Airport Photos

Source: Airport Site Visit

Airfield Facilities

The largest land use type located at GPM is the airfield. The airfield consists of the parts of the Airport which accommodate the movement of aircraft, encompassing runways, associated taxiways, and airfield lighting. Within the discussion of airfield facilities, is a presentation of the navigational and communication aids serving the Airport as well as a discussion on airspace obstructions. **Figure 1-5** shows the facilities located at the Airport.

Figure 1-5: GPM Airside and Landside Facilities



Runways

Runways are defined rectangular surfaces on an airport prepared or suitable for the landing or takeoff of airplanes. Each runway end is identified by a number. The number designation of a runway corresponds to its general position on the compass. Therefore, a runway number of 17 corresponds to a compass position of 170 degrees, and a runway number of 35 indicates a 350-degree compass position. Each runway at an airport provides two compass positions (Runway 17-35 accommodates both the 170-degree and 350-degree compass positions).

There is one runway available at GPM. The runway is oriented in the 170-350 direction and is 4,001 feet long by 75 feet wide. Runway 17-35 is constructed of grooved concrete, with load-bearing capabilities of 30,000 pounds single-wheel. **Table 1-6** provides summary data for the runway.

Table 1-6: Runway Data Summary

Data Category	Runway 17-35
Elevation (by runway end)	581.5'/572.8'
Length	4,001'
Width	75
Surface Material	Concrete (grooved)
Pavement Strength	30,000 Single Wheel
Runway Marking	Non-Precision

Source: Airport records, FAA Airport Facility Directory

Taxiways

Taxiways are paved areas over which airplanes move from one part of the airfield to another. One of their more important uses is to provide access between the terminal/hangar facilities and the runways. There are three types of taxiways: parallel, entrance/exit, and access. Taxiways that are parallel to runways generally provide a route for aircraft to reach the runway end. Entrance/exit taxiways, which usually connect runways to parallel taxiways, provide paths for aircraft to enter the runway for departure or leave the runway after they have landed. Access taxiways provide a means for aircraft to move among the various airside components of an airport: hangar areas, aprons, fueling areas, etc.

The airfield's taxiway system consists of one full-length taxiway running parallel to Runway 17-35. The taxiway is 35 feet wide, and serves as the main access to the Runway, off of which most other access and exit/entry taxiways run. The remaining taxiways serve as entrance, exit, and access taxiways for the Airport's runways and various airside areas.

Aprons

GPM has an aircraft apron area used for aircraft movement and positioning, vehicle movement and parking, and aircraft tiedown. The apron is approximately 535,000 square feet, and is capable of storing over 71 based and transient aircraft on tiedowns. Tiedown positions are leased to based aircraft owners on a monthly basis. Pavement surrounding this area serves as a vehicle movement and parking area for visitors and employees.

Airfield Lighting

A variety of lighting aids are available for use at night or during adverse weather conditions at Grand Prairie Municipal Airport.

Identification Lighting

A rotating beacon containing the universally accepted optical system for lighting airports identifies the location of the Airport. This beacon projects alternating green and white beams from dusk to dawn. When activated during daylight hours, the beacon signals Instrument Flight Rule (IFR) conditions. The GPM Airport beacon is located near terminal building.

Runway Lighting Aids

Lighting aids are necessary to provide pilots with critical takeoff and landing information concerning runway alignment, lateral displacement, rollout operations, and distance. **Table 1-7** identifies the lighting aids available for each runway.

Table 1-7: Lighting Aids, GPM

	Runway	
Type of Lighting	17	35
Runway Edge Lights	MIRL	MIRL
Center Line Lights	No	No
Approach Lighting	VASI	VASI/REIL

Source: Airport records, FAA Airport Facility Directory

Notes: MIRL – Medium Intensity Runway Lighting
VASI – Visual Approach Slope Indicator
REIL – Runway End Identifier Lights

Runway edge lights are used to outline edges of runways during periods of darkness or restricted visibility conditions. Both runways are outfitted with white Medium Intensity Runway Lights (MIRL).

A Visual Approach Slope Indicator (VASI) is a series of lights that provides visual guidance during a runway approach. VASI lighting is installed on both ends of the runway. Runway 35 also has Runway End Identifier Lights (REILs) which provide rapid and positive identification of the approach end of the runway.

Navigational Aids

GPM has several navigational aids, which are visual or electronic devices that provide point-to-point guidance information or position data to aircraft in flight. The navigational aids for each runway are shown below in **Table 1-8**.

Table 1-8: Navigational Aids, GPM

Runway	Navigational Aids
17	None
35	VOR/DME, GPS

Source: Airport records, FAA Airport Facility Directory

Grand Prairie Municipal Airport has two instrument approaches providing non-precision guidance to Runway 35. These non-precision approaches (GPS/RNAV and VOR/DME) provide lateral guidance only (no vertical guidance), and require a minimum 2 ¼ mile visibility. The Airport also has seven instrument departure procedures in place for Runway 17. However, due to potential airspace procedural conflicts with nearby Dallas/Ft. Worth International Airport, instrument approach procedures for Runway 17 and instrument departure procedures for Runway 35 do not exist at the Airport. This restriction can sometimes limit operations at the Airport during inclement weather and/or when pilots seek the reassurance and flexibility that comes with multiple approach and departure alternatives.

Obstructions

The analysis of obstructions is based on criteria defined in FAR Part 77, Objects Affecting Navigable Airspace. A primary focus of Part 77 is the establishment of standards for determining obstructions to safe flight on and in the vicinity of an airport, as well as setting forth requirements for notifying the FAA of certain proposed construction or alteration activities and providing for aeronautical studies of obstructions to air navigation. While it is the responsibility of the FAA to determine the effect of these obstructions on the safe and efficient use of airspace, it is the airport operator who has the responsibility to ensure that the aerial approaches to the airport remain adequately cleared and protected.

To determine whether an object is an obstruction to air navigation, Part 77 establishes several imaginary surfaces in relation to an airport and to each runway end. The size of the imaginary surfaces depends upon the type of approach to the runway in question. The principal imaginary surfaces include:

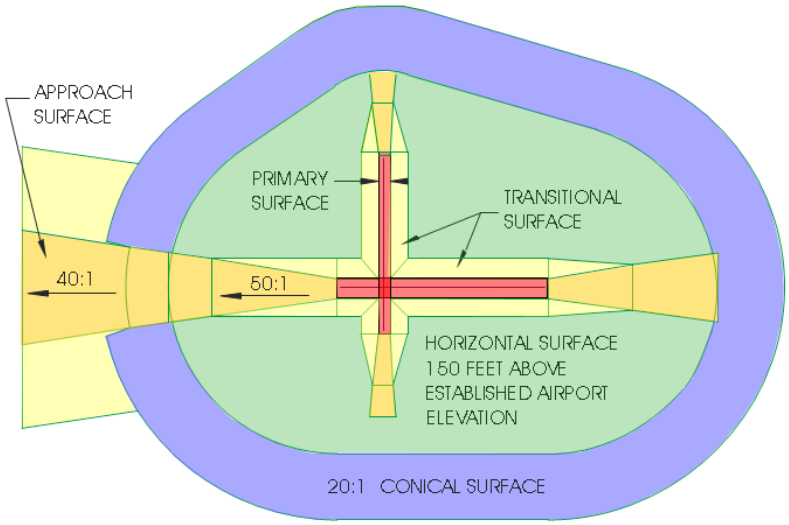
- Primary Surface: Longitudinally centered on the runway at the same elevation as the nearest point on the runway centerline.
- Horizontal Surface: Located 150 feet above the established airport elevation, the perimeter of which is established by swinging arcs of

specified radii from the center of each the primary surface end, connected via tangent lines.

- Conical Surface: Extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.
- Approach Surface: Longitudinally centered on the extended centerline, and extending outward and upward from each runway end at a designated slope based on the runway approach.
- Transitional Surface: Extends outward and upward at a right angle to the runway centerline at a slope of 7:1 up to the horizontal surface.

Figure 1-6 shows a graphic representation of the typical Part 77 imaginary surfaces that exist around an airport. Part 77 surfaces unique to GPM will be presented in the Airport Layout Plan.

Figure 1-6: Part 77 Isometric



Published approach and departure procedures for GPM were reviewed as they relate to obstructions to the Part 77 surfaces in the vicinity of the Airport. **Table 1-9** documents some of the known obstructions at GPM.

Table 1-9: Obstructions, GPM

Runway	Obstruction	Distance from Departure End	Distance from Centerline	Height above Ground (ft.)
17	Antenna	190'	456'	26'
	Road, Poles, Signs	570'	410'	31'
	Tree	1,506'	517'	37'
35	Tree	837'	204'	100'
	Pole	2,687'	122'	75'

Source: FAA Departure Procedures, June 2011

Terminal/Landside Facilities

In addition to aviation and airfield related facilities located on the Airport property, many buildings and other aviation-related facilities are located along the Airport periphery. Some of these buildings are owned by the Airport and house either GPM-related functions or are leased to tenants. Other buildings are privately owned and the land on which they sit is leased from the Airport.

Terminal Building

A new terminal building was opened in August 2011. It is centrally located along the Airport's eastern boundary where the previous terminal building once stood. It houses administrative offices, service desk, restaurant, pilot lounge, flight planning area and a conference room.

Hangars

There are currently 27 buildings at Grand Prairie Municipal Airport, which offer a mix of conventional, box and T-hangar aircraft storage space. Commercial/Corporate hangars provide a large, open space free from roof support structures, have the capability to accommodate several aircraft simultaneously, and are typically 10,000 square feet or greater. Smaller corporate hangars, referred to as executive hangars, provide the same type of aircraft storage as corporate hangars but are normally less than 10,000 square feet. Typical users of executive hangars are aircraft owners having larger, more sophisticated aircraft such as corporate jets and/or own multiple aircraft.

T-hangars provide individual hangars within a larger contiguous building. T-hangars are the most basic and affordable form of aircraft hangar infrastructure available to aircraft owners. Generally, they are built to hangar a single-engine to a light twin-engine aircraft. Aircraft larger than these will require conventional hangar space. T-Hangar facilities provide an area of approximately 1,300 square feet per individual storage unit.

GPM's entire hangar facility complex is aligned along the Airport's eastern boundary with the terminal apron (the Airport's primary GA ramp) centered

nearby. Presently, all of the T-Hangar positions on the airfield are occupied and there is a waiting list to obtain space. The following provides a brief description of the Airport's hangar facilities.

Commercial/Corporate Hangars – The Airport has four corporate hangars of varying size. These hangars house either commercial aviation-related businesses or corporate aircraft. **Figure 1-7** shows some of the commercial/corporate hangars found at GPM.

Figure 1-7: Commercial/Corporate Hangars

Source: Airport Site Visit

T-Hangars – In addition to the commercial/corporate hangars, Grand Prairie Municipal Airport has 23 T-hangar buildings providing 258 aircraft positions. The quality, condition and features of these facilities vary widely and include amenities depending on the tenant's budget. Facilities include shade structures with open access, portable structures with basic features, and permanent hangars with high-end features such as electric bi-fold doors and shared restroom facilities. **Figure 1-8** shows some of the various types of T-hangar facilities at GPM.

Figure 1-8: T-Hangars

Source: Airport Site Visit

Other Hangars – While corporate and T-hangar facilities represent the majority of aircraft storage at Grand Prairie Municipal Airport, several businesses and commercial operators at the Airport lease land from the city in order to construct, own and maintain their own hangar facilities. CareFlite is one such company which leases land and owns a hangar in the northeast portion of the Airport.

Grand Prairie Fire Department

Aircraft rescue and fire fighting services for the Airport are provided by the city of Grand Prairie through Fire Station #5 located near the terminal building within airport property. Although not required by the FAA for the operation and certification of the Airport, this station provides convenient emergency response capabilities for the Airport.

Fuel Farm

GPM owns and controls underground fuel storage tanks totaling 3,600 gallons (2,400 for Jet A and 1,200 for 100 LL). The Airport's FBO is owned and operated by Aviator Air Centers, Inc., which provides fuel (100LL and Jet A) and services for based and transient aircraft. The Airport also sells fuel directly to pilots through its 100LL and Jet A self-service fueling stations. However, fuel sales provided through truck delivery and pumped by ground service agents are available only through the FBO. The FBO has a Jet A fuel truck with a capacity of approximately 750 gallons and a 100 LL fuel truck with a capacity of approximately 500 gallons.

Table 1-10 provides an overview of Grand Prairie Municipal Airport's landside facilities and details the type of hangars found at the Airport and their specific storage capabilities.

Table 1-10: Landside Facilities

Number	Facility Type	Number of Aircraft Storage Units
14N	Conventional Hangar (13,500 sq. ft.)	1
13N	Vacant land	-
12N	Individual Hangar (6,000 sq. ft.)	1
10N	Individual Hangar (16,000 sq. ft.)	3
9N	Individual Hangar (16,000 sq. ft.)	3
8N	T-hangars (13,500 sq. ft.)	10
7N	T-hangars (10,000 sq. ft.)	10
6N	T-hangars (10,000 sq. ft.)	11
5N	T-hangars (10,000 sq. ft.)	10
4N	T-hangars (10,000 sq. ft.)	8
3N	T-hangars (10,000 sq. ft.)	8
2N	Vacant Land	-
1	New Terminal Building	-
2S	Aircraft Service Office	-
3S	Paint Hangar (2,500 sq. ft.)	-
4S	Conventional Hangar (9,000 sq. ft.)	Varies
5S	T-hangars (10,000 sq. ft.)	8
6S	T-hangars (10,000 sq. ft.)	8
7S	T-hangars (10,000 sq. ft.)	8
8S	T-hangars (13,250 sq. ft.)	12
9S	Grand Prairie Fire Department	-
10S	Corporate Hangar (9,600 sq. ft.)	Varies
11S	T-hangars (15,000 sq. ft.)	14
12S	T-hangars (15,000 sq. ft.)	14
13S	T-hangars (15,000 sq. ft.)	14
14S	T-hangars (15,000 sq. ft.)	14
15S	T-hangars (15,000 sq. ft.)	14
16S	T-hangars (13,500 sq. ft.)	12
17S	T-hangars (13,500 sq. ft.)	12
18S	T-hangars (13,500 sq. ft.)	12
19S	T-hangars (13,500 sq. ft.)	12
20S	T-hangars (13,500 sq. ft.)	12
21S	T-hangars (13,500 sq. ft.)	12
22S	T-hangars (13,500 sq. ft.)	12
23S	T-hangars (13,500 sq. ft.)	10

Source: Airport records, 2003 Airport Master Plan

1.4 Airspace, Air Traffic Control and Weather

On an average day in the U.S., approximately 50,000 general aviation and commercial aircraft depart an airport en route to another destination. As the volume of air traffic has grown so significantly over the history of aviation, there has been an increasing need to regulate the efficient use of airspace. The Federal Aviation Act of 1958 established the FAA as the responsible agency for the control and use of navigable airspace within the U.S.

The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS covers the common network of U.S. airspace, including air navigation facilities, airports and landing areas, aeronautical charts, associated rules, regulations, and procedures, technical information, and personnel and material. The system also includes components shared jointly with the military.

Administratively, control of air traffic at GPM is assigned to the FAA's Southwest Region located in Ft. Worth, Texas. The on-site control tower is managed and operated by an FAA contractor from 7am until 9pm each day. It is common that airport facilities such as GPM have contract towers operated by private companies in order to make better use of FAA resources.

Regional Airspace

Airspace in the U.S. is classified generally as controlled, uncontrolled, or special use. Controlled airspace encompasses those areas where there are specific certification, communication, and navigation equipment requirements that pilots and aircraft must meet in order to operate in that airspace.

The U.S. airspace is further divided into seven classes, each of which has different rules and regulations. These classes are:

- Class A: This is designated for positive control of the aircraft. This area of airspace ranges from 18,000 feet above MSL to 60,000 feet above MSL. Within Class A airspace, only Instrument Flight Rules (IFR)[1] operations are authorized. The aircraft must have specific equipment and an air traffic control (ATC) clearance before entering the airspace.
- Class B: This is multi-layered airspace from the surface of the earth up to a defined height (MSL) specifically determined for the airport which it serves. It is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high performance

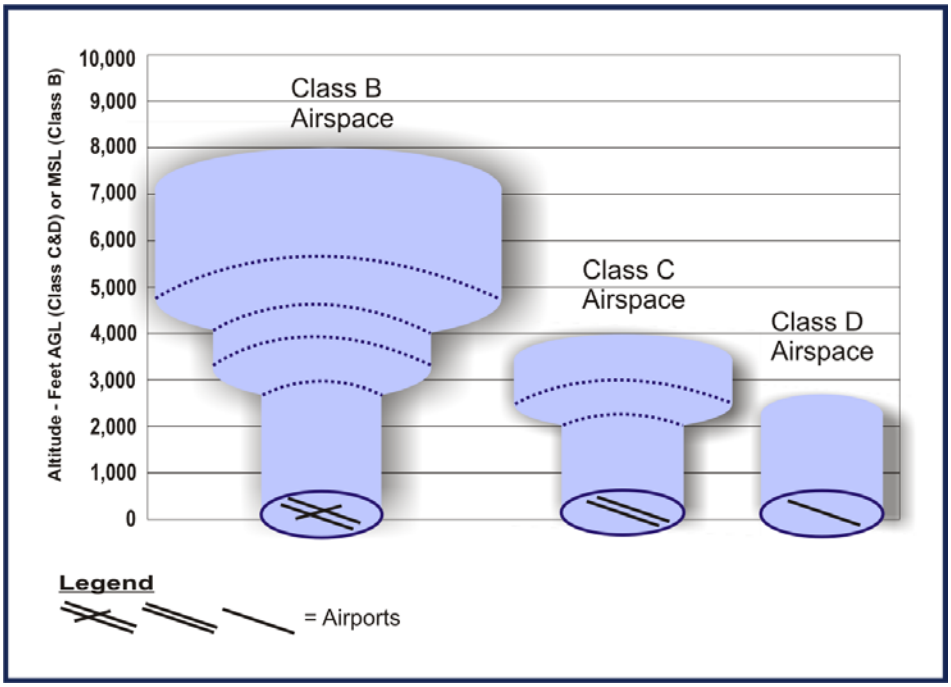
[1] IFR refers to procedures used by pilots when operating in accordance with Federal Aviation Regulations (FAR) that require an instrument flight plan.

aircraft at major airports. The aircraft must have specific equipment and an ATC clearance before entering the airspace.

- Class C: This airspace is defined around airports with ATCTs and radar approach control facilities. The top of Class C airspace is normally 4,000 feet above ground level (AGL). The aircraft must have specific equipment and must have established communications with the ATC facility having jurisdiction over the airspace before entering the airspace.
- Class D: This airspace is normally a circular area with a radius of four to five nautical miles around the primary airport and may include extensions necessary to include instrument approach and departure paths. Its height may vary based on characteristics found at the airport and in the surrounding areas. Class D airspace does not have radar approach control facilities.
- Class E: This is a general category that contains controlled airspace previously designated as control zones for non-towered airports, airspace transition areas, and Federal airways.
- Special Use Airspace (SUA): An area wherein activities must be confined because of their nature or wherein limitations are imposed on aircraft operations not part of those activities. SUA is generally classified as a Restricted, Prohibited, or Military Operations Area (MOA).
- Class G: Airspace not designated as Class A, B, C, D, E, or SUA is considered uncontrolled and is classified as Class G.

Figure 1-9 illustrates a profile perspective of the Class B, C, and D airspaces that surround towered airports throughout the country. This graphic shows the general shape of the airspace over each type of airport. The exact dimensions of these airspaces may vary depending on the unique characteristics surrounding a specific airport.

Figure 1-9: Generic Airport Airspace Profiles



Several other airports with Class B, C or D airspace surround the city of Grand Prairie and neighboring communities. Nearby public-use airports and their relative characteristics are summarized and ordered by proximity to GPM in **Table 1-11**.

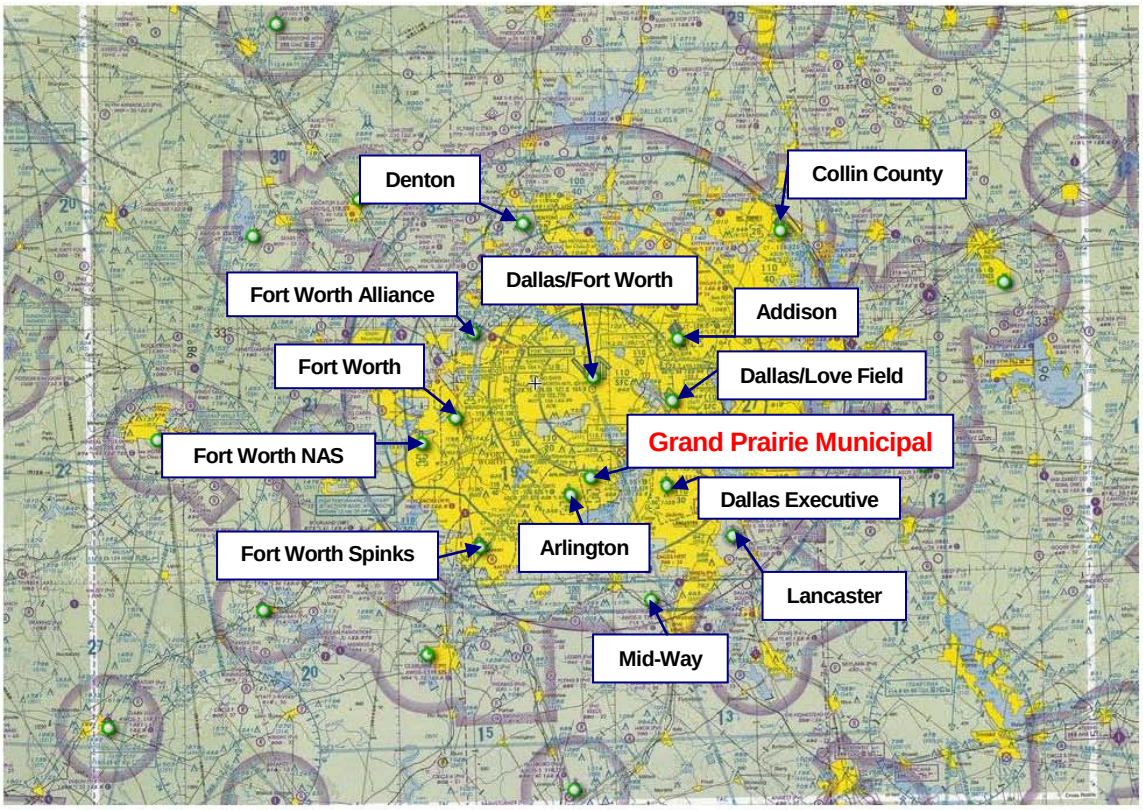
Table 1-11: Area Airports, Dallas-Ft. Worth Region

Airport	Airport Identifier	Distance to GPM	Runway Length (Max.)	Based Aircraft
Grand Prairie Municipal	**GPM**	**N/A**	**4,001'**	**236**
Arlington Municipal	GKY	3 nm	6,080'	250
Dallas Executive	RBD	9 nm	6,451'	96
Dallas/Fort Worth International	DFW	12 nm	13,401'	N/A
Dallas Love Field	DAL	13 nm	8,800'	735
Fort Worth Spinks	FWS	15 nm	6,002'	170
Mid-Way Regional Airport	JWY	16 nm	6,500'	74
Fort Worth Meacham	FTW	17 nm	7,501'	240
Lancaster Regional	LNC	18 nm	6,502'	140
Addison Airport	ADS	19 nm	7,202'	603
Fort Worth Alliance	AFW	22nm	9,600'	29

Source: www.Airnav.com and Form 5010 Airport Master Records

The locations of these and other aeronautical features of the region are illustrated in **Figure 1-10**.

Figure 1-10: Dallas Fort Worth Area, Dallas –Ft. Worth Sectional *(March 2011)*



Source: http://skyvector.com/

Air Traffic Control

FAA Order 7110.65M, Air Traffic Control (ATC), establishes that the primary purpose of the ATC system is safety and further states that the "primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic." ATC is the means by which aircraft are directed and separated within controlled airspace.

ATC is managed by three different FAA facilities depending on where the aircraft is located within the airspace. Air Route Traffic Control Centers (ARTCC) separate participating aircraft traveling between airports. The ARTCC for GPM is the Fort Worth Air Route Traffic Control Center.

At airports with high volumes of traffic, the responsibility for separating traffic within the airport area is delegated to an ATCT and/or a Terminal Radar Approach Control Facility (TRACON). An ATCT controls aircraft arriving to and departing from GPM. The Grand Prairie Municipal Airport ATCT is located on the western edge of the airport boundary. However, there are plans to relocate the

tower near the new terminal building. The ATCT coordinates the movement of all aircraft within a five-mile radius of the Airport up to an altitude of 2,000 feet above the ground.

Meteorological Conditions

Weather conditions play an important role in the operational capabilities of an airport. Temperature and humidity are important factors in determining the length of runway required for aircraft takeoffs and landings. High temperatures and humidity levels in the summer months result in longer runway length requirements. In addition, wind speed and direction determine runway orientation and therefore, dictate the period of time a particular runway may be in use. Periods of low visibility due to weather conditions are a major factor in determining the need for instrument aids.

In order to determine these conditions at GPM, 10 years of hourly weather data collected by the weather station at DFW were analyzed during the previous master plan and are carried forward in this study. The analysis of the data was focused on temperature, wind, ceiling, and visibility. The average annual temperature for the region is 66 degrees Fahrenheit. During the month of July, the region's hottest month, the average high temperature is 85 degrees Fahrenheit.

The direction and speed of the wind affects the direction in which traffic at an airport operates. The FAA recommends that an airport's runway configuration provide coverage during approximately 95 percent of all weather conditions. The 95 percent wind coverage requirement is computed on the basis of the crosswind not exceeding the thresholds defined in Advisory Circular 150/5300-13. Associated wind coverage for each runway and aircraft group at GPM is presented in **Table 1-12**. Combined, the runways provide the required coverage for all aircraft types.

Table 1-12: Runway Wind Coverage, GPM

Runway	Wind Velocity	Wind Coverage
17-35	10.5 knots	96.07%
	13 knots	98.16%
	16 knots	99.49%
	20 knots	99.87%

Source: 2003 Master Plan Source Station: Dallas – Fort Worth International Airport
Observation Period: 1988 through 1997 (85,043 observations)

Independent of the wind direction, the ceiling and visibility conditions at an airport determine the ATC procedures in effect. Ceiling is the height above the earth's surface of the lowest layer of clouds not classified as "thin" or "partial." Visibility is the ability to see and identify prominent unlighted objects by day and prominent lighted objects by night. Ceiling and visibility vary with cloud conditions, fog, precipitation, and haze. Operating conditions at GPM as they relate to weather

are grouped into two categories: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). VFR is in effect when the cloud ceiling is greater than or equal to 1,000 feet and visibility is greater than or equal to three miles. IFR conditions prevail when the visibility or cloud ceiling falls below those minimums prescribed under VFR.

1.5 Summary

This inventory chapter represents a consolidated source of airport data that will be referenced during the completion of the GPM Airport Master Plan. When necessary, data presented in this chapter will be expanded on for the completion of specific master planning tasks. In addition, as the master plan progresses, new and/or updated data related to facilities and infrastructure examined in this chapter may become available. When appropriate, new data will be incorporated into this chapter and the entire GPM Airport Master Plan Report.

The inventory data presented in this chapter provides a framework from which analysis in the GPM Master Plan will proceed. Some inventory data, such as the Airport's history, provides general background knowledge. Other types of inventory data, such as Airport role, historic activity, area socioeconomic trends, and existing Airport facilities are used to develop forecasts of future activity levels at the Airport and to determine future facility requirements. Much of the data presented in this chapter is used to conduct numerous analyses as the master planning process works towards identifying a recommended development plan for GPM.

Chapter
2

Forecast of Aviation Demand

Projecting future aviation demand is a critical element in the overall master planning process. The activity forecasts developed in this chapter will be used in subsequent tasks to determine the characteristics of future airside and landside facility developments.

This chapter discusses the findings and methodologies used to project aviation demand at Grand Prairie Municipal Airport (GPM). It must be recognized that there are always short-term fluctuations in an airport's activity due to a variety of factors that cannot be anticipated. The forecasts developed in the Master Plan Update provide a meaningful framework to guide the analysis of future Airport development needs and alternatives.

The projections of aviation demand developed for GPM are documented in the following sections:

- Regional Demographics
- Historic Aviation Activity
- National General Aviation Trends – FAA Aerospace Forecasts
- Texas Aviation Trends and Forecast
- Projections of Aviation Demand – Grand Prairie Municipal Airport
  - Based Aircraft Projections
  - Aircraft Operations Projections
- Critical Aircraft
- Summary

This forecast analysis includes methodologies that consider historical aviation trends at GPM and throughout the nation. Local historical data were collected from FAA Terminal Area Forecast (TAF) records, Airport records, and the 2003 Grand Prairie Municipal Airport Master Plan Update. In addition, demographic data for the Dallas-Fort Worth-Arlington MSA, informally known as the Dallas-Fort Worth Metroplex, were used to track local trends and conditions that can impact general aviation demand levels. Projections of aviation activity for the Airport were prepared for the near-term (2015), mid-term (2020), and long-term (2025 and 2030) timeframes. These projections are generally unconstrained and assume the Airport will be able to develop the various facilities necessary to accommodate based aircraft and future operations.

2.1 Regional Demographics

Regional population and employment data were examined in detail in the preceding inventory chapter. Where applicable, this demographic data can be used in the master planning process to relate future aviation activity levels at GPM to area demographic trends. The Dallas-Fort Worth Metroplex includes the following counties: Collin, Dallas, Denton, Ellis, Johnson, Rockwall, Tarrant. As a whole, the Dallas-Fort Worth Metroplex and its surrounding counties, cities, and towns have experienced growth over the past 19 years. This analysis examines the historical trends and future projections of the region's population, employment and earnings. Several reliable data sources were utilized. Historic and projected future population data was obtained from the U.S. Census as well as the Grand Prairie Municipal Airport Strategic Market Assessment. Employment and earnings data was compiled from the U.S. Bureaus of Labor Statistics and Economic Analysis as well as projections from Woods & Poole Economics, Inc.

Table 2-1 summarizes population growth trends experienced between 1990 and 2009 for the counties in the area, Dallas-Fort Worth Metroplex, and in the state. The Dallas-Fort Worth Metroplex was included in this analysis based on the assumption that the market area of Grand Prairie Municipal expands beyond the borders of the city of Grand Prairie. Trends impacting cities and towns within the region may impact Grand Prairie Municipal Airport. These trends are compared to population trends in Texas and the United States.

Table 2-1: Population Growth Statistics

Area	1990	2000	2009	CAGR[1]
Metroplex Counties				
Collin County	266,856	500,162	791,631	5.9%
Dallas County	1,863,546	2,225,371	2,451,730	1.5%
Denton County	276,436	438,994	658,616	4.7%
Ellis County	85,407	112,394	151,737	3.1%
Johnson County	97,258	127,978	156,997	2.6%
Rockwall County	25,918	43,880	81,391	6.2%
Tarrant County	1,177,220	1,454,402	1,789,900	2.2%
Dallas-Fort Worth Metroplex	**3,792,641**	**4,903,181**	**6,082,002**	2.5%
State of Texas	**17,056,755**	**20,945,963**	**24,782,302**	2.0%
United States	**249,622,814**	**282,171,957**	**307,006,550**	1.1%

Source: 1990, 2000, and 2009 data from U.S. Census
[1] CAGR = Compound Annual Growth Rate 1990-2009

Historical population growth in the Dallas-Fort Worth Metroplex region has outpaced the growth rates of both the entire state of Texas and the entire United States, averaging 2.5 percent compound annual growth rate (CAGR) from 1990 to 2009. All seven Metroplex counties experienced growth rates over 1.5 percent, with the highest being Rockwall and Collin Counties at 6.2 and 5.9 percent CAGR, respectively. Growth within the state of Texas has outpaced that of the national average, with a CAGR of 2.0 percent from 1990 to 2009. The fact that Texas's growth rate exceeded the national average is largely due to economic success of the major city centers within the state, particularly those of the Metroplex region. Some of the largest cities in the country are in the Metroplex (including Dallas and Fort Worth) and drive much of the overall population and economic growth in the region.

There are a number of demographic factors that impact, to varying degrees, the demand for general aviation in any particular region. In addition to population trends, regional economic trends also can significantly impact aviation demand. Regional economic trends are summarized in this analysis through an examination of employment and earnings data. **Table 2-2** presents historic employment and earnings data for the Dallas-Fort Worth Metroplex.

Table 2-2: Regional Economic Trends

Year	Metroplex Employment	Metroplex Personal Income ($ thousands)
2000	2,600,283	170,022,693
2001	2,612,075	175,822,574
2002	2,603,746	177,794,509
2003	2,600,529	182,644,518
2004	2,666,217	195,051,746
2005	2,697,697	210,937,893
2006	2,752,290	228,917,441
2007	2,789,036	243,966,066
2008	2,800,282	262,932,786
2009	2,757,271	257,119,025
Metroplex CAGR		
2000 - 2009	0.7%	4.7%
2007 - 2009	-0.6%	2.7%
Texas CAGR		
2000 - 2009	1.7%	5.4%
2007 - 2009	0.1%	4.0%
U.S. CAGR		
2000 - 2009	0.6%	4.0%
2007 - 2009	-0.4%	1.1%

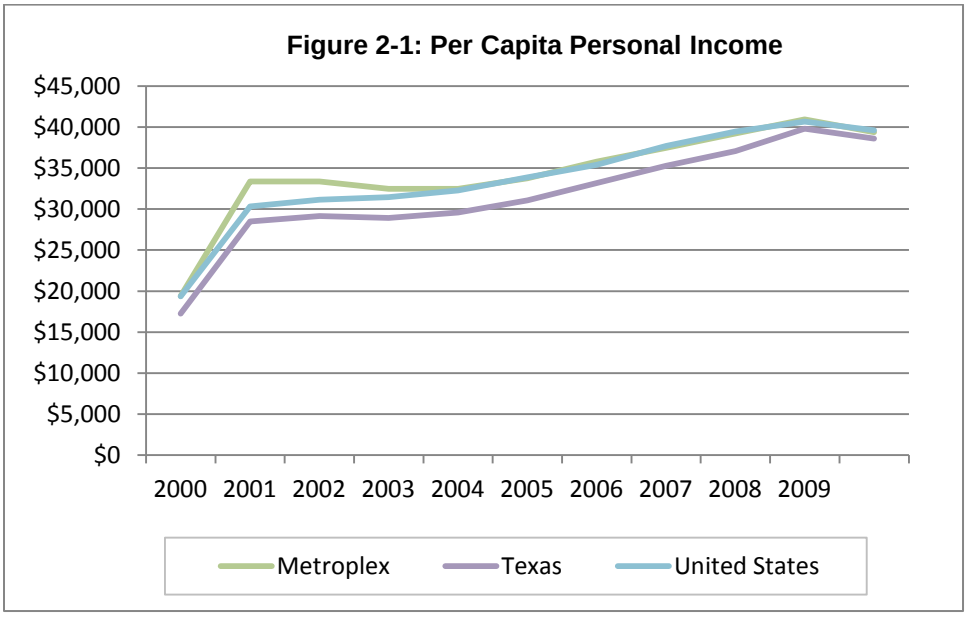
Source: Employment - U.S. Bureau of Labor Statistics. Earnings – U.S. Bureau of Economic Analysis
2010 Census employment data not available as of June 2011

Data presented in Table 2-2 indicates that in the Dallas-Fort Worth Metroplex, compound growth in employment averaged 0.7 percent annually from 2000 to 2009. This is less than half the state average of 1.7 percent, but greater than the national average of 0.6 percent. When observing the recessionary period of 2007 to 2009, the Metroplex and U.S. both experienced negative employment growth, while the state saw minimal employment growth.

Regional personal income can be one of the most important demographic factors influencing aviation demand, illustrating an underlying assumption that as personal income, and consequently discretionary income grows; regional residents have more to spend on all goods and services, including aviation-related goods and services. Personal income in the Dallas-Fort Worth Metroplex grew at an average annual compound growth rate of 4.7 percent between 2000 and 2009. This is below the state average of 5.4 percent, but above the national average of 4.0 percent.

The regional economic growth experienced in the Metroplex area could influence future aviation activity at Grand Prairie Municipal. Growth in personal income has slowed in recent years (2.7 percent between 2007 and 2009), indicating reduced regional potential. The Dallas-Fort Worth Metroplex region's personal income growth was outpaced by the state average of 4.0 percent, but greater than the national average of 1.1 percent between 2007 and 2009. On the state level, the large cities such as Dallas, Houston and Austin influence much of the economic growth in Texas.

The difference in personal income growth in the Metroplex and other parts of the state and nation demonstrates a large financial sector of the economy which exhibits less stability than other parts of the state and country. The 2007/2009 recession in Texas had a greater impact on larger cities in Texas, especially Dallas, Houston, and Austin. This is due, in part, to large businesses in high growth industries within these cities observing reduced sales and reductions in workforce. Unfortunately, economic stability does not guarantee economic growth. Rather, economic growth occurs because of relatively high levels of concentration in fast growing industries. Localized economies in high growth industries typically fuel faster rates of new business formations and expansion that become the basis for more specialized and higher paying occupations. Based on the data provided above, the Metroplex's average per capita income is estimated to be about $39,393 which is higher than the state average.



Source: U.S. Bureau of Economic Analysis

Figure 2-1 shows that income per capita in the Metroplex kept pace with the national averages and exceeded the state averages. However, the gap narrowed during 2008 - 2009 timeframe due to stronger recessionary forces in higher growth industries that developed in Texas' larger cities. The Dallas-Fort Worth Metroplex shows signs of building on recent growth momentum based on its economic stability and resiliency. However, the Metroplex continues to face the challenge of competition from other areas of the country and state as they seek to achieve some of the economies that are driving metro areas toward higher rates of growth in per capita income.

Projections of population, employment, and personal income developed for the Dallas-Fort Worth Metroplex illustrate continued growth in these demographic indicators, albeit at levels slightly different than experienced between 2000 and 2009. **Table 2-3** summarizes the projections of population, employment and personal income for the region.

Table 2-3: Metroplex Demographic Projections

Year	Population	Employment	Personal Income ($ thousands)
2009	6,082,002	2,757,271	257,119,025
Projected			
2015	7,083,817	4,133,530	256,334,350
2020	8,089,587	4,458,450	295,358,820
2025	9,268,413	4,807,030	341,950,940
2030	10,637,324	5,180,880	393,741,940
CAGR	2.7%	3.0%	2.1%

Source: Population – Texas State Data Center, using scenario 2000-2007
Employment – Bureau of Labor & Statistics and Woods & Poole
Personal Income – Woods & Poole Economics, Inc. 2011

The projected growth rates of personal income demographics are lower than historical trends, reflecting a loss in regional economic growth over the projection period. Population and employment demographics are expected to be higher than historical trends, indicating a strong recovery from the slowed growth experienced between 2007 and 2009. All three categories show positive compound annual growth rates, indicating the potential for growth in aviation activity.

2.2 Historic Aviation Activity

Forecasting activity at GPM poses a unique challenge compared to most airport forecasts. While the Airport is a general aviation facility, the activity consists of a unique mixture of training flights, aviation industry activity and transient flights. This forecast will evaluate local and regional trends related to aviation growth, as found in many airport forecasts and highlighted in the previous section, but it will also look at the unique mix of aircraft and operational nature found at the Airport in order to develop a forecast which encompasses regional influences as well as characteristics found only at GPM.

Historic based aircraft and operations data for GPM provides the baseline from which future activity at the Airport can be projected. While historic trends are not always reflective of future periods, historic data does provide insight into how local, regional, and national demographic and aviation-related trends may be tied to an airport.

Historic activity data for GPM has been compiled from several sources including Airport and ATCT records. Information from the previous (2003) master plan was also used as applicable. Some activity data for years for which no actual or estimated data was available have been interpolated by the consultant.

For the purposes of the following analysis, a based aircraft is generally defined as an aircraft that is permanently stored at an airport. An aircraft operation represents either a landing or departure conducted by an aircraft. A takeoff and a landing, for example, would count as two operations.

It should be noted that, typically, the FAA Terminal Area Forecast (TAF) presents information obtained for operations and based aircraft data collected during the 5010 inspection process. The based aircraft data is not necessarily accurate as it is generally estimated at the the time of inspection. In some cases, annual inspections are not always completed within a calendar year and based aircraft data may be carried forward to the next year. The most recent data from the Airport Inventory and Data Survey conducted as a part of this study indicates that the number of based aircraft has increased to 236 in 2010.

Table 2-4: Historic Based Aircraft, GPM

Year	Single Engine	Multi-Engine	Helicopter	Jet	Total
1980	149	21	0	0	170
1981	144	21	1	0	166
1982	139	20	1	0	160
1983	150	20	3	0	173
1984	150	20	2	0	172
1985	152	30	7	0	189
1986	233	54	3	1	291
1987	233	54	3	1	291
1988	233	54	3	0	290
1989	229	49	7	0	285
1990	246	32	12	0	290
1991	246	32	12	0	290
1992	289	43	18	0	350
1993	289	43	18	0	350
1994	289	43	18	0	350
1995	236	17	34	0	287
1996	236	17	34	0	287
1997	236	17	34	0	287
1998	236	17	34	0	287
1999	236	17	34	0	287
2000	236	17	34	0	287
2001	236	17	34	0	287
2002	236	17	34	0	287
2003	236	17	34	0	287
2004	236	17	34	0	287
2005	236	17	34	0	287
2006	236	17	34	0	287
2007	236	17	34	0	287
2008	177	19	2	1	199
2009	177	19	2	1	199
2010	198	18	20	0	236
2011	198	18	20	0	236
CAGR[1]					
1980 – 2010	1.0%	-0.5%	100.0%	100.0%	1.1%
1990 – 2010	-1.1%	-2.8%	2.6%	100.0%	-1.0%
2000 – 2010	-1.7%	0.6%	-5.2%	100.0%	-1.9%

Source: 1980 – 2009 FAA Terminal Area Forecast, 2010 Airport Records
[1] CAGR = Compound Annual Growth Rate

It is unlikely that GPM maintained 287 aircraft between 1996 and 2007, as it is more likely that the actual figure was either slightly higher or lower than this figure. Very few airports have an accurate historic account of based aircraft due to shifting demand and multiple aircraft stored in single hangars. The estimates do however, present an educated estimate of activity and are useful in developing based aircraft trends for forecasting purposes.

According to the TAF, the number of aircraft based at GPM remained fairly consistent over the past 15 years, only recently decreasing to 199 in 2008. The based aircraft count was at a peak from 1992 to 1994, with 350 aircraft. In the mid-1990's the number of aircraft based at the Airport decreased greatly, with the number of single-engine and multi-engine diminishing, while based helicopter aircraft grew significantly. Single-engine piston aircraft have suffered the greatest loss since the early 1990's. Factors causing this drop may include:

- The likely increase in aircraft storage costs and pilots relocating their aircraft to other airports.
- The increase in fuel and operating costs associated with aircraft ownership may have reduced the number of privately owned aircraft.
- Regional airport competition due to GPM's congested airspace.
- Advances in telecommunications technology reduce the need for travel.
- There may also be discrepancies in the data as reported by the FAA Terminal Area Forecast versus data from the 5010 forms.

Annual operations represent the number of aircraft takeoffs and landings occurring at the Airport during a calendar year. Historic operations data for GPM includes operations conducted by both based aircraft as well as those conducted by itinerant aircraft stored at other airports arriving at GPM for a variety of reasons including business, recreation, or flight training purposes. Historic aircraft operations data for GPM are summarized in **Table 2-5**.

As with based aircraft records, historic operations are sometimes inaccurate and may vary between data recorded at the FAA and the airport. Estimates present an educated guess of activity and are useful in developing operational trends for forecasting purposes.

Historic operations presented in the following table present available data for the Airport. For activity from 1990 to 2009, data was collected from the FAA Terminal Area Forecast. Records for 2010 activity were collected directly from the Airport via the ATCT. It is estimated the 15 percent of the total operations at GPM occur at night, when the ATCT is closed.

It is important to note the dramatic decline in operations shown for the Airport from 2009 to 2010. Part of the reason for the decline may be market driven. Recording methods, however, may play a role as well. Data reported by the FAA

for the TAF do not always match data collected by an airport. This may explain part of the significant difference in aircraft operations from one period to the next. Operations data for 2009 was collected from the FAA TAF where as 2010 data are based on actual operations during tower hours. Approximately 15 percent additional operations occur at night. An example of the differences between the data records can be seen in recent years. In 2007, the airport tower reported 93,849 (not including night operations) while the TAF showed 87,805. In 2008, airport records showed 96,321 day time operations and the TAF showed 101,150. And in 2009, the airport tower reported 80,395 operations and the TAF reported 150,570.

Table 2-5: Historic Operations, GPM

	General Aviation		Military				
Year	Itinerant	Local	Itinerant	Local	Air Taxi[1]	Air Carrier[2]	Total
1990	72,000	123,000	2,000	0	2,000	0	199,000
1991	75,000	125,000	2,000	0	2,000	0	204,000
1992	85,600	149,200	2,000	0	2,000	0	238,800
1993	85,600	149,200	2,000	0	2,000	0	238,800
1994	85,600	149,200	2,000	0	2,000	0	238,800
1995	17,921	18,946	41	39	1	0	36,948
1996	39,138	46,055	122	96	0	0	85,411
1997	38,331	49,798	69	168	0	0	88,366
1998	39,634	49,399	29	26	6	0	89,094
1999	44,088	47,214	11	14	0	0	91,327
2000	43,466	44,776	7	96	0	0	88,345
2001	37,062	45,897	44	404	0	0	83,407
2002	34,442	50,591	102	34	21	0	85,190
2003	30,476	47,249	84	28	0	0	77,837
2004	28,268	38,742	136	32	13	0	67,191
2005	26,872	33,629	118	60	12	0	60,691
2006	26,724	35,244	56	22	81	0	62,127
2007	28,870	58,770	87	26	52	0	87,805
2008	33,103	67,711	52	56	156	72	101,150
2009	56,182	93,681	240	154	313	0	150,570
2010	30,095	50,182	129	82	168	0	80,656
CAGR							
1990 - 2009	-1.3%	-1.4%	-10.6%	100.0%	-9.3%		-1.5%
2000 - 2009	2.9%	8.5%	48.1%	5.4%	100.0%		6.1%
2009 Percent of Total	37.3%	62.2%	0.2%	0.1%	0.2%	0.0%	100.0%

Source: Using total annual operations from FAA TAF 1990 – 2009, 2010 from actual tower records
[1] Air Taxi category represents non-scheduled or for-hire service on aircraft with 60 seats or fewer
[2] Air charter operations

Activity at the GPM has decreased by a total of 24.3 percent, or -1.5 percent annually from 1990 to 2009. As mentioned earlier, the dramatic difference between 2009 and 2010 activity is due, in large part, to the variation in sources (FAA versus Airport).

During the 1990's, activity fluctuated from about 240,000 in 1992 to less than 40,000 in 1995. Activity levels rebounded and, in recent years, increased to about 150,000 annual operations or 6.1 percent annually since 2000.

General aviation traffic represents over 99 percent of the aviation activity at GPM. Local operations comprise over 62 percent of the general aviation traffic, a majority of which are attributable to the helicopter training activities of American Eurocopter, located adjacent to GPM. The Airport's location and services makes it a very convenient airport for itinerant aircraft to land, be serviced or fueled. The Airport has the benefits such as an air traffic control tower, instrument approach procedures, and both aviation gas and jet fuel to attract aircraft passing through the area. For many corporate aircraft, GPM is a logical alternative to the larger commercial airports in the Metroplex due to its central location and relatively uncongested airspace and operating environment. Regional economic growth and future development of the Airport may help to increase the flow of itinerant activity at the Airport. Such development may also increase the number of based aircraft at the Airport. As companies are attracted to the region, corporate flight departments may find interest in basing aircraft at GPM. Although operations at GPM have shown an overall decline, in recent years the number of operations has grown significantly, making the Airport well positioned for future growth.

2.3 National General Aviation Trends – FAA Aerospace Forecasts

The aviation industry and general aviation activity, especially in the North Central Texas region, have experienced significant changes over the last 20 years. At the national level, fluctuating trends regarding general aviation usage and economic upturns/downturns resulting from the nation's business cycle have all impacted general aviation demand. This section will examine general aviation trends, and the numerous factors that have influenced those trends, in the U.S. and the State of Texas.

Recent trends, both national and local, will be important considerations in the development of projections of aviation demand for GPM. National trends can provide insight into the potential future of aviation activity and anticipated facility needs. Data sources that were examined and used to support this analysis of national general aviation trends included the following:

- Federal Aviation Administration, FAA Aerospace Forecasts, 2010-2030
- General Aviation Manufacturers Association (GAMA), General Aviation Statistical Databook

- National Business Aircraft Association, Aviation FactBook, 2010
- General Aviation Statistical Databook, 2010
- Honeywell Corporation, 19th Annual Business Aviation Outlook, 2011

Historic and anticipated trends related to general aviation will be important considerations in developing regional forecasts of aviation demand for GPM. Data from these sources regarding historic and anticipated trends in general aviation will be summarized in the following sections of this report:

- General Aviation Overview
- General Aviation Industry
- Business Use of General Aviation
- Summary of National General Aviation Trends

General Aviation Overview

General aviation aircraft are defined as all aircraft not flown by commercial airlines or the military. General aviation activity is divided into six use categories, as defined by the FAA. There are more than 18,300 public and private airports located throughout the United States, as reported by the FAA. More than 3,300 of these airports, including GPM, are in the National Plan of Integrated Airports (NPIAS), indicating their eligibility for federal funding assistance. Commercial service airports, those that accommodate scheduled airline service, represent a relatively small portion (538 or roughly 16%) of the airports in the National Airport System. General aviation airports, including relievers, comprise more than 2,800 facilities within the National Airport System. More than 15,000 additional airports, both private and public use, supplement those airports that are included in the National Airport System. As a comparison, Texas has an airport system of nearly 300 airports, of which 26 provide scheduled air service.

General Aviation Industry

A pronounced decline in the general aviation industry began in 1978, and lasted throughout most of the 1980s and into the mid-1990s. This decline resulted in the loss of over 100,000 manufacturing jobs and a drop in aircraft production from about 18,000 aircraft annually to only 928 aircraft in 1994 and a dramatic drop in the number of new student pilots.

Contributing to the decline in general aviation during this period was the increasing number of liability claims against aircraft manufacturers, the loss of Veterans Benefits that covered many costs associated with student pilot training, and the recessionary economy. Product liability lawsuits arising from aircraft accidents resulted in dramatic increases in aircraft manufacturing costs. Manufacturers estimated that these liability claims contributed to approximately 30 percent of the cost of a new aircraft.

Enactment of the General Aviation Revitalization Act (GARA) of 1994 provided significant relief to the aviation industry. This Act established an 18-year Statute of Repose on liability related to the manufacture of all general aviation aircraft and their components where no time limit was previously established. GARA spurred manufacturers including Cessna and Piper Aircraft to resume production of single-engine piston general aviation aircraft. While enactment of GARA stimulated production of single-engine piston aircraft, the cost of these aircraft has continued to increase. The relatively high cost of new general aviation aircraft has contributed to significantly lower levels of aircraft production from those experienced during the 1960's and 1970's when the annual numbers of aircraft manufactured were commonly between 10,000 and 18,000 new aircraft per year.

Some positive impacts the Act has had on the general aviation industry are reflected in recent national statistics. Since 1994, statistics indicate an increase in general aviation activity, an increase in the active general aviation aircraft fleet, and an increase in shipments of fixed-wing general aviation aircraft.

Most recently, however, the terrorist attacks of September 11, 2001 and the 2007 recessionary national economy have had a dampening impact on these positive general aviation industry trends. Significant restrictions were placed on general aviation flying following September 11th, which resulted in severe limitations being placed on general aviation activity in many areas of the country. Most of these restrictions have now been lifted and business and corporate general aviation have experienced some positive gains resulting from additional use of general aviation aircraft for business and corporate travel tied in part to new security measures implemented at commercial service airports and the increased personal travel times that have resulted.

Business Use of Aviation

Business aviation is one of the fastest growing facets of general aviation. Companies and individuals use aircraft as a tool to improve their businesses efficiency and productivity. The terms business and corporate aircraft are often used interchangeably, as they both refer to aircraft used to support a business enterprise.

The FAA defines business use as "any use of an aircraft (not for compensation or hire) by an individual for transportation required by the business in which the individual is engaged." The FAA estimates that business aircraft conducts slightly more than 11 percent of all aviation activity. The FAA defines corporate/executive transportation as "any use of an aircraft by a corporation, company or other organization (not for compensation or hire) for the purposes of transporting its employees and/or property, and employing professional pilots for the operation of the aircraft." An additional 12 percent of the nation's general aviation activity is considered corporate. Regardless of the

terminology used, the business/corporate component of general aviation use is one that has experienced significant recent growth.

Increased productivity is one of the most important benefits of using business aircraft. Companies flying general aviation aircraft for business have control of their travel. Itineraries can be changed as needed, and the aircraft can fly into destinations not served by scheduled airlines. Business aircraft usage provides:

- Employee time savings
- Increased enroute productivity
- Minimized time away from home
- Enhanced industrial security
- Enhanced personal safety
- Management control over scheduling

Many of the nation's employers who use general aviation are members of the National Business Aircraft Association (NBAA). The NBAA's Business Aviation Fact Book 2004 indicates that approximately 75 percent of all Fortune 500 businesses operate general aviation aircraft and 92 of the Fortune 100 companies operate general aviation aircraft. Business use of general aviation aircraft ranges from small, single-engine aircraft rentals to multiple aircraft corporate fleets supported by dedicated flight crews and mechanics. General aviation aircraft use allows employers to transport personnel and air cargo efficiently. Businesses often use general aviation aircraft to link multiple office locations and reach existing and potential customers. Business use by smaller companies has escalated as chartering, leasing, time-sharing, interchange agreements, partnerships, and management contracts have emerged.

The popularity of business aircraft has increased as more companies realized the efficiency and productivity of this powerful tool. The number of companies operating business aircraft in this country has grown more than 60 percent from 6,584 companies operating 9,504 aircraft in 1991 to 10,661 companies operating 15,879 aircraft in 2003. Texas has the most fixed-wing business aircraft (1,457).

A growing option for business aircraft operators is fractional ownership, in which companies or individuals own a fraction of an aircraft and receive management and pilot services associated with the aircraft's operation. Fractional ownership allows companies that have never before used business aircraft to experience many advantages business aviation quickly and without many of the startup considerations typically associated with traditional flight departments. Executive Jet Aviation (NetJets), which began its fractional program in 1986, and was followed by Bombardiers's Business Jet Solutions (FlexJet), has promoted the concept of fractional ownership the longest. Others, including Flight Options and CitationShares, have since entered the marketplace. This segment of the industry has experienced substantial growth.

Fractional ownership continues to be a major contributor to the growth of business aviation because it extends the benefits of business flying to new customers. Fractional aircraft programs have grown dramatically in less than 20 years since the concept was introduced. In 1986, there were three owners of fractionally held aircraft. By 1993, there were 110. From 2000 to 2004, the number of companies and individuals using fractional ownership grew by 62 percent, from 3,834 to 6,217 shares.

Other new, growing, segments of the business aircraft fleet mix include business liners and ultralight jets. Business liners are large business jets, such as the Boeing Business Jet and Airbus ACJ, which are reconfigured versions of passenger aircraft flown by large commercial airlines. Very light jets (VLJ) are a relatively new category of aircraft that includes the Adam A-700, Eclipse 500, Safire S-26, and Cessna Mustang. These are small, six-seat jets that cost substantially less than typical business jet aircraft and have been labeled as "personal jets". VLJ aircraft represent a significant departure from the cost of previously available jet aircraft.

Business aviation is projected to experience additional growth in the future. The Honeywell Business Aviation Outlook projects that more than 11,000 new business aircraft valued at over $225 billion will be delivered between 2010 and 2020, excluding business liners and very light jets. The anticipated changes in the nation's active general aviation fleet, including growth in the number of active jet aircraft and use of fractional ownership, are likely to impact aviation activity at GPM over the 20-year study period. General aviation trends and projected changes to the active general aviation fleet may be reflected in the projections of aviation demand for the Airport.

FAA Aerospace Forecasts

On an annual basis, the FAA publishes forecasts that summarize anticipated trends in most components of civil aviation activity. Each published forecast revisits previous activity forecasts and updates them after examining the previous year's trends in aviation and economic activity. Many factors are considered in the FAA's development of forecasts, some of the most important of which are U.S. and international economic growth and anticipated trends in fuel costs. FAA forecasts generally provide one of the most detailed analyses aviation trends and provide the general framework for examining future levels of aviation activity for the nation as well as in specific states and regions.

Examples of measures of national general aviation activity that are monitored and forecasted by the FAA on an annual basis include the following:

- Active Pilots
- Active Aircraft Fleet
- Active Hours Flown

Historic and projected activity in each of these categories will be examined in **Table 2-6**. Data presented is based on the most recent available data, contained in *FAA Aerospace Forecasts, Fiscal Years 2011-2031.*

Table 2-6: FAA Aerospace Forecast
Active Aircraft, Hours Flown, Active Pilots

Year	Total Active Aircraft	Percent Growth	Total Hours Flown (000s)	Percent Growth	Total Active Pilots	Percent Growth
Historic						
2000	217,533		30,102		625,581	
2005	224,350	3.1%	27,078	-10.0%	609,737	-2.5%
2006	221,939	-1.1%	27,705	2.3%	597,109	-2.1%
2007	231,606	4.4%	27,852	0.5%	590,349	-1.1%
2008	228,668	-1.3%	26,009	-6.6%	613,746	4.0%
2009	223,920	-2.1%	23,771	-8.6%	894,285	45.7%
2010E	224,172	0.1%	24,051	1.2%	627,588	-29.8%
Forecast						
2011	224,475	0.1%	24,301	1.0%	618,660	-1.4%
2012	225,300	0.4%	25,071	3.2%	610,710	-1.3%
2013	226,440	0.5%	25,772	2.8%	610,760	0.0%
2014	227,695	0.6%	26,084	1.2%	610,140	-0.1%
2015	229,140	0.6%	26,398	1.2%	611,140	0.2%
2016	230,650	0.7%	26,732	1.3%	612,450	0.2%
2017	232,205	0.7%	27,130	1.5%	615,270	0.5%
2018	233,900	0.7%	27,563	1.6%	618,130	0.5%
2019	235,750	0.8%	28,046	1.8%	621,210	0.5%
2020	237,795	0.9%	28,614	2.0%	624,840	0.6%
2021	240,045	0.9%	29,203	2.1%	628,650	0.6%
2022	242,425	1.0%	29,861	2.3%	632,680	0.6%
2023	244,940	1.0%	30,589	2.4%	637,000	0.7%
2024	247,650	1.1%	31,393	2.6%	641,720	0.7%
2025	250,560	1.2%	32,261	2.8%	647,410	0.9%
2026	253,490	1.2%	33,148	2.7%	653,160	0.9%
2027	256,610	1.2%	34,052	2.7%	659,510	1.0%
2028	259,905	1.3%	34,955	2.7%	666,560	1.1%
2029	263,385	1.3%	35,881	2.6%	674,160	1.1%
2030	267,055	1.4%	36,858	2.7%	682,130	1.2%
CAGR						
2000-2010E		0.3%		-2.2%		0.0%
2010E-2020		0.6%		1.8%		0.0%
2010-2030		0.9%		2.2%		0.5%

Source: FAA Aerospace Forecast, Fiscal Years 2011 – 2030
E = Estimate

The FAA annually tracks the number of active general aviation aircraft in the U.S. Active aircraft are those aircraft that are currently registered and fly at least one hour during the year. By tracking this information, the FAA is able to identify trends in the total number of active aircraft, as well as the types of aircraft operating in the active fleet. Any changes in the number of active aircraft in the national fleet are generally anticipated to be reflected in similar changes to based aircraft in local fleets throughout the country. As shown in Table 2-6, the total active aircraft fleet is forecast to experience a compounded annual growth rate of 0.9 percent between 2010 and 2030. Active general aviation aircraft grew slowly from 2000 to 2010 at a rate of 0.3 percent per year. It should be noted that one of the most significant trends identified by the FAA in these forecasts is the relatively strong growth anticipated in active general aviation jet aircraft. This trend illustrates a movement in the general aviation community towards higher-performing, more demanding aircraft.

Growth in general aviation jet aircraft grew by 5.2 percent annually from 2000 to 2010, and is expected to outpace growth in all other segments of the general aviation aircraft fleet, with an annual growth rate of 4.2 percent through 2030. As discussed earlier, one of the reasons for this growth may be due to the development very light jets (VLJ). These aircraft offers an alternative to existing commercial aviation markets of 500 miles or less and provides a potential on-demand air taxi market. The future of VLJs, however, is still in question. Due to the economic downturn and businesses seeking methods to cut costs, this new entrant into the business jet aircraft market has experienced limited success.

Because jets are outnumbered nearly 10 to one by single-engine piston aircraft, the growth in jets could not make up for the overall decline of the active general aviation fleet. Still, the overall growth of jets is an important trend.

The increase in general aviation aircraft manufactured after 2005 can be largely attributed to, a new category of two-seat aircraft. The introduction of Light Sport Aircraft (LSA) is expected continue the increase in the number of pilots and interest in flying. The Experimental Aircraft Association (EAA) worked with the FAA to introduce this new element which was implemented in September 2004. Much of this growth is the result of already existing, but unregistered, aircraft. The FAA estimates that by 2030, there will be 13,570 sport aircraft, many of which will be already existing ultralights that the owners register as sport aircraft.

The FAA also records the total hours flown by type of aircraft in the active general aviation fleet. As shown in Table 2-6, the total hours flown declined from 2000 to 2010. This decrease occurred primarily in the segments of single and multi-engine aircraft. Increases in jet hours flown, while steady, could not offset the significant decreases in single and multi-engine hours flown. A sign of the economic turnaround after recessionary trends, the total hours flown are forecast by the FAA to experience an average annual growth rate of 2.2 percent between 2010 and 2030.

The overall trend in the number of pilots in recent years has seen sharp growth after several years of decline. Positive growth in the number of active pilots was first experienced from 2007 to 2008, then from 2008 to 2009 enormous growth occurred, with active pilots increasing by over 45 percent. This extreme growth can be attributed to the advent of the Sport Pilot certification category associated with the introduction of the Light Sport Aircraft category. The 2010 estimate shows a decline in active pilots by nearly 30 percent. This is assumed to be a result of the economic recession of 2008/2009. The FAA forecasts the pilot population will average 0.5 percent growth from 2010 to 2030.

Summary of National General Aviation Trends

The cyclical nature of general aviation activity is illustrated in the historic data presented in this analysis. While general aviation activity experienced rebounded growth during the mid and late-1990s, the terrorist attacks of 2001 and the subsequent economic downturn and recession dampened activity over the last several years. FAA projections of general aviation activity, including active pilots, active aircraft, and hours flown, all show varied growth through the forecast horizon of 2016. Following stalled growth and some declines during 2008 and 2009, most components of general aviation activity are projected to rebound and soon surpass previous activity levels. An important national trend that has the potential to impact general aviation activity at GPM is the growing proportion of jet aircraft in the active general aviation fleet. The ability of GPM to accommodate increasing activity by general aviation jet aircraft will be an important consideration in the master plan update.

2.4 Texas Aviation Trends and Forecast

Aviation activity at the State level is not only impacted by national economic and aviation trends, but it is also directly linked to the health of the Texas economy. Many factors influence the use of general aviation aircraft by Texas residents and businesses. These local factors may result in Texas aviation trends that are divergent from trends identified on the national level. To better understand general aviation trends in the State of Texas, the Texas Airport System Plan Update 2010 (TASP), completed by the Texas Department of Transportation, was examined.

The TASP's examination of general aviation activity in the State will be summarized in the following sections:

- Texas Economic Trends
- Texas General Aviation Trends
- TASP Aviation Activity Forecast

Trends affecting general aviation at both the national and State level will be important considerations in developing the projections of demand for GPM.

Texas Economic Trends

Economic trends tend to impact general aviation activity at both the individual and corporate level. For example, increases in population, employment, and personal income, as discussed at the beginning of this chapter, are all factors that lead to an increased number of individuals having disposable income to use towards general aviation pursuits, such as getting a pilots license or purchasing an aircraft. At the corporate level, economic upturns often lead to increased corporate sales and profits. Many corporate executives utilize general aviation aircraft to expand their businesses' reach during cyclical upswings, thereby generating additional sales and profits. During periods of economic decline, both individuals and corporations often find themselves operating on reduced budgets and cutting costs, often by reducing or eliminating utilization of general aviation aircraft.

Historic data indicate that aviation activity in Texas often fluctuates in corresponding fashion with the general health of the statewide economy. For example, during the oil bust experienced in Texas during the mid 1980's, aviation activity levels in the State were depressed relative to trends experienced at the national level. During the mid- to late-1990s, Texas' economy, along with the national economy, expanded rapidly. Aviation activity statistics for the State during that period tend to reflect strong economic growth in higher levels of air carrier enplanements as well as recovery in some general aviation activity statistics.

Economic indicators presented at the beginning of this chapter and TASP analysis indicate that since 1990, the State of Texas has, on an annual basis, outperformed the United States as whole in the following economic indicators:

- Gross state/national product growth rates
- Personal income growth rates
- Population growth rates
- Employment growth rates

As economic data indicate, the State experienced strong economic and demographic growth through the 2000s and one would expect corresponding growth in general aviation activity levels in Texas. Historic general aviation activity in Texas and recent trends will be examined in the following section to determine the impacts that the State's relatively strong economy may have had on the State's general aviation system.

Texas General Aviation Trends

During the 1990s, a period in which the State of Texas experienced rapid economic growth, general aviation activity in the State increased. Like many other states, general aviation activity levels in Texas experienced declining trends through the 1980s, reached relative lows during the early 1990s, and then experienced growth during the mid- to late-1990s. In many cases, however, even though activity indicators in Texas experienced increases during the 1990s, they did not reach the relatively high activity levels seen in the 1980s.

Those general aviation activity indicators examined in the TASP for which the State of Texas was experiencing a generally positive growth trend through the 1990s include the following:

- General aviation active aircraft
- General aviation operations
- General aviation hours flown
- General aviation fuel consumption

The available data indicates that as the Texas economy experienced rapid growth during the 1990s, general aviation activity also increased, but not as dramatically as some statewide economic and demographic measures. The economic downturn experienced since 2001, propagated and perpetuated by the terrorist attacks of September 11, 2001, had a dampening effect on the general aviation activity rebound in Texas. The number of hours flown by general aviation aircraft registered in Texas experienced a downward trend through most of the decade until the trend was reversed in 2007, showing significant growth in hours flown. However, the upward trend is expected to slow due to the economic recession of 2008/2009 and subsequent high fuel costs.

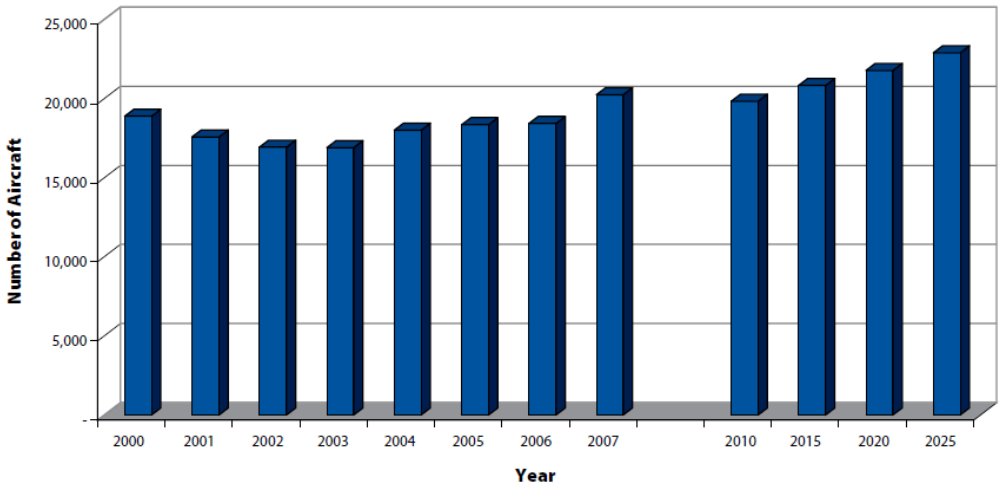
TASP Aviation Activity Forecasts

The 2010 Texas Aviation System Plan Update examined aviation activity at the statewide level and developed aviation activity forecasts through 2025. The TASP forecasts were prepared using a top-down methodology where national activity forecasts were allocated to Texas. The allocation of activity was based on the historical ratios of state-to-national activity and the trends experienced in those relationships in recent years. The TASP developed forecasts of general aviation activity for the following:

- Texas General Aviation Active Aircraft **(Figure 2-2)**
- Texas General Aviation Activity **(Figure 2-3)**
- Texas Pilots **(Figure 2-4)**

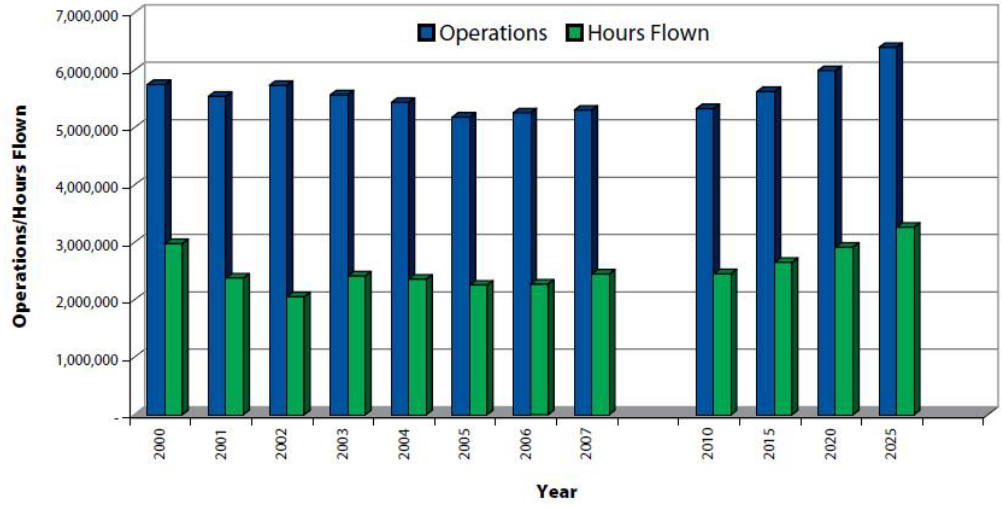
TASP aviation activity forecasts are summarized in the following exhibits.

Figure 2-2: Texas General Aviation Active Aircraft



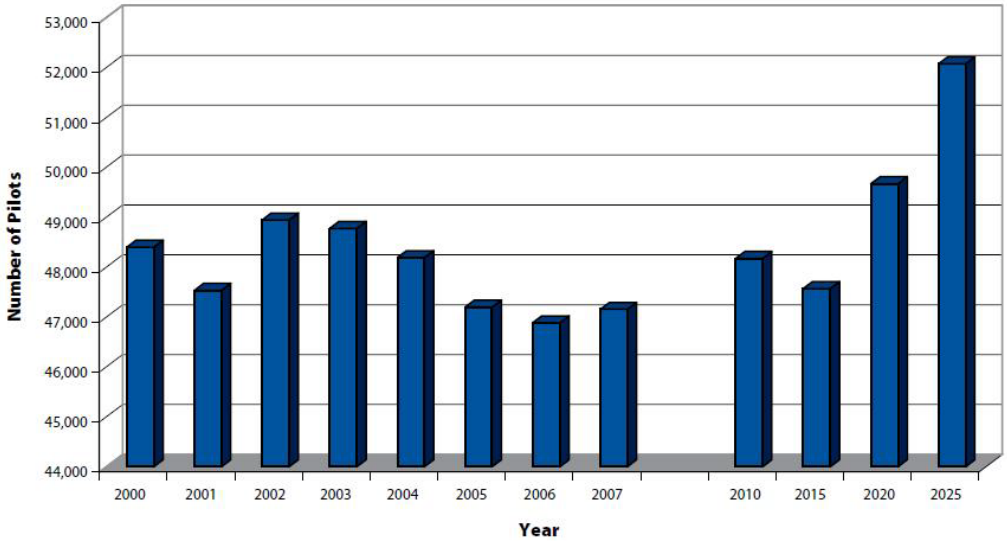
Source: TxDOT, Texas Airport System Plan Update, 2010

Figure 2-3: Texas General Aviation Activity
(Thousands)



Source: TxDOT, Texas Airport System Plan Update, 2010

Figure 2-4: Texas Pilots



Source: TxDOT, Texas Airport System Plan Update, 2010

As the exhibits indicate, the TASP projected growth in each of the general aviation benchmarks examined in its aviation activity forecasts. Considering that recent economic and demographic trends for the State of Texas and the expectation that the State's economy will grow at a rate above the U.S. growth rate, it is reasonable to assume that Texas aviation activity growth rates will grow at higher rates than the nation over the study period. However, as discussed earlier in this chapter, the Metroplex region has experienced less overall growth in employment and personal income than the State and realized higher population growth. This fact may influence the growth predicted at GPM in future years.

2.5 Projections of Aviation Demand – Grand Prairie Municipal Airport

Projections of aviation demand at GPM for the 20-year planning period are presented in the following sections:

- Based Aircraft Projections
- Aircraft Operations Projections

Various methodologies were examined and used to develop projections of based aircraft and aircraft operations at GPM. The results of these different methodologies are compared and a preferred projection of each is selected. **It is important to note that while the projection methodologies are based on demographic data from 2009 (latest), the 2010 operations activity and 2011 based aircraft data at GPM were used as base years.** This is done in order to provide more accurate projections for based aircraft and aircraft operations.

Based Aircraft Projections

Based aircraft are those aircraft that are permanently stored at an airport. Estimating the number and types of aircraft expected to be based at GPM over the 20-year study period will impact the planning for future Airport facility and infrastructure requirements. As the number of aircraft based at an airport increases, so too does the aircraft storage required at the facility. Based aircraft at the Airport was projected using several different methodologies. Each methodology is summarized in the following sections and the results presented. These results are then compared and a preferred based aircraft projection for the Airport selected. The preferred based aircraft projection for GPM will be carried forward in the master planning process and will be used to examine future Airport facility needs.

Population Growth Methodology

Changes in area population are often a key factor that can affect aviation demand in a study area. In many instances there tends to be a direct correlation between an area's population and number of based aircraft in that area. Furthermore, as that area's population grows, corresponding growth is experienced in based aircraft numbers. A based aircraft projection was developed for GPM that reflects the anticipated population growth for the Airport's general market area[1]. The seven county study area was used for this analysis as it is recognized that the airport may draw users from neighboring counties in order to save costs or take advantage of unique facilities or services. The results of the population growth methodology are summarized in **Table 2-7**.

Table 2-7: Based Aircraft Projection Based on Population Growth

Year	Population	Total Based Aircraft
Current	6,080,002	236
Projected		
2015	7,083,817	270
2020	8,089,587	308
2025	9,268,413	352
2030	10,637,324	402
CAGR	2.7%	2.7%

Source: CDM Smith
Texas State Data Center, using scenario 2000-2007
Woods & Poole Economics, Inc. 2011
Airport Records

[1] The Dallas-Fort Worth Metroplex – includes Collin, Dallas, Denton, Ellis, Johnson, Rockwall, and Tarrant Counties

Using this methodology and continuing the growth rate through the forecast period allows us to project the number of based aircraft. As the Metroplex area's total population increases from approximately 6,080,002 in 2009 to 10,637,324 in 2030, total based aircraft at GPM are projected to increase from 236 in 2011 to 402 in 2030, representing a CAGR of 2.7 percent.

Employment Growth Methodology

The growth in the number of people employed in an area is another demographic factor that can be tied to the growth of based aircraft in an area. The predicted annual growth of employment for the Metroplex area is 3.0 percent. This factor was applied to the number of existing based aircraft in **Table 2-8** to develop a forecast number of based aircraft through the planning period.

Table 2-8: Based Aircraft Projection Based on Employment Growth

Year	Employment	Total Based Aircraft
Current	2,757,271	236
Projected		
2015	4,133,530	276
2020	4,458,450	322
2025	4,807,030	375
2030	5,180,880	430
CAGR	3.0%	3.0%

Source: CDM Smith
Woods & Poole Economics, Inc. 2011
Airport Records

Using this methodology predicts that based aircraft will reach a count of 430 by the end of the planning period.

Personal Income Growth Methodology

Personal income growth is another demographic factor that can be correlated to airport activity in an area. Using this methodology, based aircraft projections were developed by growing the current number of based aircraft at GPM at the same rate as earnings in the Metroplex area, a CAGR of approximately 2.1 percent. The results of this methodology are shown in **Table 2-9**.

Table 2-9: Based Aircraft Protection Based on Personal Income Growth

Year	Personal Income ($ thousands)	Total Based Aircraft
Current	257,119,025	236
Projected		
2015	256,334,350	273
2020	295,358,820	315
2025	341,950,940	364
2030	393,741,940	354
CAGR	2.1%	2.1%

Source: Woods & Poole Economics, Inc. 2011, Airport Records

As shown, based on projected growth in personal income, total based aircraft at GPM are projected to increase from 236 in 2011 to 354 in 2030.

Growth in FAA Active Aircraft Methodology

This based aircraft projection methodology is used to develop projections of future based aircraft at GPM by assuming that the growth of based aircraft at GPM will be equal to the rate forecast by the FAA for active general aviation aircraft.

The results of the FAA active aircraft methodology are summarized in **Table 2-10**.

Table 2-10: Based Aircraft Projection Based on FAA Growth of Active General Aviation Aircraft

	Year	Total Based Aircraft
Current	2011	236
Active GA Aircraft Growth Rate 2010 - 2030		0.9%
Projected	2015	247
	2020	258
	2025	270
	2030	282

Source: CDM Smith, Airport records and FAA Aerospace Forecasts FY 2011-2031

This methodology projects the growth of total based aircraft from 236 to 282 by the end of the 20-year planning period.

Summary of Based Aircraft Projection Scenarios

The results of the population, employment, personal income, and active aircraft methodologies represent low, mid, and high-growth forecasts of total based aircraft at GPM. **Table 2-11** summarizes the results of the four based aircraft projection scenarios utilized in this analysis.

Table 2-11: Comparison of Based Aircraft Projections

Year	Low Active Aircraft	Mid-Low Personal Income	Mid-High Population	High Employment
Current				
2011	236	236	236	236
Projected				
2015	247	261	270	274
2020	258	289	308	319
2025	270	320	352	370
2030	282	354	402	430
CAGR	0.9%	2.1%	2.7%	3.0%

Source: CDM Smith
Woods & Poole Economics, Inc. 2011
Airport Records

As shown, the four projection methodologies resulted in based aircraft forecasts ranging from 282 total based aircraft in the active aircraft growth scenario to 430 total based aircraft in the employment scenario for the out-year of the planning period, 2030. Based aircraft growth rates represented by these forecasts ranged from a CAGR of 0.9 percent to a CAGR of 3.0 percent. Several other scenarios predicting the future number of based aircraft could have been presented in this exercise. However, the range of these growth rates shown in these scenarios represent the most realistic growth patterns considering the Airport's history and predicted regional growth estimates.

Preferred Based Aircraft Projection

The preferred based aircraft projection for GPM is based on the active general aviation aircraft methodology. Several parallels can be drawn between this methodology and other demographic and economic indicators discussed earlier in this chapter. The following similarities exist between the chosen methodology, which employs a 0.9 percent CAGR, and other factors:

- This methodology results in a total active aircraft growth rate of 0.9 percent annually, which is similar to the FAA's Terminal Area Forecast for GPM, projecting a 1.0 percent CAGR for based aircraft at the airport, albeit from a lower number of based aircraft as a starting point.

- Includes the projected growth of the general aviation jet aircraft fleet, which will be a part of the activity experienced at GPM.
- It closely resembles the historical long range growth trend in national aircraft operations from 1990 – 2010 at 0.5 percent CAGR.
- Presenting a higher growth rate may be unrealistic considering the historic growth in based aircraft at the Airport.

For the reasons stated above, the low range scenario of 0.9 percent CAGR is the preferred based aircraft projection for GPM and is presented in **Table 2-12**.

Table 2-12: Preferred Based Aircraft Projection

Year	Active Aircraft Growth Scenario
Current	
2011	236
Projected	
2015	247
2020	258
2025	270
2030	282
CAGR	0.9%

Source: CDM Smith
Airport Records

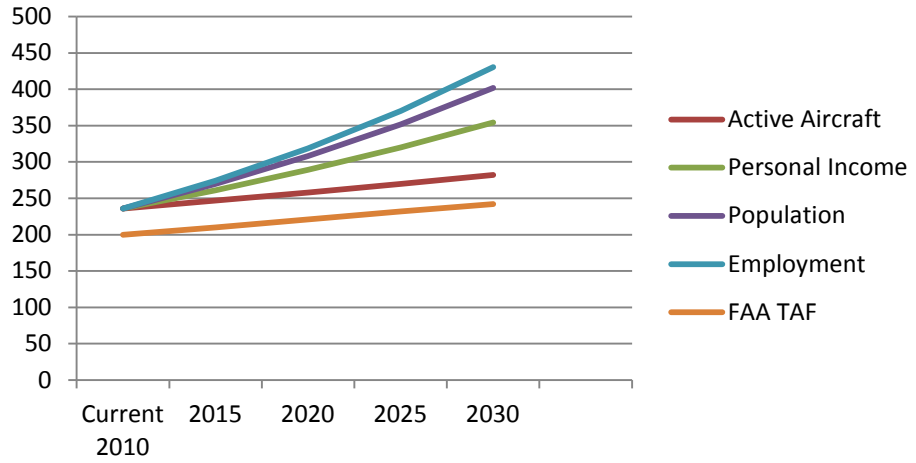
Comparison to the FAA Terminal Area Forecast (TAF)

The FAA typically reviews airport master planning forecasts for compatibility with their TAF. The current TAF shows based aircraft growing steadily at 1.0 percent CAGR for the foreseeable future. For many airports similar to GPM, the FAA does not actively forecast growth or decline in future years; rather they project things as status-quo. The FAA TAF, which uses an outdated estimate for 2010, represents the lowest range forecast of future based aircraft at the Airport, with an estimated increase from 200 to 242 by 2030.

The preferred based aircraft forecast for GPM shows a conservative growth of 0.9 percent (CAGR) to the year 2030. This growth will account for additional users/tenants that may decide to store aircraft at GPM or any other development/event that may attract additional interest in the Airport, not shown in the TAF.

The preferred based aircraft projection is graphically compared to the results of the other methodologies used in this analysis for GPM in **Figure 2-5**.

Figure 2-5: Based Aircraft Forecast Comparison



Source: FAA TAF and CDM Smith

As illustrated in Figure 2-5, the active aircraft growth projection methodology, the preferred projection of based aircraft, resulted in a low-range forecast of total based aircraft at the Airport when compared to other forecasts of based aircraft. The employment methodology represents the upper range of based aircraft projections for GPM. The population and personal income growth methodologies represent the mid-high and mid-low range forecasts, respectively.

Although the actual number of total based aircraft at the Airport in the future will be determined by a number of factors, the forecast methodologies and scenarios presented in this analysis present a range within which the likely number of aircraft based at GPM may fall. From the methodologies and scenarios examined in this master plan update, the active aircraft growth scenario is selected as the preferred based aircraft projection for use in following analyses.

Based Aircraft Fleet Mix Projections

Total based aircraft projected for GPM over the projection period in the preferred based aircraft projection were allocated to four aircraft categories – single engine, multi-engine, helicopter, and jet aircraft. The fleet mix projections were developed based on the fleet mix percentages exhibited at the Airport in 2011. The existing based aircraft fleet mix at GPM is summarized as follows:

- Single engine piston aircraft – 84 percent of total based aircraft
- Multi-engine piston aircraft – 7.6 percent of total based aircraft
- Helicopter aircraft – 8.47 percent of total based aircraft
- Small jet aircraft – 0 percent of total based aircraft

Using the percentages above, the preferred based aircraft fleet mix projections are presented in **Table 2-13**. With expected growth in jet aircraft throughout the country, it is reasonable to expect to see some based jet aircraft at GPM in future years. Future growth of jet aircraft was increased to represent 3 percent of total based aircraft, while single engine aircraft was reduced to 81 percent.

Table 2-13: Preferred Based Aircraft Fleet Mix Projection

Year	Single Engine	Multi-Engine	Helicopter	Jet	Total
Current					
2011	198	18	20	0	236
Projected					
2015	200	19	21	7	247
2020	209	20	22	8	258
2025	218	21	23	8	270
2030	228	22	24	8	282

Source: CDM Smith and Airport Records

Aircraft Operations Projections

Many different factors influence the number of aircraft operations at the Airport, including but not limited to, total based aircraft, area demographics, activity and policies at neighboring airports, and national aviation trends. These factors are examined in the following sections and two methodologies are used to develop projections of future aircraft operations at GPM through the forecast period.

Projections of future operations at GPM are discussed in the following sections:

- Operations Per Based Aircraft Methodology
- FAA Hours Flown Methodology
- Comparison of Aircraft Operations Projections
- Preferred Aircraft Operations Projections
- Projected Local/Itinerant Split
- Projected Category Mix

In 2010, the Airport had 80,656 operations (including night operations) as reported by airport management. This number significantly deviates from recent prior years, but in order to develop the most accurate and realistic forecast, the 2010 actual operations figure of 80,656 is used as the base year for future projections.

The result of each projection methodology is compared and a preferred projection scenario is selected. Following the selection of the preferred operations projection for the Airport, the local/itinerant split at the Airport is also identified. The preferred aircraft operations projection for GPM will be used to conduct a demand/capacity analysis in which the adequacy of existing airfield facilities will be evaluated to determine if capacity enhancing projects may be required to support future levels of aircraft operations at the Airport.

Operations Per Based Aircraft (OPBA) Methodology

The operations per based aircraft methodology is recognized by the FAA as an accepted means for relating the total number of aircraft operations to a known variable; in this case, based aircraft. OPBA is calculated by dividing the number of total general aviation operations that occur at an airport by the number of aircraft based at the airport. Total operations at GPM are projected by applying the Airport's OPBA ratio to the preferred projection of based aircraft. For this study, however, the 1990 - 2009 average historic OPBA of 401 was held constant throughout the 20-year forecast period and multiplied by the preferred based aircraft projection to obtain the projection of aircraft operations. This allows for the historic relationship between based aircraft and operations to be considered, rather than from just one year. The results of this projection scenario are summarized in **Table 2-14**.

Table 2-14: Aircraft Operations Based on Operations per Based Aircraft

Year	Based Aircraft	OPBA	Total Operations
Historic			
2010	236	342	80,656
Projected			
2015	247	401	98,964
2020	258	401	103,498
2025	270	401	108,240
2030	282	401	113,199
CAGR	0.9%		1.7%

Source: Airport Records and CDM Smith

FAA Hours Flown Methodology

The second operations projection methodology was based on the FAA's forecast of active general aviation and air taxi hours flown. Under this methodology, it was assumed that GPM would experience growth in operations consistent with growth in the number of hours flown nationally by general aviation and air taxi aircraft, according to FAA forecasts. Growth in hours flown is expected to increase approximately 2.2 percent annually through the planning period. Applying the same growth rate to GPM operations through the forecast period results in growth from 80,656 in 2010 to 123,605 operations by 2030, as shown in **Table 2-15**.

Table 2-15: Projected Aircraft Operations Based on FAA Hours Flown Forecast

Year	FAA Active General Aviation and Air Taxi Hours Flown (000s)	GPM Operations Projection
Historic		
2010	24,051	80,656
Projected		
2015	26,398	89,740
2020	28,614	99,847
2025	32,261	111,093
2030	36,858	123,605
CAGR		2.2%

Source: CDM Smith, Airport records, FAA Terminal Area Forecast, FAA Aerospace Forecasts 2011-2030.

Comparison of Aircraft Operations Projections

The results of the different aircraft operations projection scenarios examined in this analysis are summarized and compared with the FAA Terminal Area Forecast for GPM in **Table 2-16**.

Table 2-16: Summary of Operations Projections

	Year	OPBA	FAA Hours Flown Forecast	FAA Terminal Area Forecast
Historic	2010	80,656	80,656	70,528
Projected	2015	98,964	89,740	74,510
	2020	103,498	99,847	80,267
	2025	108,240	111,093	86,474
	2030	113,199	123,605	93,168
CAGR		1.7%	2.2%	0.7%

Source: CDM Smith, Airport records and FAA Terminal Area Forecast

As shown in Table 2-16, the different methodologies resulted in a CAGR ranging from 0.7 percent in the FAA TAF methodology to 2.2 percent in the FAA hours flown methodology. In these projection scenarios, total aircraft operations at GPM in 2030 are projected to range between about 93,000 total aircraft operations to over 123,000 operations.

Preferred Aircraft Operations Projections

The OPBA forecast methodology is selected as the preferred projection of aircraft operations for the Airport. Given the long history of increases and declines in operations at the Airport, developing trends within the general aviation marketplace and factors unique to GPM, this midrange projection of on-going conservative growth is reasonable to expect. Additionally, the 1.7 percent CAGR maintains the historic OPBA throughout the planning period, representing a realistic increase in the current OPBA or higher utilization of existing aircraft as predicted by the FAA. For these reasons, the OPBA methodology is the preferred forecast, as shown in **Table 2-17**.

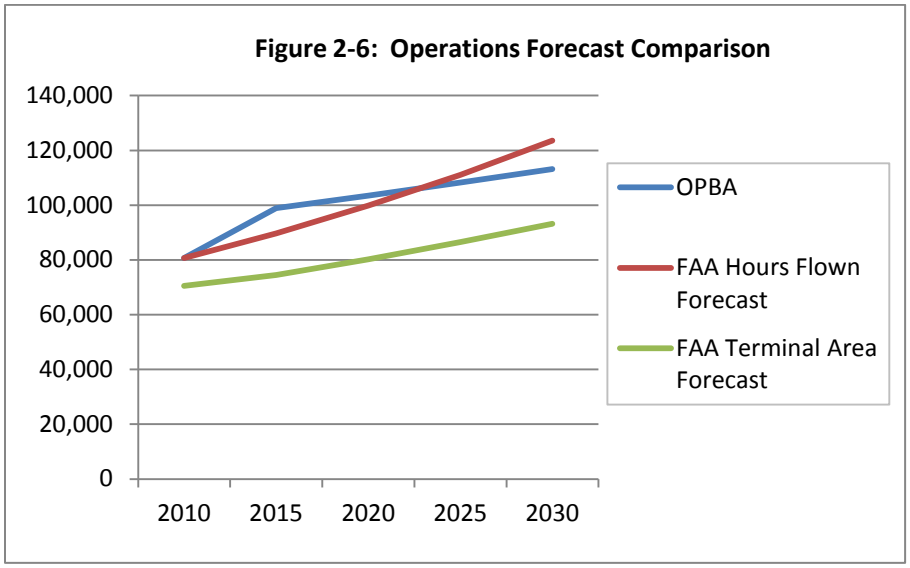
Table 2-17: Preferred Operations Projection

Year	Total Operations
Historic	
2010	80,656
Projected	
2015	98,964
2020	103,498
2025	108,240
2030	113,199
CAGR	1.7%

Source: Airport Records and CDM Smith

In the preferred projection scenario, total aircraft operations at GPM are projected to increase from 80,656 in 2010 to over 113,000 in 2030, representing a CAGR over the projection period of approximately 1.7 percent. The master plan update's preferred projection of aircraft operations is compared to other projections of aircraft operations at the Airport as developed in this analysis and from other sources in **Figure 2-6**.

The trend line for the OPBA projection shows a relatively high growth rate from 2010 to 2015 due to a higher than average OPBA rate of 401 operations per aircraft compared to the current rate. The trend line then takes a shallower slope as the OPBA rate is held constant for future years. It crosses the trend line associated with FAA hours flown because the CAGR for OPBA is less than the CAGR for FAA hours flown.



Source: FAA TAF and CDM Smith

The preferred projection of aircraft operations identified for the master plan update represents a mid-range estimate of future activity at GPM when compared to the other projection scenarios. The FAA hours flown methodology represents the upper range of the projections. The FAA TAF low growth projection provides a lower-range estimate of future Airport activity even though it uses outdated operations data.

It should be noted that the preferred aircraft operations projection for GPM represents an unconstrained projection based on existing market conditions and presumes that airport development needed to accommodate growth will be undertaken in a timely manner. This is especially relevant for infrastructure needed to support large scale hangar development for accommodating additional aircraft service companies at the Airport. Facilities needed for this type of growth are speculation and would require further study as to the exact timeframe, tenants and uses of the proposed expansion. Impacts from this possible development would result in a growth of operations, which could set a new benchmark level of operations at GPM in the later years. Direct potential impacts to facilities will be discussed in following chapters.

Higher Than Expected Growth

Through additional facility development based aircraft and operations activity could be higher than predicted in this forecast. The development of additional T-hangars, shade structures, conventional hangars and aircraft maintenance facilities may attract aircraft owners and businesses from neighboring airports or

other parts of the country. Aggressive business development initiatives may attract businesses to the Metroplex region and the implementation of additional airport services could increase the use of GPM as a base of operations.

However, despite these high-growth scenario possibilities, without firm interest or commitments from area businesses or individuals, the chosen growth methodologies discussed above appear reasonable considering historical activity, regional and national trends, and the state and predicted growth of the industry.

Projected Local/Itinerant Split

An important consideration when examining historic and projected airport operations at an airport is whether they are local or itinerant. Local operations are those operations conducted by aircraft remaining in the Airport's traffic pattern. It should be noted that almost all local operations are training-related. Itinerant operations are those conducted by aircraft coming from outside the traffic pattern. Changes in the local/itinerant operations split at an airport are an indicator of changes in the nature of activity occurring at the facility.

In the past, operations have averaged 38 percent classified as itinerant and 62 percent as local. Historically, these percentages have remained steady from year to year and represent a very consistent nature of operations. These percentages will be used in projecting the itinerant/local split of operations in future planning years. **Table 2-18** shows the projected split of itinerant and local operations for the planning period is expected to remain the same as in past years.

Table 2-18: Itinerant and Local Split Projections

	Year	Itinerant Operations	Local Operations	Total Operations
Historic	2010	30,392	50,264	80,656
Projected	2015	37,290	61,674	98,964
	2020	38,998	64,500	103,498
	2025	40,785	67,455	108,240
	2030	42,654	70,546	113,199
Percentage Split		38%	62%	100%

Source: CDM Smith, Airport records, FAA Terminal Area Forecast

Projected Category Mix

In addition to developing projections of total aircraft operations for the Airport, it is important in the master planning process to determine the types of operations that are anticipated. Using historic estimates as a basis, the percentage of total operations conducted by the major categories of operations were estimated and applied to the preferred projections of aircraft operations at GPM.

The historical percentage total operations conducted by each major category at GPM were obtained through FAA TAF, Airport records and air traffic control data as presented in Table 2-5. The average mix of general aviation, military, air taxi and air carrier operations from 2010 was assumed to remain constant throughout the projection period. **Table 2-19** shows the operations mix projection for each category of operation.

Table 2-19: Operations Mix, GPM

	General Aviation		Military				
Year	Itinerant	Local	Itinerant	Local	Air Taxi[1]	Air Carrier	Total
Historic							
2010	30,095	50,182	129	82	168	0	80,656
Projected							
2015	36,926	61,573	158	101	206	0	98,964
2020	38,618	64,394	165	106	215	0	103,498
2025	40,387	67,344	173	111	225	0	108,240
2030	42,238	70,430	180	116	235	0	113,199
Average % of Total	37.3%	62.2%	0.2%	0.1%	0.2%	0.0%	100.0%

Source: Category distribution: 2010 (tower records),
[1] Air Taxi category represents non-scheduled or for-hire service on aircraft with 60 seats or fewer

2.6 Critical Aircraft

The development of airport facilities is impacted by both the demand for those facilities, typically represented by total based aircraft and operations at an airport, as well as the type of aircraft that will make use of those facilities. In general, airport infrastructure components are designed to accommodate the most demanding aircraft, referred to as the critical aircraft, which will utilize the infrastructure on a regular basis. The factors used to determine an airport's critical aircraft are the approach speed and wing span of the most demanding class of aircraft that is anticipated to perform at least 500 annual operations at the airport during the planning period.

The FAA groups aircraft into Aircraft Categories and Airplane Design Groups based on their approach speed and wingspan, respectively. The criteria for these categories are presented in **Table 2-20**.

Table 2-20: Aircraft Categories and Design Groups

Aircraft Category	Approach Speed	Example
A	< 91 knots	Cessna 172
B	91 to < 121 knots	King Air 200
C	121 to < 141 knots	B737
D	141 to < 166 knots	B767
E	166 knots or more	SR-71
Airplane Design Group	**Wingspan**	**Example**
I	< 49 feet	Cessna 172
II	49 to < 79 feet	King Air 200
III	79 to < 118 feet	B737
IV	118 to < 171 feet	B767
V	171 to < 197 feet	B747
VI	197 to < 262 feet	A380

Source: FAA

After identifying an airport's critical aircraft it is then possible to determine the facility's Airport Reference Code (ARC). The ARC is a coding system that relates airport design criteria to the physical characteristics of the airplanes that are intended to operate at an airport. An airport's ARC is a composite designation based on the Aircraft Category and Airplane Design Group of that airport's critical aircraft. For GPM, the current critical aircraft is a Beechcraft Super King Air, which has an approach speed of 100 knots and a wing span of 54.5 feet. These measurements would produce an ARC of B-II. GPM supports a great deal of business activity on many types of multi-engine and business jet aircraft; however, the twin engine turbo-prop Beechcraft Super King Air is the most frequently used. Runway 17-35 will continue to serve B-II aircraft during the planning period, and will therefore maintain its B-II ARC designation.

2.7 Summary

It is anticipated that GPM will see moderate growth during the 20-year planning period. Market area demographic trends indicate that the Airport will slightly outpace national growth trends in general aviation and fall slightly behind trends in Texas growth. Based aircraft are expected to increase from approximately 236 aircraft to 282 aircraft by 2030. The Airport will also see an increase in the number of operations. By the end of the planning period, over 113,000 operations could be expected. It is important to note that this is an unconstrained projection. Additional operations may be realized in future years should addition aviation businesses locate on or around the Airport. Following sections of the Master Plan will explore the facility implications of accommodating the projected demand. **Table 2-21** summarizes the projections contained in this chapter.

Table 2-21: Summary of GPM Projections

	Year	Based Aircraft	Itinerant Operations	Local Operations	Total Operations
Historic	2010	236	30,391	50,265	80,656
Current	2011	236			
Projected	2015	247	37,290	61,674	98,964
	2020	258	38,998	64,500	103,498
	2025	270	40,785	67,455	108,240
	2030	282	42,654	70,546	113,199

Source: CDM Smith

Chapter

3

Facility Requirements

This chapter will assess the capacity of various airport components at Grand Prairie Municipal Airport (GPM) and compare them with the forecasted demand presented in the previous chapter. Further analysis will identify the facilities which will be necessary to meet the forecasted demand, the plans for which are presented in subsequent chapters. Full consideration is given to the critical aircraft, presented in the previous chapter, and the airport's anticipated role which will yield design criteria for the Airport and associated facilities.

3.1 Airport Design Criteria and Classification

The critical aircraft was determined by considering the families of aircraft, having similar performance and dimensional characteristics, expected to use the Airport on a regular basis. According to the forecasts, the most demanding aircraft expected to use GPM on a regular basis is the Beechcraft Super King Air aircraft. This aircraft operates within Approach Category B and Design Group II. All existing and planned facilities associated with the Airport should meet the requirements for ARC B-II.

The FAA's National Plan of Integrated Airport System (NPIAS) currently classifies Grand Prairie Municipal Airport as a general aviation reliever airport. General aviation pilots often find it difficult and expensive to gain access to congested airports, particularly large and medium hub airports. In recognition of this, the FAA has encouraged the development of high capacity general aviation airports in major metropolitan areas. These airports, called relievers, provide pilots with attractive alternatives to using congested hub airports. They also provide general aviation access to the surrounding area. The 260 reliever airports throughout the U.S. have an average of 228 aircraft and account for 27 percent of the Nation's general aviation fleet.

An existing or proposed public use airport may be included in the NPIAS as a reliever airport if it relieves airport congestion at a commercial service airport and provides general aviation access to the overall community. In order to continue to qualify as a reliever airport, Grand Prairie Municipal Airport must meet the following criteria:

(a) have current activity level of at least 100 based aircraft or 25,000 annual itinerant operations

(b) have a forecasted activity level of at least 100 based aircraft or 25,000 annual itinerant operations for the time period in which it is being designated as a reliever, and

(c) be located in such a manner, with respect to the city center or business or industrial district served by the relieved airport, that it will provide essentially the same user conveniences as those provided by the relieved airport.

The relieved airport must:

(a) be a commercial service airport that serves a metropolitan area (MA) with a population of at least 250,000 persons or at least 250,000 annual enplaned passengers, and

(b) operate at 60 percent of its capacity, or would be operated at such a level before being relieved by one or more reliever airports, or is subject to restrictions that limit activity that would reach 60 percent of capacity.

Grand Prairie Municipal Airport and the relieved airports in the Dallas/Ft. Worth Metroplex meet the above criteria and Grand Prairie Municipal Airport should continue to be classified as a general aviation reliever airport throughout the planning period.

The following sections will evaluate the airfield and landside requirements to meet the needs of the Airport throughout the 20-year planning period.

3.2 Airfield Requirements

Airfield Capacity

The generally accepted airport capacity model is provided in FAA AC 150/5060-5 "Airport Capacity and Delay". The following key terms are relative to the discussion of capacity:

- *Demand* – the magnitude of aircraft operations to be accommodated in a specified period of time, provided by the forecasts.
- *Capacity* – a measure of the maximum number of aircraft operations that can be accommodated on an airport in one hour.
- *Annual Service Volume* – or ASV, a reasonable estimate of the airports annual capacity.
- *Delay* – the difference between the actual time it takes an aircraft to operate on the airfield and the time it would take the aircraft if it were operating without interference from other aircraft, usually expressed in minutes.

There are several factors known to influence airport capacity. The Visual and Instrument Flight Rule (VFR and IFR) hourly capacities were based on the following assumptions:

1. *Runway-use Configuration.* The appropriate runway use configuration (No. 1) was taken from Figure 2-1 in the Advisory Circular.

2. *Percent Arrivals.* Arrivals equal departures.

3. *Percent of Touch and Go's.* Approximately 55-65 percent of the total operations are considered to be touch and go's. This is above the range provided in Table 2-1 of the Advisory Circular.

4. *Taxiways.* The Airport has a dedicated full-length parallel taxiway serving the primary runway, and provides ample runway entrance/exit taxiways with no crossing problems.

5. *Airspace limitations.* Due to potential airspace procedural conflicts with nearby DFW Airport, instrument approach procedures for Runway 17 and instrument departure procedures for Runway 35 do not exist at GPM. This restriction can sometimes limit operations at GPM during inclement weather and/or when pilots seek the reassurance and flexibility that comes with multiple approach and departure alternatives.

6. *Runway Instrumentation.* The Airport has two published non-precision approach procedures which allow access during inclement weather conditions.

7. *Mix Index.* A mathematical expression used to categorize the fleet of aircraft using the Airport, is estimated to fall between 0 and 20 percent based on existing fleet usage and will continue to be in this range in future years. This index range is used as a reference for determining ASV.

Under optimum conditions, Grand Prairie Municipal Airport would have a VFR hourly capacity of 98 operations, and an IFR capacity of 59 operations. Based on annual forecast figures presented in the previous chapter, the Airport will likely experience a peak hour of 44 to 58 operations throughout the forecast period.

By applying methodologies found in the Advisory Circular on capacity and demand, Grand Prairie Municipal Airport has an annual service volume of approximately 230,000 operations. Overall capacity could be reduced based on the fact that the percentage of touch and go operations is relatively high in relation to other airports and the fact that the Airport does not have a precision instrument approach procedure. However, the capacity of the Airport is enhanced by the presence of an air traffic control tower. This capacity value is validated by the fact that it matches the ASV from the previous Master Plan with no changes in assumptions since its completion.

The forecast for annual operations is expected to increase from 80,656 (2010) to 113,199 (2030) operations by the end of the forecast period. **Table 3-1** compares expected demand to estimated capacity.

Table 3-1: Aviation Demand Capacity Analysis

	2010	2015	2020	2025	2030
ASV (C)	230,000	230,000	230,000	230,000	230,000
Forecasted Operations (D)	80,656	98,964	103,498	108,240	113,199
Percent of Capacity	35%	43%	45%	47%	49%

Source: Wilbur Smith Associates
Note: C = Capacity; D = Demand

According to the FAA, the following guidelines should be used to determine necessary steps as demand reaches designated levels.

- 60 percent of ASV: Threshold at which planning for capacity improvements should begin.
- 80 percent of ASV: Threshold at which planning for improvements should be complete and construction should begin.
- 100 percent of ASV: Airport has reached the total number of annual operations (demand) the airport can accommodate, and capacity-enhancing improvements should be made to avoid extensive delays.

Using the comparison presented in Table 3-1, the demand is below the Airport's annual capacity. Based upon existing demand criteria, no additional capacity projects for the runway system will be needed during the planning period.

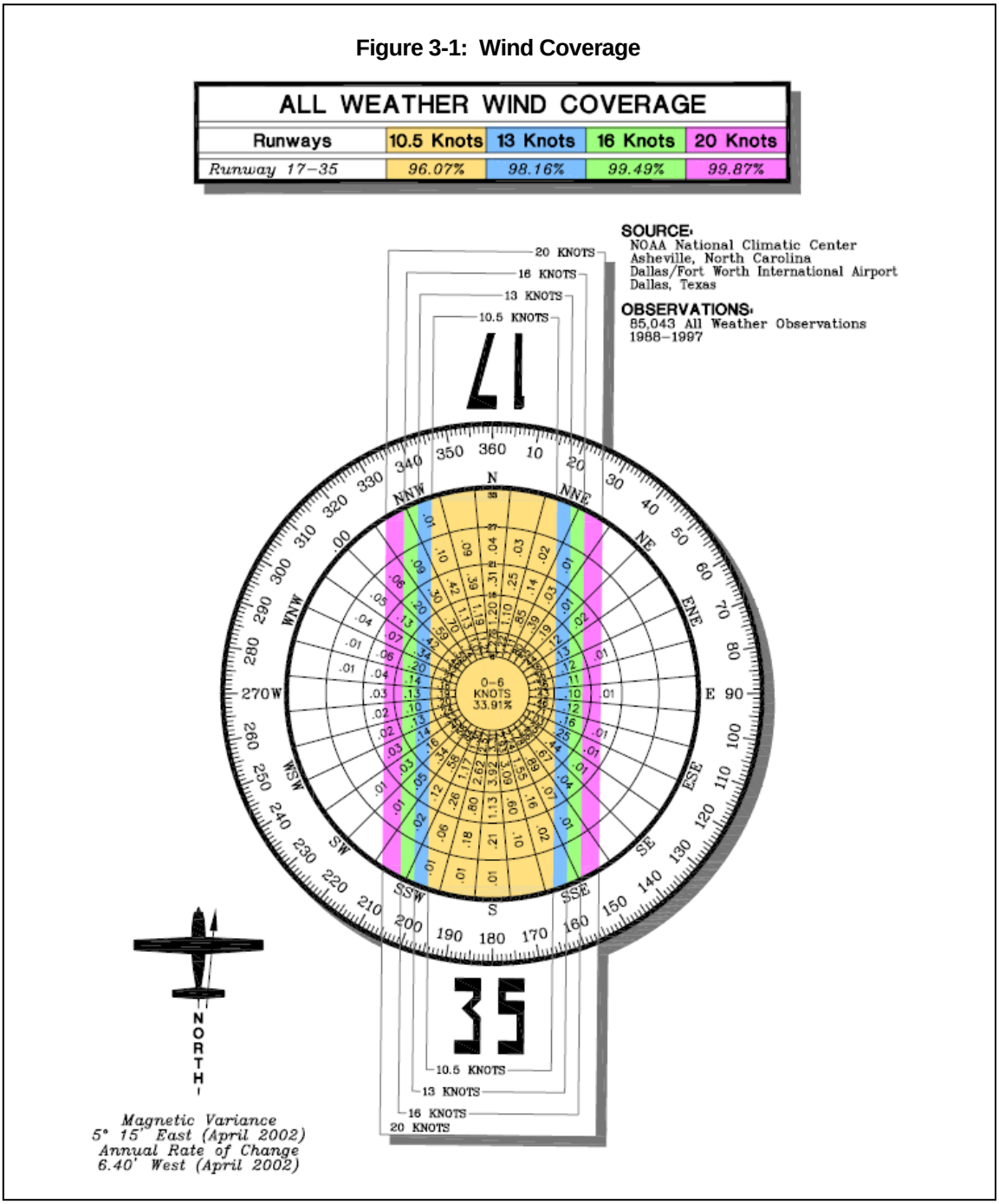
Runway Orientation

The single most important criterion for runway orientation is wind coverage. The runways should provide the maximum opportunity for takeoff and landing into the wind. The FAA recommends the crosswind coverage of the runway system to be at least 95 percent. The percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for Airport Reference Codes (ARC) A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; and 16 knots (18 mph) for ARC C-I through D-II.

Figure 3-1 illustrates the all weather wind rose and analysis results using data collected from nearby DFW International Airport. More recent data was not retrieved based on the scope of this study and the fact that, regardless of wind coverage results, the runway could not be reoriented within the confines of the airport property. As depicted on the exhibit, however, Runway 17-35 provides 96.07 percent coverage for 10.5 knot crosswinds, 98.16 percent at 13 knots, and

99.49 percent at 16 knots. Runway 17-35 meets the minimum recommended 95 percent coverage and future plans for a crosswind runway do not need to be considered.

Figure 3-1: Wind Coverage



Runway Length

Runway length requirements for Grand Prairie Municipal Airport were accessed in accordance with FAA AC 150/5325-4B, "Runway Length Requirements for Airport Design". The runway at Grand Prairie Municipal Airport is 4,001 feet long and 75 feet wide. The minimum runway length requirement is based upon several factors including airport elevation, average temperature, and type aircraft expected to use the runway on a regular basis. The airport's published altitude is 588 feet Mean Sea Level (MSL) and the mean daily maximum temperature of the hottest month is 97° Fahrenheit.

Using these criteria, runway length requirements are presented in **Table 3-2**. The Airport currently has sufficient runway length to accommodate all of the small aircraft with less than 10 passenger seats. Larger aircraft, however, may have to reduce their payload in order to takeoff within the 4,001 feet available. For the purposes of this report, airplanes less than 60,000 pounds with a haul length of 1,000 miles were also evaluated for runway length requirements. Within these perimeters, the present runway length available at Grand Prairie Municipal Airport would have to be extended in order to accommodate these aircraft.

Table 3-2: Runway Length Requirements for Airport Design
Grand Prairie Municipal Airport

Airport Elevation ……	588 feet
Mean daily maximum temperature of the hottest month ……	97°
Maximum difference in runway centerline elevation ……	9 feet
Length of haul for airplanes of more than 60,000 pounds ……..	1,000
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots ……..	310 feet
Small airplanes with approach speeds of less than 50 knots ……..	840 feet
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes ……..	2,800 feet
95 percent of these small airplanes ……..	3,300 feet
100 percent of these small airplanes ……...	4,000 feet
Small airplanes with 10 or more passenger seats ……	4,500 feet
Airplanes of 60,000 pounds or less	
75 percent of these airplanes at 60 percent useful load …….	5,000 feet
75 percent of these airplanes at 90 percent useful load …….	7,400 feet
100 percent of these airplanes at 60 percent useful load ……..	6,000 feet
100 percent of these airplanes at 90 percent useful load ……..	9,500 feet
Airplanes of more than 60,000 pounds …….	6,200 feet

Reference: AC 150/5325-4A, Runway Length Requirements for Airport Design

The previous master plan, completed in 2003, shows a 600-foot runway extension at GPM in order to meet the needs of a broader user base. In this plan, each end of the runway would be extended 300 feet. The need for additional runway length was discussed with airport management and it was determined that, within the planning period, the cost of extending the runway is not worth the benefits gained from an additional 600 feet of runway. Longer extensions would likely require the added cost of property acquisitions and roadway relocations. While demand justifies a runway extension, without the will or support of the project, an extension within the planning period is unlikely. With that said, however, it is deemed reasonable to show the 600-foot extension as an ultimate project on the airport layout drawing (ALD) as it would be consistent with the previous master planning effort and would continue to preserve the land use and airspace for such enhancements. Potential obstructions as a result of this extension will be illustrated on the Inner Approach Surface drawings included with the airport layout plan set completed with this study.

Runway Width

The width of a runway is determined by the critical aircraft and the instrumentation available for the approach. The minimum width for a B-II runway expected to have approach visibility minimums not lower than ¾ mile is 75 feet. The runway at Grand Prairie Municipal Airport is 75 feet wide and is consistent with design standards for category B-II group aircraft.

Runway Strength

There are several factors which influence the strength of pavement required to provide satisfactory service. These factors include aircraft loads, frequency and concentration of operations, and the condition of subgrade soils. Runway pavement strength is typically expressed based on common landing gear configurations. An example aircraft for each type of gear configuration are as follows:

- *Single-wheel* – each landing gear unit has a single tire, example aircraft include light general aviation aircraft and some business jet aircraft.
- *Dual-wheel* – each landing gear unit has two tires, example aircraft include the Boeing 737, Boeing 727, MD-80, CRJ 100/200, and the Dash8.
- *Dual-tandem* – each main landing gear unit has four tires arranged in the shape of a square, example aircraft include the Boeing 707 and the KC135.
- *Double dual-tandem* – the main landing gear units have the same configuration as the dual-tandem configuration, however, there are twice as many main gear units. Boeing 747 aircraft have a double dual-tandem landing gear configuration.

The runway at GPM currently has a load bearing weight capacity of 30,000 pounds single wheel, which meets the forecast critical/design aircraft and B-II fleet mix. Thus, no increases to the load bearing strength are anticipated unless it is found through other project work that the actual runway strength is less than reported. Efforts to repair and/or maintain the reported load bearing strength of the runway should be completed as necessary. Runway 17-35 is currently considered to be in good condition and will require some level of pavement maintenance, likely either significant crack sealing or a mill and overlay, within the mid- to long-term period of the planning study to preserve the pavement strength and operational safety of that runway. Projects to maintain the integrity of the runway pavement throughout the 20-year planning period are a part of the master plan update and are identified in the Capital Improvement Plan (CIP) in the last chapter of this report.

Taxiways

A taxiway is a defined path established for taxiing aircraft from the runway to a parking position, or from one part of the airport to another. It is recommended that an airport's primary runway be served by a full-length parallel taxiway allowing aircraft to enter or exit the runway expeditiously as possible.

At present, Runway 17-35 is served by what could be considered a full-length parallel taxiway. On the Runway 35 end, the taxiway ends at the runway designation numbers. To be truly full-length, the taxiway could be extended and connected to the end runway threshold, closer to the end of runway pavement. Aircraft departing Runway 35 must taxi onto the runway and turn around at the threshold to use the Runway's full length.

On the airport's Westside, two access taxiways connect the businesses there to the 17 end of the Runway. To improve aircraft accessibility and flow within this area, it is recommended that these two taxiways be connected, effectively creating a partial parallel taxiway on the Westside of the Airport.

Runway 17-35 and the parallel taxiway are connected by five entrance/exit taxiways. The entrance/exit taxiways are located near each runway end, two approximately midfield, and one near the north end of the runway (location of the previous runway end). The terminal area is linked to the parallel taxiway by the main aircraft parking apron as well as other taxiways that connect hangar areas to the taxiway/runway system.

The width of the parallel taxiways and all entrance/exit taxiways is 40 feet, with exception to the most recently constructed Taxiway C, which is 50 feet in width. In order to accommodate design group II aircraft, FAA criterion calls for a taxiway width of 35 feet. Currently, all taxiway widths meet FAA and TxDOT criteria.

Future development of the Airport's eastern property could accommodate aviation and/or non-aviation uses. If aircraft storage, maintenance or manufacturing uses that require airfield access were developed, additional taxiways serving this area will be necessary. The taxiway leading to this development should be designed to meet FAA dimensional standards for Design Group II aircraft consistent with other Airport design elements.

Navigational Aids (NAVAIDs)

Navigational aids (NAVAIDs) are any visual or electronic devices, airborne or on the ground, that provide point-to-point guidance information or position data to aircraft in flight. Airport NAVAIDs provide guidance to a specific runway end or to an airport. Equipment necessary to provide an airport with precision, non-precision, or visual capabilities are installed in accordance with design standards that are based on safety considerations and airport operational needs. The type, mission, and volume of aeronautical activity used in association with meteorological, airspace, and capacity considerations determine an airport's eligibility and need for various NAVAIDs. Grand Prairie Municipal Airport is equipped with visual landing aids to allow for visual approaches. The airport also utilizes NAVAIDS to aid in the execution of non-precision approach procedures

Facility requirements at the Airport include the following two types of NAVAIDs: instrument approach NAVAIDs and visual NAVAIDs. Existing lighting and/or instrumentation at Grand Prairie Municipal Airport is summarized in **Table 3-3**.

Table 3-3: Existing Airport Lighting and Instrumentation

Runway	Type of Approach	ALS	MIRL	REIL	VASI	PAPI
17	Visual		✓		✓	
35	Non-Precision		✓	✓	✓	

Source: Airport/Facility Directory, Wilbur Smith Associates

Notes:

ALS: Approach Lighting System
MIRL: Medium Intensity Runway Lighting
REIL: Runway End Identifier Lights
VASI: Visual Approach Slope Indicator
PAPI: Precision Approach Path Indicator

Lighting and NAVAID facility requirements are primarily determined by the needs of aircraft operators frequently using the airport. Existing NAVAID and lighting facilities at Grand Prairie Municipal Airport are examined in more detail in the following sections.

Instrument NAVAIDs

This category of NAVAIDs provides assistance to aircraft performing instrument approach procedures to an airport. An instrument approach procedure is defined as a series of predetermined maneuvers for guiding an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

The standard type of precision approach available today is the ILS approach. The FAA, however, is currently developing a global navigation satellite system (GNSS) using the U.S. Department of Defense's GPS satellites for precision approaches. The GPS satellite-based navigation system is able to provide instant and precise aircraft position information for every phase of a flight. Non-precision GPS approaches are currently available at many airports, including Grand Prairie Municipal Airport through RNAV (GPS) approach procedures for Runway 35. Precision GPS approaches have yet to achieve wide-spread implementation. To fully implement a precision approach, three the following types of electronic guidance must be in place:

- *Azimuth guidance* – ILS requires a localizer
- *Altitude guidance* – ILS requires glide slope instrumentation
- *Distance guidance* – ILS requires marker beacons and/or distance measuring equipment (DME)

As discussed earlier, due to airspace limitations in conjunction with instrument procedures at Dallas Ft. Worth International Airport, Runway 17 at GPM is not eligible for instrument approach systems. Runway 35, however, is currently served by VOR/DME and GPS non-precision approaches. The GPS Runway 35 approach provides the best weather minimums, allowing the Airport to remain operational with reported cloud ceilings not lower than 1,000 feet and a two and one-quarter-mile visibility minimum for Category A and B aircraft only.

GPS Satellite data in concert with a ground-based transmitter can provide three-dimensional guidance for a GPS precision approach. As precision GPS approach technology is developed and commissioned on a wide-spread basis, Grand Prairie Municipal Airport should work to augment and/or replace the Airport's existing approaches. To achieve guidance for a precision GPS approach with at least one-mile visibility minimums, the FAA recommends an approach lighting system and a greater degree of obstacle clearance than without precision guidance.

Visual Landing Aids

Visual landing aids provide aircraft guidance to and alignment with a specific runway end, once the airport is within a pilot's sight. Visual landing aids at Grand Prairie Municipal Airport currently include the following:

- *Runway Lighting* – Runway 17/35 is equipped with medium intensity runway lighting (MIRL). This lighting system was installed in 1995 and the airport plans to install more efficient LED runway lights as soon as practical.

- *Runway End Identifier Lights (REILs)* – The FAA and TxDOT indicate that REILs should be considered for all lighted runways at reliever airports not planned for a more sophisticated approach lighting system (ALS). Grand Prairie Municipal Airport currently has REILs in place to identify the approach to Runway 35. Based on FAA and TxDOT guidelines mentioned above, Runway 17 should be considered for REILs.

- *Approach Lighting* System (ALS) – As previously mentioned, Runway 17 would not be considered for an instrument approach. If any runway would be served by a GPS approach with "not lower than three-quarters mile" visibility, an omni-directional approach lighting system (ODALS) or something similar would be recommended. An ODALS system includes single strobe light standards, spaced 300 feet apart extending up to 1,500 feet beyond the runway end. Ultimate planning will consider the installation of this type of ALS to improve operational safety during nighttime or low visibility conditions. The primary consideration for installing an ALS is the requirement to acquire property to locate the system.

- *Other Runway Lighting and Guidance* – Several additional NAVAIDs and visual aids are available at the Airport to assist in locating and landing aircraft at night and in poor weather conditions. NAVAIDs include a rotating beacon, lighted wind cone, and an Automated Weather Observing System (AWOS). These systems should be maintained during the 20-year planning period as they play a crucial role in the Airport's operation.

- *Air Traffic Control Tower (ATCT)* – The Airport also is equipped with an ATCT. The ATCT is located west of the runway, aligned with the northern half of the airfield and across the airfield from the terminal building. Short-term plans call for the relocation of the ATCT to the east side of the airfield near the newly constructed terminal building.

  Future ATCT development should take into consideration the position and height of existing and planned structures as well as the line of sight

limitations they may present so that air traffic controllers may see an aircrafts' movement while on the ground.

- *Visual Glide Slope Indicators (VGSI)* – Visual glide slope indicators are a system of lights located at the side of the runway which provide visual descent guidance information to pilots during an approach to the runway. Currently, Runways 17 and 35 are equipped with visual approach slope indicators (VASIs), a system consisting of a set of visual indicators for each runway end. Four-box precision approach path indicator systems (PAPIs), however, are recommended by TxDOT and FAA. The VASI system in place at GPM should be considered for replacement at some time in the future with four-box PAPIs.

The recommended lighting and NAVAID improvements sited above will allow Grand Prairie Municipal Airport to better serve current and future users through the 20-year planning period.

Dimensional Standards

The FAA's airfield design standards relative to runway lengths, widths, various centerline separations, and safety dimensions as they relate to Grand Prairie Municipal Airport are reviewed in this section.

Obstacle Free Zone

The OFZ is a three-dimensional volume of airspace that supports the transition of ground-to-airborne operations (or vice versa). The OFZ clearing standards prohibit taxiing and parked airplanes and other objects, except frangible NAVAIDs or fixed-function objects, from penetrating this zone. The OFZ consists of a volume of airspace centered on the runway. In addition, some precision instrument runways are required to meet standards regarding inner-approach, inner-transitional and precision OFZs.

The OFZ for Runway 17-35 at Grand Prairie Municipal Airport is 400 feet wide and extends 200 feet beyond each runway end. This area must be cleared using the requirements stated above. Existing and future facilities at Grand Prairie Municipal Airport comply with all OFZ clearance requirements. The ultimate 600 foot extension to Runway 17-35 also complies with these clearing requirements.

Part 77 Obstruction Standards

Federal Aviation Regulations (FAR) Part 77 exist to identify objects which may be hazardous to air navigation. These standards apply to the use of navigable airspace by aircraft and to existing or planned air navigation facilities (airports). An obstruction may be an existing or proposed manmade object, object of natural growth, or terrain. Any changes to the airfield must provide the obstacle clearance necessary to meet the requirements designated in FAR Part 77. The

critical surfaces are identified in drawings associated with the Airport Layout Drawing (ALD). Existing Part 77 surfaces will be evaluated during the development of the ALD and any penetrations will be noted and addressed for removal or marking.

Runway Protection Zones (RPZ)

The RPZ is an area off the runway end intended to enhance the protection of people and property on the ground. RPZ size is a function of critical aircraft and the visibility minimums established for the approach to the runway. Visual runways have smaller RPZs because the landing minimums are higher and the runway is not used during periods of reduced visibility. Precision navigational aids are used to guide aircraft to runways equipped with advanced instrumentation during periods of reduced visibility; thus allowing the airport to remain open and increasing its utility. These instrumented approaches are required to be protected by the larger runway protection zones. In summary, the lower the visibility minimums for landing, and the larger the RPZ.

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

- *Runway Object Free Area (OFA)* - The runway OFA is a two-dimensional ground area surrounding the runway that prohibits parked aircraft and objects, except NAVAIDs and objects with locations fixed by function, from locating there. For the runway at Grand Prairie Municipal Airport, the OFA meets clearing standards and extends 300 feet beyond each runway end and has a width of 500 feet.

- *Controlled Activity Area* - The controlled activity area is the portion of the RPZ beyond and to the sides of the runway OFA. It is recommended that an airport control, in fee, this area. The controlled activity area should be free of land uses that create glare and smoke. Also, the construction of residences, fuel-handling facilities, churches, schools, and offices is not recommended in the RPZ's controlled activity area. Roads are typically not recommended in the RPZ unless they are under airport control.

With existing and recommended future approach visibility minimums slated to remain one mile or greater, RPZs at GPM are not expected to change over the life of the planning period, as long as the ARC approach category remains at the B level. Any increase in ARC approach category or changes in approach procedures which lower approach visibility minimums may require a larger RPZ. Also, any runway extensions would effectively shift the RPZ the same distance of the extension. **Table 3-4** shows the existing RPZ dimensions at Grand Prairie Municipal Airport.

Table 3-4: Runway Protection Zones, Grand Prairie Municipal Airport

Runway	Type of Approach	Inner Width	Outer Width	Length	Approach Slope
17	Visual	500’	700’	1000’	20:1
35	NP (+1 mi)	500’	700’	1000’	34:1

Source: FAA Approach Plates, AC 150 5300-13 “Airport Design”

Runway Safety Area (RSA)

The RSA serves as a safety area if an aircraft overruns the paved runway surface. According to the FAA’s definition, the RSA should be cleared and graded and have no potentially hazardous ruts or surface variations. This area should also be drained through grading or by storm sewers. General requirements for grading of the RSA are 0 to –3 degree grade for the first 200 feet from the runway end, with the remaining longitudinal grade ensuring that no part of the RSA penetrate the approach surface or drop below a –5 degree grade.

For design standard B-II runways, like Runway 17-35 at GPM, the RSA is required to be 150 feet wide and 300 feet beyond the runway end. Runway 17-35 provides an adequate RSA. The Airport maintains approximately 600 feet both north and south of the runway ends within the airport property boundary.

The RPZ, its components and runway safety areas are illustrated in **Figure 3-2** and shown on the Grand Prairie Municipal Airport Layout Drawing.

Figure 3-2: Runway Protection Zone and Safety Areas

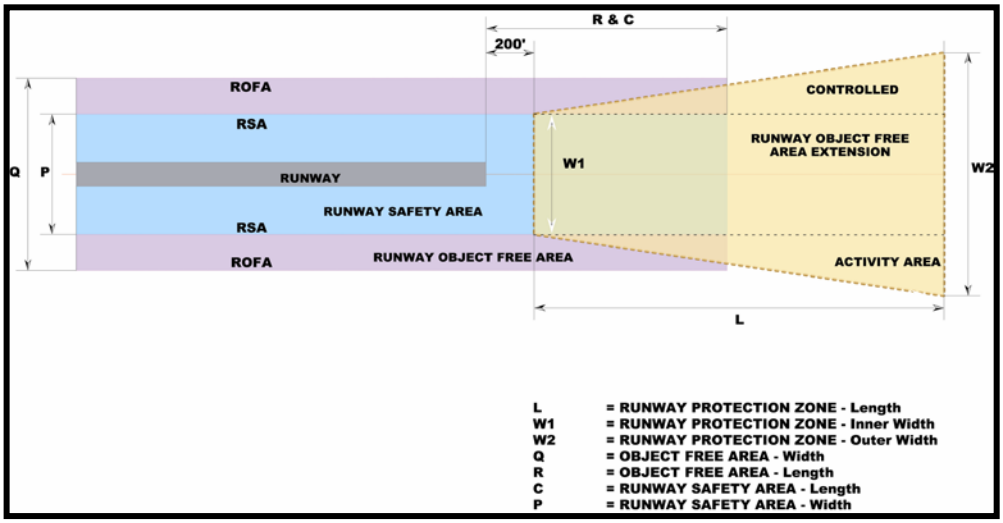


Table 3-5 shows the minimum airfield dimensional standards that apply to Grand Prairie Municipal Airport.

Table 3-5: Minimum Airfield Dimensional Standards

Facility	Runway 17-35 Group B-II Design Aircraft
Width:	
Runway	75’
Taxiway	35’
Runway Safety Area	150’
Object Free Area	500’
Runway Centerline to:	
Taxiway Centerline	240’
Aircraft Parking Area	250’
Taxiway Object Free Area	131’
Taxiway Centerline to:	
Aircraft Parking Area	65.5’

Source: AC 150/5300-13 “Airport Design”

The centerline of the parallel taxiway is situated 250 feet east of the runway centerline. The required separation is 240 feet for runways serving ARC B-II aircraft and having approach minimums not lower than one mile. The current 250-foot separation exceeds the FAA design criteria of a 240-foot separation. The runway/taxiway separation will be adequate for the future if approach minimums remain not lower than ¾-mile. The FAA requires a minimum of 300 feet runway/taxiway separation for approaches with lower than ¾-mile visibility minimums.

The airfield represents almost no delay related issues to aircraft operations. One modification to the airfield is recommended within the planning period to increase the efficiency of aircraft movement:

- *Taxiway Modifications* – A right-angled taxiway should extend from Taxiway A to the end of Runway 35. This extension will allow departing aircraft on the runway to access the end of the runway efficiently and safely without having to back taxi or turn around to use the runway’s full length. Additional taxiways may also be needed for future airfield, apron or hangar development that requires access to the runway system.

3.3 Landside Requirements

This section will briefly describe the landside requirements needed to accommodate general aviation activity through the planning period. These will include hangars, aprons and tie down areas, terminal building, ATCT, automobile parking, aircraft rescue and firefighting, fuel storage and access roadways.

Hangars

The demand for hangar storage is generally a function of the number of based aircraft on an airport. At Grand Prairie Municipal Airport, most of the hangars are T-hangars intended to store a single-engine or light multi-engine aircraft in each. There are also conventional hangars at Grand Prairie Municipal that are used by airport-based companies for the storage, maintenance and modification of based and transient airplanes and helicopters. Additional hangar needs will be led by a variety of factors.

- *T-hangar/Shade Structures* - The growth of aviation at Grand Prairie Municipal and the interest of private aircraft owners will drive the need for increased T-hangar structures used to protect single engine and light multi-engine aircraft. Most of the 236 based aircraft at Grand Prairie Municipal are stored in a variety of T-hangar type structures as described in Chapter 1. Some of the structures are newly built with a broad range of amenities, while others are dated and in need of replacement, such as the portable hangars north of the terminal building. The forecast for Grand Prairie Municipal Airport shows a growth of 34 single- and multi-engine piston aircraft within the planning period. It is recommended that new T-hangars are constructed to keep pace with this expected demand as well as the replacement of older portable hangars with new T-hangars.
- *Conventional Hangars* – Most of the conventional hangars used on the airfield are dedicated for aircraft maintenance, corporate aircraft or other commercial aviation-related businesses. Their uses are specialized based on the company using the facility. The forecast presented in Chapter 2 of this study, shows a growth of 12 based helicopters or jet aircraft within the planning period. It is common that a company or business may have multiple aircraft, and hangars within this category could store more than one aircraft in a larger hangar. Given that the demand driving additional conventional hangar needs is dictated by the business needs of the organizations operating within the hangars as well as the limited amount of land necessary to build them, alternatives for placement of these buildings will be outlined in the following chapter.

Aprons and Tie Down Areas

Grand Prairie Municipal Airport has approximately 40,000 square yards of apron pavement located along the east side of the airfield in front of the terminal building and hangars. This apron, capable of accommodating over 71 aircraft on tiedowns, is used primarily for the storage of single-engine aircraft as well as parking for itinerant aircraft stopping briefly in the Dallas area. Helicopters and large aircraft use this apron as a staging/parking area frequently. There are a large number of conventional apron tie downs available at Grand Prairie Municipal Airport, but most aircraft owners prefer covered storage in order to avoid exposure to the weather.

Given that the majority of based aircraft are stored in hangars and the abundance of existing tie-downs, additional apron space will not be needed within the planning period to accommodate the growth based aircraft. Apron space should be added, however, to connect any new hangar development with the runway/taxiway system, where appropriate. Alternatives presented in the next chapter will include apron areas that help facilitate the flow of aircraft.

Terminal Building

As mentioned in Chapter 1 of this study, a new 7,000 square foot terminal building was recently constructed at GPM to house administrative offices, restaurant, pilot lounge, flight planning area and a conference room. The facility is constructed in place of the old terminal building and will not conflict with the development of hangar facilities or the planned relocation of the ATCT near terminal building.

Since the new terminal building has a useful life beyond the 20-year planning horizon it is deemed adequate to meet the needs of the Airport and additional facilities related to this are not recommended.

Air Traffic Control Tower (ATCT)

GPM has an ATCT with services provided through a contract with the FAA. The tower was constructed by American Eurocopter and was not designed specifically for general airport ATCT services. The facility was designed for American Eurocopter's operational control only. Although the facility is serviceable, it is undersized and under-equipped to meet the current demands of the Airport. As mentioned earlier, a new ATCT is planned for construction commencing in the spring of 2013. It will be located on the Airport's east side, near the fire station, and will provide controllers a clear view of the aircraft movement area.

Automobile Parking

The demand for automobile parking is led by the volume of people using the terminal building. Automobile parking for the terminal building area was planned and designed through the terminal building development effort. The new terminal building has 55 public parking spaces including four handicapped spaces. These spaces are intended to accommodate pilots, passengers, staff and public visiting the terminal building.

Automobile parking for visitors to the maintenance hangars or other structures located on the north side of the airport are driven by the nature of business inside each facility. Parking for planned hangar areas will be shown in the alternatives presented in the next chapter.

Aircraft Rescue and Firefighting (ARFF)

Since GPM is a GA facility that does not have and is not expected to have commercial service and/or a Part 139 certification, ARFF services are not required to be located on the Airport. City fire trucks carry a small amount of foam with aerators that can be used for aircraft fire fighting. Based on this and the fact that ARFF services are not required for GPM, ARFF services provided by the city of Grand Prairie Fire Department may be considered adequate for the existing and forecasted level of operations.

Fuel Storage

GPM owns and controls underground fuel storage tanks totaling 3,600 gallons (2,400 for Jet A and 1,200 for 100 LL). These tanks are owned by the city and are leased by the FBO. As with similar airports, fuel storage requirements are typically based upon maintaining a two or three-week supply of fuel during an average month. The availability for more frequent deliveries can reduce the fuel storage capacity requirement. Storage beyond a four-week period is not recommended as it could degrade the quality of fuel. Because an increasing percentage of future aircraft utilizing the Airport will require Jet A fuel, future fuel storage requirements may consider increasing Jet A fuel requirements.

As operations by turbine and piston aircraft increase and more aircraft base at the airport, average monthly fuel usage can be expected to increase. It is unlikely; however, that two or three-week fuel usage will exceed current storage capacities. Additionally, with the flexibility to increase fuel deliveries, the current storage capacity will be adequate for the planning horizon. If for some reason, however, additional fuel storage at the airport is needed, it would have to be located above ground at a different location than the current underground system.

Access Roadways

Access to the terminal area and businesses located along the Airport's eastern edge is provided by Great Southwest Parkway. Businesses located along the Airport's western boundary use Aviation Parkway to access their facilities. Regionally, the Airport can be accessed via Interstate 20, State Highway 360 or newly constructed State Highway 161 via Great Southwest Parkway, or Arkansas Lane or Mayfield Road. The airport has excellent access, which if maintained, will be adequate for the future.

3.4 Summary

As demonstrated by the demand capacity discussion at the beginning of this chapter, the capacity of the airfield at Grand Prairie Municipal Airport will exceed the demand throughout the planning period. Based on the FAA Advisory Circular for demand capacity analysis, the ASV of the airfield is approximately 230,000 operations while the forecast projects 113,199 annual operations, or 49 percent of its capacity. Therefore, airfield improvements related to demand and capacity are not required within the planning period.

Improvements to the airfield are recommended, however, to meet runway length requirements and to improve the flow of aircraft on the ground. Limitations placed on some of the airport's aircraft as a result of takeoff requirements, justify the extension of the Airport's runway. With property limitations and uncertainty regarding the benefits in operational performance, it is recommended that any runway extension take place beyond the planning period. A taxiway connecting the Runway 35 threshold to the Airport's apron would provide added efficiency for aircraft departing Runway 35. A connector taxiway on the west will improvement aircraft flow. VASI systems for each runway should also be replaced by PAPI systems and Runway 17 should have a REIL system within the planning period. A recommended improvement to help lower approach visibility minimums to Runway 35 includes the installation of ODALS or similar ALS to that approach. Additionally, runway lights will be replaced by more efficient LEDs.

Landside improvements include an additional T-hangar and conventional hangar development for based aircraft as well as replacement hangars for portable hangars that have gone beyond their useful life. Uses for new hangar facilities include aircraft maintenance operations as well as business and private aircraft storage. Aircraft apron areas should be expanded to facilitate the efficient flow of aircraft to newly developed hangar areas.

Alternatives for development will be reviewed and a recommended concept will be presented and illustrated on the Airport Layout Drawing.

Chapter

4

Development Alternatives

The objective of this chapter is to identify feasible development options that meet the projected levels of aviation demand as well as maintain a safe aviation environment in and around Grand Prairie Municipal Airport (GPM) within the 20-year planning period. In order to achieve this objective, the following five sections will help determine a recommended approach to future development at GPM.

1. Summary of Airport Recommendations
2. Ability of Existing Facilities to Accommodate Improvements
3. Identification of Development Alternatives
4. Evaluation of Alternatives
5. Conclusions and Recommendations

4.1 Summary of Airport Recommendations

Grand Prairie Municipal Airport will continue in its role as a general aviation reliever airport, helping to reduce congestion at large and medium hub airports in the Dallas/Ft. Worth Metroplex. Grand Prairie Municipal Airport does this by supporting the region's general and business aviation activities including extensive helicopter maintenance, corporate and business activity and personal small and light aircraft operations. The preceding capacity analysis and facility requirements chapter determined that overall airfield capacity at GPM is sufficient to meet expected demand during the planning period. However, there are several airfield improvements that are recommended to meet runway length requirements, update navigational aids and improve the flow of aircraft on the ground. Landside improvements will address the demands for additional aircraft storage and replace structures that are beyond their useful life. The following is a summary of the key facility recommendations, as discussed in the previous chapter.

- Extend Runway 17-35 to accommodate a greater share of larger aircraft that have to lighten their loads in order to use the runway today.
- Taxiway improvements to enhance the efficiency of aircraft ground movement.
- Airfield navigational aid improvements such as upgrading runway lighting, PAPI and REIL installation and an approach lighting system such as ODALS to lower visibility minimums, if property constraints allow.

- Additional T-hangars and conventional hangars to accommodate based aircraft demand.
- Apron area expansion consistent with providing efficient airfield access from planned hangar development.

Perhaps the most significant project identified in this list is the extension of Runway 17-35. This project could require property acquisitions and roadway relocations in order to meet runway length requirements. For this project to be developed, key factors for a runway extension should be met. First of all, there must be adequate demand from based and transient aircraft to warrant such a project. The extension must meet the needs of critical aircraft that would otherwise not be able to use the airfield. Second, airport management, city of Grand Prairie and TxDOT must recognize the benefit of the extension given the cost of development. Once these key factors are met, GPM could consider the extension as a justified project.

4.2 Ability of Existing Facilities to Accommodate Improvements

This section will evaluate the ability of existing facilities to accommodate recommended facility improvements.

Airfield

Before evaluating airfield improvements, it is important to explore the need/demand for existing airfield facilities. As stated in the preceding chapter, the existing runway and taxiway system has enough capacity to accommodate the forecasted demand for future aviation activity. Grand Prairie Municipal Airport is, however, a very active general aviation reliever airport with a growing number of based aircraft and operations which warrant the development of airfield improvements to enhance the flow of aircraft movement. Facilities recommended to enhance airfield efficiency and improve safety will require the modification of existing facilities or land areas.

Runway Extension

This and the previous master planning effort studied the need and justification for extending Runway 17-35 to a length that would better meet the runway length requirements of some of the larger aircraft serving the Airport. At 4,001 feet, Runway 17-35 sometimes requires larger aircraft to reduce their load in order to depart within the runway's length, especially during hotter months.

The existing runway length accommodates most of the operations at GPM. In order to accommodate a greater share of larger aircraft the runway would require an extension. The next section of this chapter will discuss alternatives developed in the previous master planning effort to extend the runway. Although a preferred

alternative was selected in that study, due to the relatively high cost and low benefit resulting from the project, the city of Grand Prairie and Airport management wish to delay this project to beyond the 20-year planning horizon. Illustrating this project as it is currently shown on the Airport Layout Plan preserves the airspace, land use and potential funding for future years when demand warrants.

Taxiway Improvements

Although the taxiway system at GPM is adequate to meet the needs of current based aircraft users, it is important to improve areas that maximize aircraft ground movement and avoid areas that create congestion or bottlenecks. The recommended taxiway improvements are to 1) install a connector taxiway between two taxiways leading from Runway 17 to the west side of the Airport and 2) construct a connector taxiway from the threshold of Runway 35 to primary Taxiway A. If Runway 35 was extended within the planning period, connecting Taxiway A to the threshold of Runway 35 would not be necessary. But, because the runway extension project is beyond the planning period, it is reasonable to construct the connector to improve efficiency throughout the 20-year period.

Airfield Navigational Aid Improvements

There are two primary reasons for updating existing navigations aids, updating older systems currently in place and lowering minimums for instrument approach procedures. Through analysis of existing navigational aid features and discussions with airport staff and users, there are three primary airfield navigational aid recommendations:

- Upgrade Runway Lighting – This project would call for the replacement of existing medium intensity runway lights to more efficient LED lights. The existing system was installed over 15 years ago and the cost of maintaining a system that is becoming obsolete will become higher each year. LED lights are more efficient, use less power and are more reliable than the traditional incandescent system currently in place.

- PAPI and REIL Installation – It is recommended that the current VASI system installed on Runway 17 and 35 be replaced by a PAPI system. As VASI systems age, the FAA has been recommending they be replaced by PAPI systems. Although the current system is functional, replacement is recommended before the system fails. The FAA and TxDOT also recommend that runways without advanced approach lighting systems have REILs installed. Runway 35 has REILs while Runway 17 does not. Providing this for Runway 17 would provide an added level of safety for pilots.

- Approach Lighting System – The FAA recommends the installation of an approach lighting system in order to lower visibility minimums for an instrument approach. Runway 17 does not have instrument approach procedures due to conflicts with Dallas/Ft. Worth International Airport airspace. Visibility minimums for Runway 35 approaches are set at 2¼ mile. The installation of ODALS, as recommended in the previous chapter, could effectively lower visibility minimums allowing flights into GPM in adverse weather conditions than allowed today. It is important to note, however, that this system extends up to 1,500 feet from the runway which would be beyond the Airport's current avigation easement. This issue will be addressed and a recommended course of action will be provided in the next section.

Landside

Similar to airfield facilities development, landside development opportunities will also look to existing structures to accommodate improvements.

Hangars

The Airport currently has a wide array of hangars on the east apron to accommodate a variety of based aircraft and aviation businesses. In order to accommodate anticipated demand within the 20-year planning period, additional T-hangars and conventional hangars will be necessary. To make the best use of available space, new hangars could be developed in vacant land spaces as well as through the replacement of older hangars. Additionally, new facilities could be extended off of the existing facilities to create additional aircraft storage opportunities. Nevertheless, the use of the existing structures is accounted for in the calculation of recommended aircraft storage units necessary to meet the total demand for the planning period.

Apron Expansion

Aircraft apron space is used to access hangars and provide for transition between aircraft movement and non-movement areas. The Airport's aircraft apron is adequate to access existing facilities. With the development of new hangars, additional apron area will be needed to provide access to these facilities.

Alternatives for developing the airfield and landside facilities mentioned above will be addressed in the next section, *Identification of Development Alternatives*. These alternatives will make use of existing facilities where they provide benefit, cost savings, or minimize the development impacts to other areas. In some instances; however, using existing facilities is not the most logical approach to development. In such circumstances, a facility may require replacement or removal to accommodate new opportunities.

4.3 Identification of Development Alternatives

Before development alternatives are discussed, it is important to review possible areas for future development. Grand Prairie Municipal Airport has a limited land envelope available for expanding facilities needed to house existing and future tenants. With industrial and commercial development to the west and heavily used roadways along the north, south and east borders; GPM has few opportunities for development. With limited areas for expansion within the Airport's property boundary, most of GPM's future expansion will be focused on in-fill development. Alternatives will be developed within the property boundary.

Each of the airport requirements listed in the previous section represents several development alternatives. Because Grand Prairie Municipal Airport, like so many general aviation airports, has experienced cyclical periods of increased and decreased activity levels, this study aims to provide the flexibility to respond to aviation demand beyond the current expectations. Some of the guiding principles to the development of alternatives include the identification of opportunities within the property boundary, cost effective nature of development, and the ability of new facilities to meet appropriate levels of demand.

Airfield Development Alternatives

Runway Extension

The 2003 Airport Master Plan evaluated four alternatives for extending the runway at GPM. Through discussions with the Airport and TxDOT, it was determined that these alternatives and the recommendation to extend Runway 17-35 a total of 600-feet are appropriate. Based on existing airfield capacity and the limited number of critical aircraft that would benefit from the extension within the 20-year planning period, it is recommended that the extension of the runway be carried out as an ultimate project beyond the 20-year planning period. Further discussion on the rational for the runway extension recommendation is provided later in this chapter. As a prelude to this discussion; however, alternatives that required the relocation of roadways were determined to be unfeasible. **Table 4-1** below summarizes the alternatives and their impact. **Exhibits 4A and 4B** on the following pages illustrate the alternatives as shown in the 2003 Master Plan.

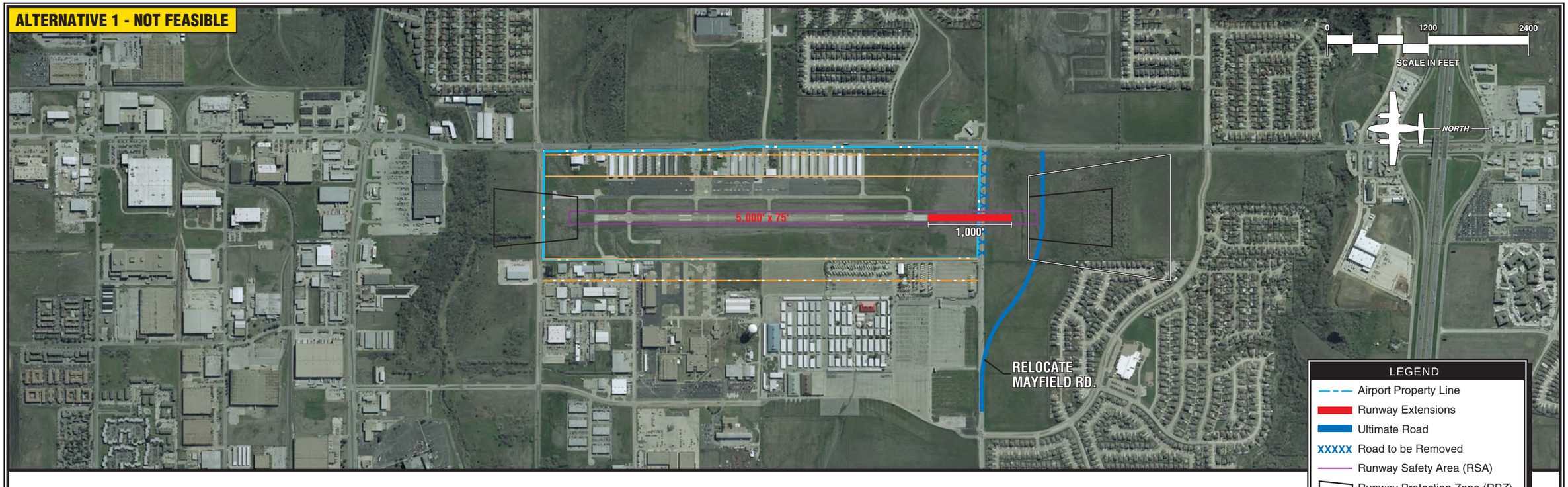
Table 4-1: Runway 17-35 Extension Alternatives Summary

Runway	Total Length	Extension	Threshold Displacement	Declared Distances	Requires Road Relocation
Alternative 1	5,000'	1,000' (35 end)	0'	No	Yes
Alternative 2	5,000'	1,000' (17 end)	0'	No	Yes
Alternative 3	4,600'	300' (each end)	0'	No	No
Alternative 4	5,000'	500' (each end)	250' (each end)	Yes	No

Source: 2003 Grand Prairie Airport Master Plan

02MP07-4A-8/27/03

ALTERNATIVE 1 - NOT FEASIBLE



ALTERNATIVE 2 - NOT FEASIBLE

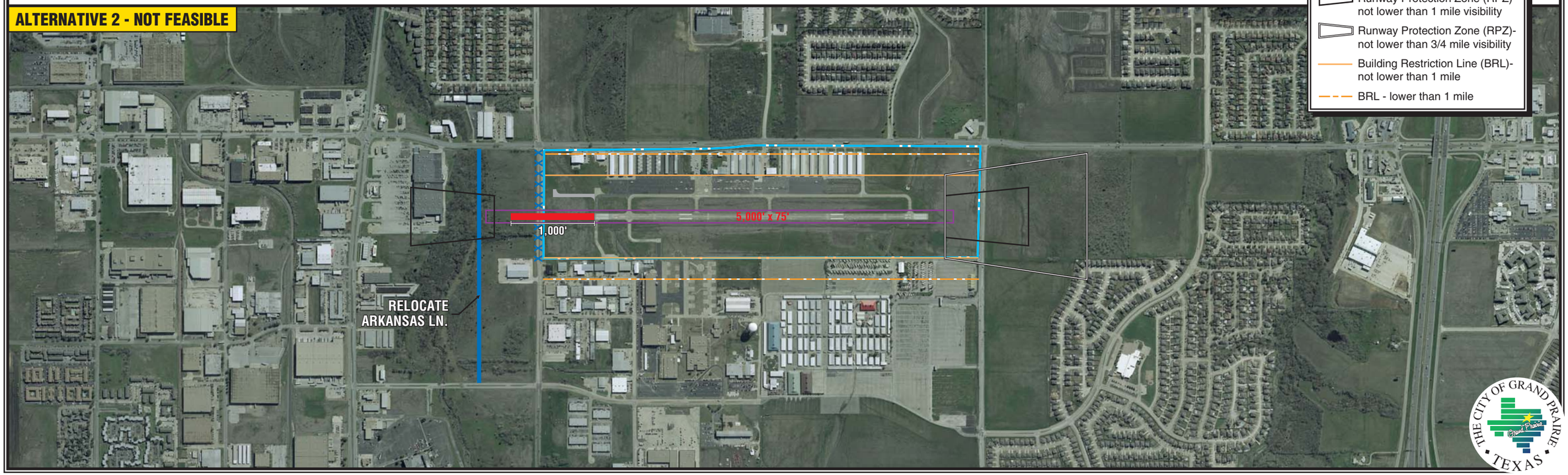
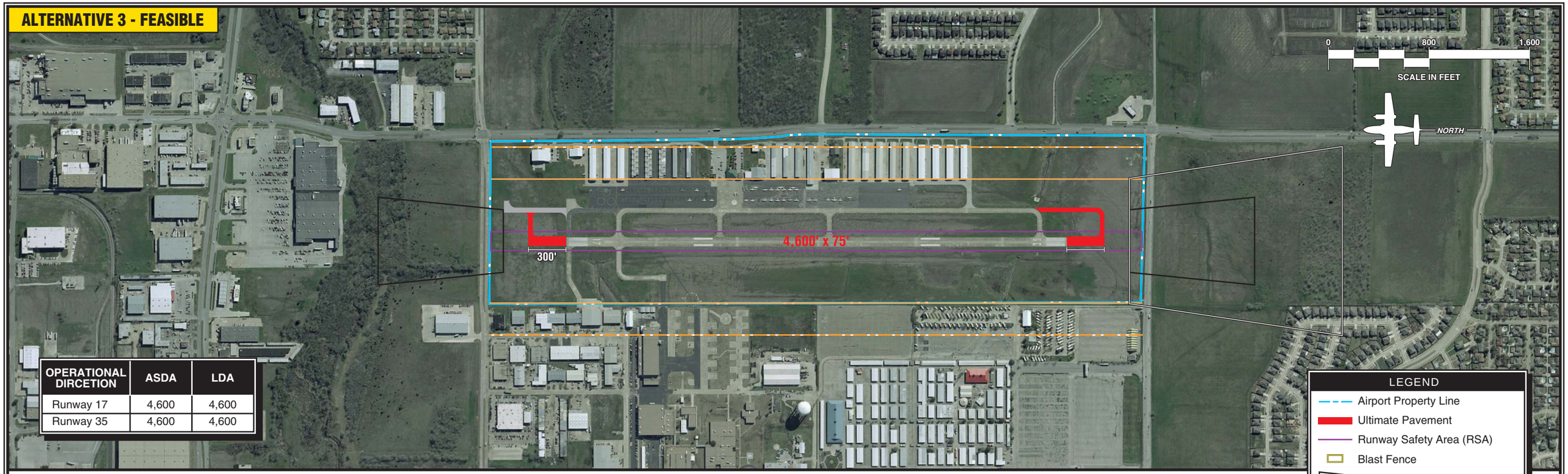


Exhibit 4A
RUNWAY EXTENSION ALTERNATIVES
CONSIDERED NOT FEASIBLE

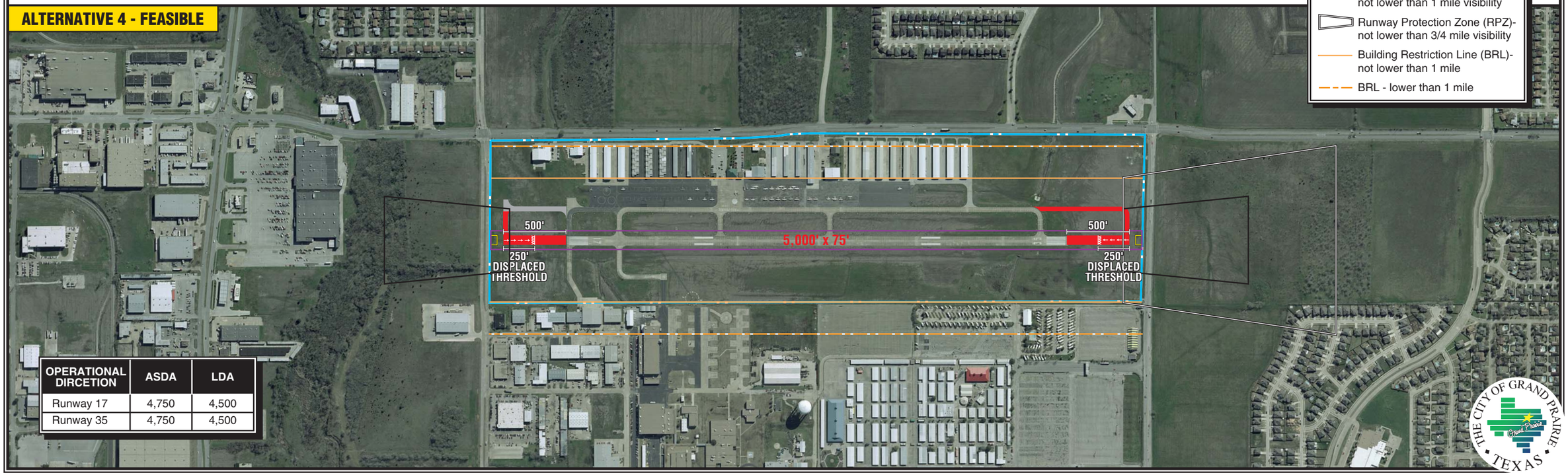
02MP07-4B-8/27/03

ALTERNATIVE 3 - FEASIBLE



OPERATIONAL DIRCETION	ASDA	LDA
Runway 17	4,600	4,600
Runway 35	4,600	4,600

ALTERNATIVE 4 - FEASIBLE



OPERATIONAL DIRCETION	ASDA	LDA
Runway 17	4,750	4,500
Runway 35	4,750	4,500

Exhibit 4B
RUNWAY EXTENSION ALTERNATIVES
CONSIDERED FEASIBLE

Taxiway

Figure 4-1 illustrates recommended taxiway improvements intended to improve aircraft flow and avoid potential bottlenecks. On the Airport's west side, a connector between taxiways A and B is recommended for improved access to facilities in that area and the runway system. Also illustrated on Figure 4-1 is the recommended ultimate runway extension. It is recommended that a taxiway connector to Runway 35 be carried out within the planning period since the ultimate runway extension would take place beyond the 20-year planning period and the connector would be used for many years prior to the extension. At the time of the runway extension, it is also recommended that connector taxiways to each new runway end be developed.

Airfield Navigational Aid Improvements

Similar to taxiway improvements, many of the recommended improvements for airfield navigational aids do not have alternatives. They are either carried out or not. The recommendations to install REILS on runway 17, PAPIs on Runways 17 and 35 and upgrading runway lights to LEDs are all recommendations supported by the FAA and TxDOT and do not have alternative concepts. As they benefit the efficient use of the airport and increase the margin of safety for its users, these projects should be carried out as soon as practical considering potential funding.

One of the airfield navigational aid improvements does consider alternatives. There are various options related to the development of approach lighting systems for Runway 35. The following lighting systems are common at airports:

1. ALSF-2 – is a 2,400 foot high intensity ALS with sequenced flashing lights. It is required for Category II and Category III precision approaches. GPM does not have a precision approach and if it did, it would not likely be Category II or III approach.
2. MASLR – is a 2,400 foot medium intensity ALS with runway alignment indicator lights and is used for Category I precision approaches.
3. MALS – is a 1,400 foot medium intensity ALS used to enhance nonprecision instrument and night visual approaches.
4. MALSF – identical to MALS above except that flashing lights are added.
5. ODALS – consist of five sequencing flashing omnidirectional lights spaced in 300-foot intervals form the runway threshold. Two additional lights are located on either side of the runway threshold.

Figure 4-1: Airfield Improvements

Landside

This section will identify landside alternatives addressing the existing and future needs for conventional and T-hangar development as well as associated apron space within the 20-year planning period. The only opportunity for development is within the existing land envelope. Other areas of the Airport are bordered by roadways to the north and south and commercial development to the west. While small pockets of development opportunities exist, the primary area for focused development is along the east side.

Three alternatives for landside development are presented in this section. Each alternative has a distinct focus:

Alternative 1 – Corporate/Commercial Focus

Alternative 2 – General Aviation Based Aircraft Focus

Alternative 3 – Hybrid Concept

Alternative 1 – Corporate/Commercial Focus

Grand Prairie and neighboring cities have a diverse collection of business enterprises and are continually recruiting new business. As an airport within an industrial and business oriented setting, it is important for GPM to meet the needs of surrounding businesses. Alternative 1 (**Figure 4-2)** concentrates on the development necessary to provide facilities for corporate and maintenance-related tenants. This alternative also provides some expanded facilities to accommodate some of the growth in the recreational aviation market. The focus of this alternative; however, is to support aggressive growth in business enterprises in the market area. Divided by zones, the layout specifically identifies the following development:

Zone 1 – The northern-most section of Zone 1 could contain an aviation maintenance/corporate hangar complex. Two medium-sized hangars provide for individual tenants, while two larger facilities provide flexibility for multiple tenants or a single large tenant. The complex shares a large aircraft parking apron with dual taxilanes to access the taxiway and runway system. A private roadway entrance from Great Southwest Parkway leads to ample automobile parking behind the hangars.

Existing hangars in Zone 1 are expanded to take advantage of available land. As a result, large hangar facilities designed to meet the needs of maintenance businesses are shown. Large aircraft aprons are provided for possible helicopter operations and aircraft staging for maintenance activities.

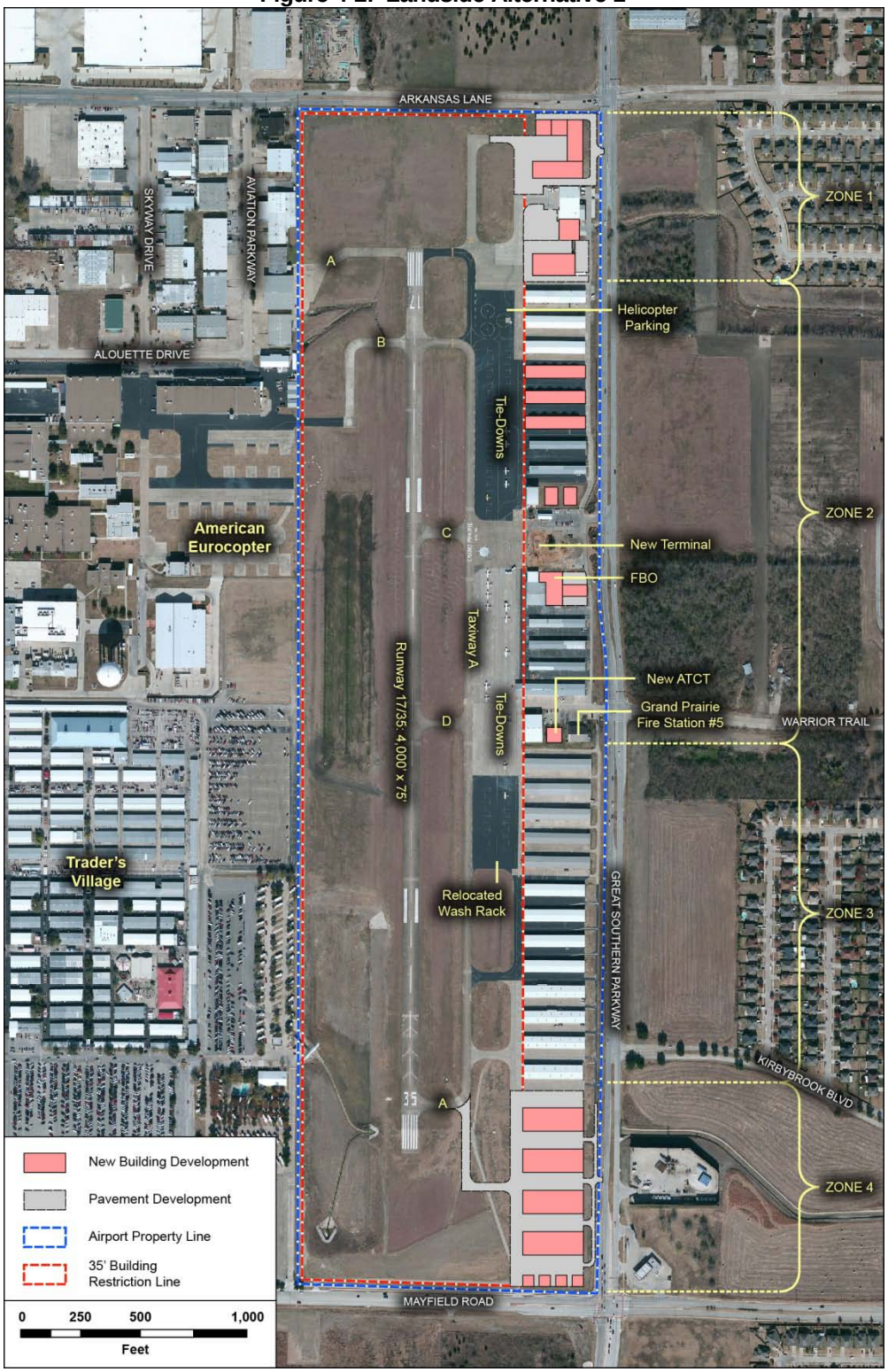
Zone 2 – The new terminal building is located within this zone. Administrative and operational functions of the Airport are centered within this building. The proposed ATCT is also located within this zone. Additional in-fill development

includes two large conventional hangars. These facilities will take advantage of available land with existing airside access and provide adequate facilities for maintenance or other aviation business-related tenant. Zone 2 also includes the expansion of the FBO located near the terminal building. As shown in all the alternatives, the FBO is projected to more than double in size. This expansion will call for the relocation of the wash rack. The wash rack will be relocated to an area on the aircraft apron which is convenient to based aircraft and away from movement areas. Also, the three rows of portable hangars are replaced by traditional T-hangars.

Zone 3 – No additional development is shown. Existing structures remain in place.

Zone 4 – Four large aircraft maintenance, aviation business or community-style corporate hangars are shown as the key development concept in this zone. These buildings would most likely house multiple tenants. Hangars are spaced to provide B-II corporate aircraft taxilane access to the area. Four small executive hangars are also provided. This alternative also provides a dedicated entry for vehicles from Great Southwest Parkway to the new hangars in this zone.

Figure 4-2: Landside Alternative 1



Alternative 2 – General Aviation Based Aircraft Focus

There are over 2,800 aircraft currently based at airports within a 30-minute drive of GPM. The Dallas/Ft. Worth Metroplex has a strong aviation market with a relatively large number of aircraft based at each general aviation airport. This high concentration of general aviation aircraft, when combined with forecasted growth within the region, is an indication of a strong local aviation market which presents an opportunity for GPM. Presented as **Figure 4-3**, Alternative 2 depicts facilities to accommodate growth in single engine and small multi-engine general aviation aircraft. This alternative assumes limited growth in corporate flight departments and maintenance related activities at the Airport. Divided by zones, the layout specifically identifies the following development:

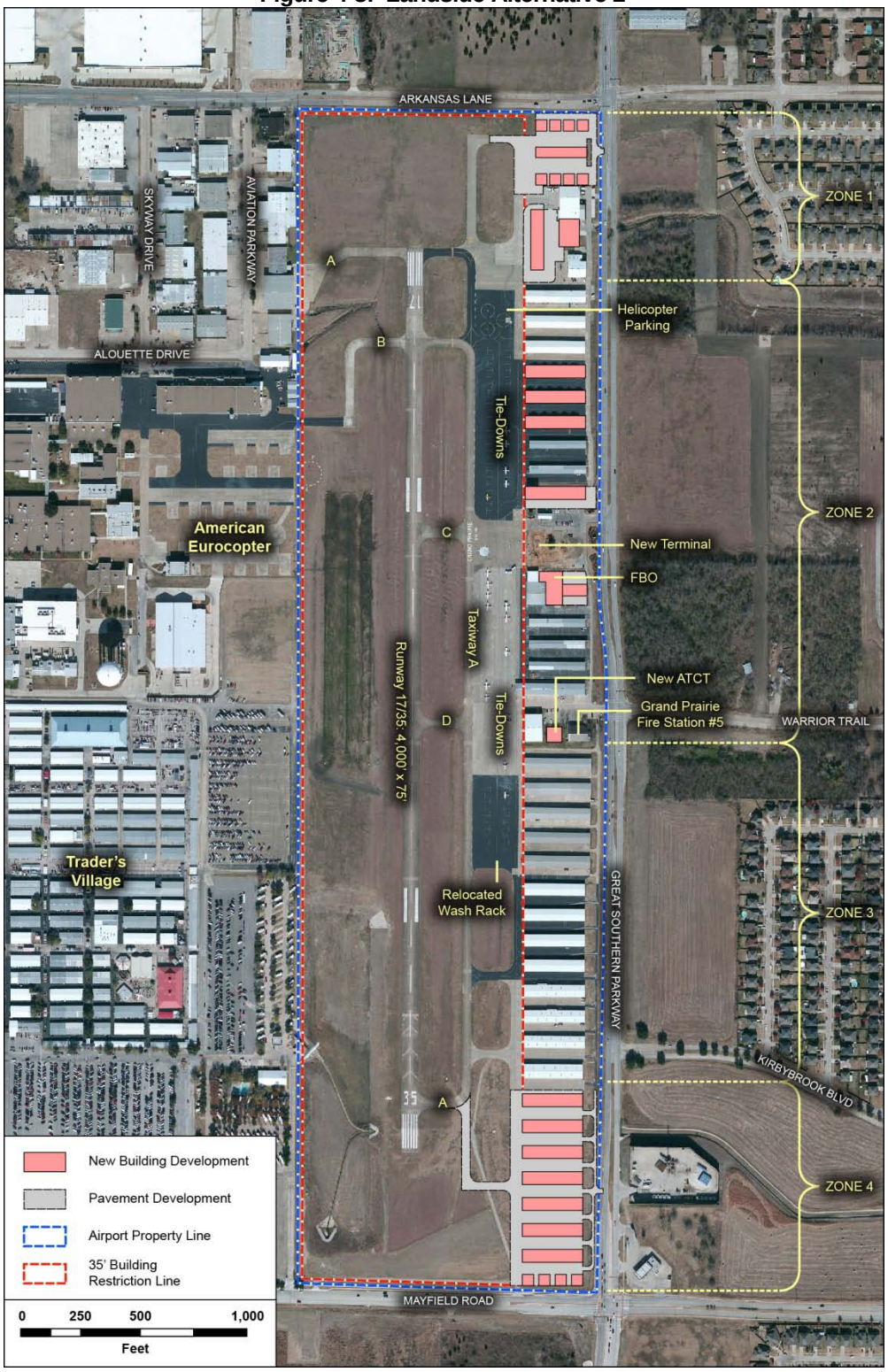
Zone 1 – The northern portion of Zone 1 includes an aircraft hangar complex intended to provide additional based aircraft storage. This area includes a 12-unit T-hangar building and eight small executive hangars with taxiway access, roadway access and automobile parking. Also shown is an additional 12-unit T-hangar building oriented parallel to the runway and an expansion of one of the existing maintenance hangars.

Zone 2 – Three rows of portable hangars are replaced by traditional T-hangars and a fourth 12-unit T-hangar building constructed near the terminal building. The new terminal building is located within this zone. Administrative and operational functions of the Airport are centered within this building. The proposed ATCT is also located within this zone. Zone 2 also includes the expansion of the FBO located near the terminal building. This expansion will call for the relocation of the wash rack which will be moved to an area on the aircraft apron which is convenient to based aircraft and away from movement areas.

Zone 3 – No additional development is shown. All existing structures remain in place.

Zone 4 – Seven 12-unit T-hangar buildings, similar to the recently completed hangars to the north, are illustrated. In addition, four small conventional hangars are located along the south boundary. Taxiway A would be extended to connect it to the aircraft apron in order to provide multiple paths for aircraft access. This alternative also provides a dedicated entry for vehicles from Great Southwest Parkway to the new hangars in this zone.

Figure 4-3: Landside Alternative 2



Alternative 3 – Hybrid Concept

General aviation tenants may be attracted to an airport that provides a variety of service and maintenance options, while service providers and maintenance companies may be attracted to an airport with a large number of based aircraft. These two opportunities for growth effectively go hand-in-hand. Presented as **Figure 4-4**, Alternative 3 provides facilities necessary to accommodate increases general aviation based aircraft as well as additional commercial/business enterprises. Developed as a hybrid of the previous two alternatives, tempered with input from airport management, this alternative seeks to take advantage of opportunities for aircraft storage and anticipated corporate/maintenance opportunities. Divided by zones, the layout specifically identifies the following development:

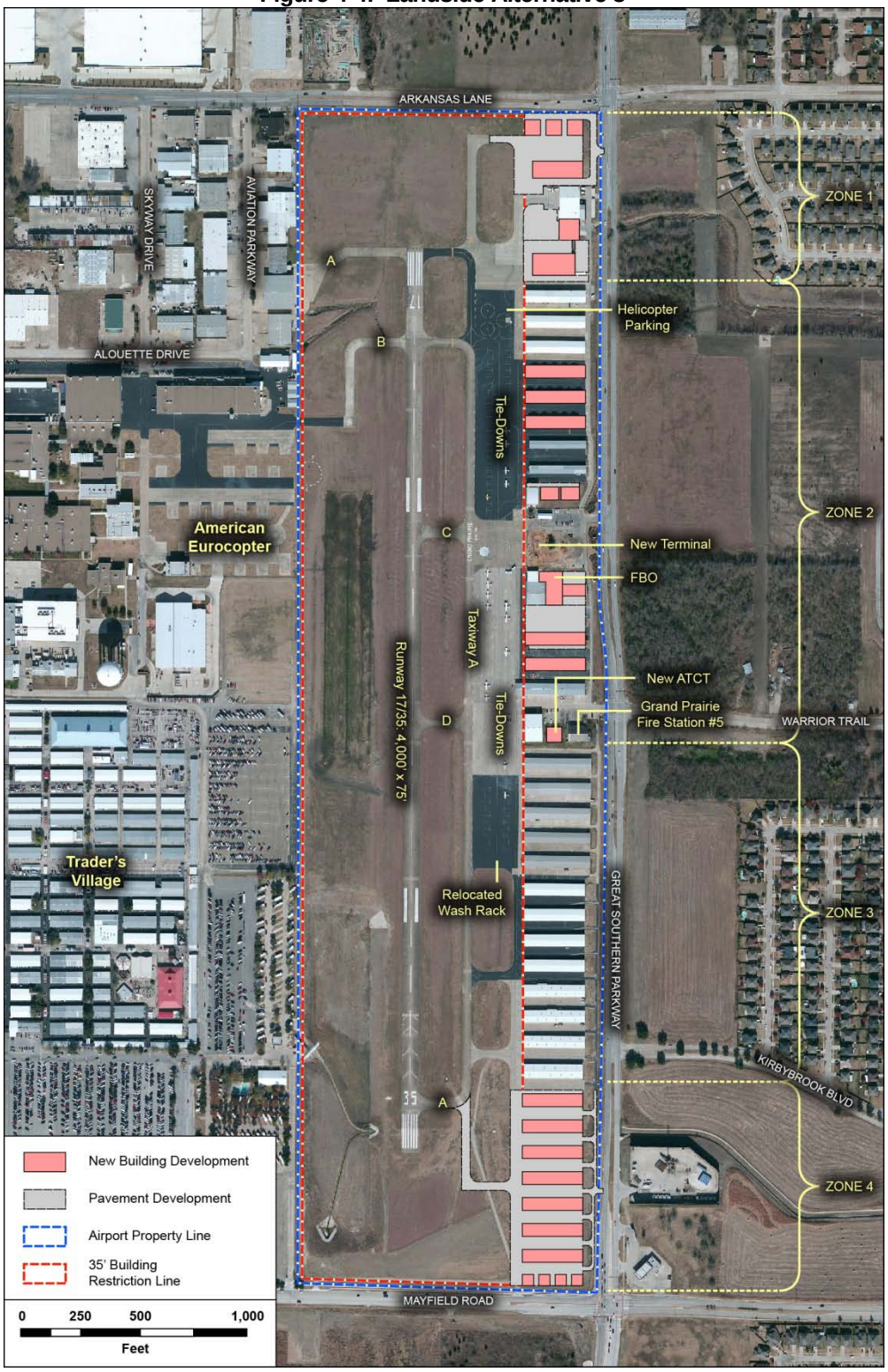
Zone 1 – As shown in Alternative 1, Zone 1 provides a wide variety of hangar options to meet the needs of corporate tenants, aviation businesses and/or maintenance operations. The development in this zone supports future commercial activities at the Airport, including an abundance of apron pavement space that could be used for helicopter operations. The development is detached from other areas of the Airport yet maintains convenient access to the airfield.

Zone 2 – Portable hangars are replaced by traditional T-hangars. Additionally, two large corporate hangars are located near the Airport entrance and terminal building. The new terminal building is located within this zone. Administrative and operational functions of the Airport are centered within this building. The proposed ATCT is also located within this zone. Zone 2 also includes the expansion of the FBO located near the terminal building. This expansion will call for the relocation of the wash rack which will be moved to an area on the aircraft apron which is convenient to based aircraft and away from movement areas.

Zone 3 – No additional development is shown. Existing structures remain in place.

Zone 4 – Similar to Alternative 2, seven 12-unit T-hangar buildings, configured similarly to the recently completed hangars immediately to the north, are illustrated. In addition, four small, executive style hangars are located along the south boundary of the zone to accommodate corporate based aircraft or other key tenants. Taxiway A would be extended and connected to the aircraft apron in order to provide multiple paths for aircraft access. This alternative also provides a dedicated entry for vehicles from Great Southwest Parkway to the new hangars in this zone.

Figure 4-4: Landside Alternative 3



4.4 Evaluation of Alternatives

Because each facility requirement discussed above can be developed independently, without impacting other future facility requirements, they can also be evaluated independently. Each development alternative is evaluated based on its own merit and considers the alternative's reasonableness, functionality and its ability to meet anticipated demand. Each alternative impacts the criteria above differently and to varying degrees. The evaluation summarized below demonstrates the critical impacts and issues of each alternative as they relate to the above criteria.

Airfield

Runway Extension

Through the analysis of runway facility requirements, it has been determined that there is a lack of justification to extend the runway within the planning period. Based on existing and forecasted activity, it is unlikely that enough operations by critical aircraft using GPM would benefit from the extension to justify the associated project cost. With that said, alternatives to *ultimately* extend the runway can be studied.

Airfield Alternatives 1 and 2 pose significant implementation challenges. Either Arkansas Lane or Mayfield Road would need to be relocated, impacting vehicular traffic. Both extension potentials would place the RPZ on existing commercial/industrial or residential land uses. For these reasons, Alternatives 1 and 2 are considered as not prudent or feasible and were not pursued further.

Alternative 3 provides 4,600 feet for both take-off and landing operations. This length would meet the needs of the majority of ARC B-II aircraft. It would provide an added level of safety for larger B-II aircraft including business jets in this category. The length, however, would still fall short of the requirements of these aircraft during hot conditions, requiring some operators to take-off with lighter loads. Some operators have to make an additional fuel stop along their route, which reduces the cost effectiveness of utilizing their aircraft at GPM.

Alternative 4 provides 150 feet greater take-off length than Alternative 3, and only provides 4,500 feet for landing, or 100 feet less than Alternative 3. Given that take-off length is more critical to aircraft performance, more value is put on take-off distance for aircraft operating at GPM. Alternative 4 would also cost more with 400 feet more pavement and require the installation of a blast fence.

Alternative 3 was the chosen alternative because:

1. It did not require the relocation of any roadways surrounding the Airport,
2. Accommodated an added level of safety for larger B-II aircraft, and
3. Provided only 150 feet less of runway take-off length than Alternative 4 while having lower costs and avoiding the use of displaced thresholds.

The chosen alternative extends each runway end 300 feet to provide a total runway length of 4,600 feet. This is maximum extension that can be accommodated within the property boundary while meeting design standards and avoiding the use of declared distance to comply with RSA requirements. It is recommended that this runway extension be shown beyond the planning period for the following reasons:

1. Limited benefit to critical aircraft using the Airport,
2. Relative high cost for minor runway length extension,
3. Lack of interest by airport management, city and community to extend runway.

Taxiway

Within the 20-year period, recommended improvements include a connector taxiway on the west side of the Airport between Taxiways A and B and the extension of Taxiway A to the end of Runway 35. When the runway is ultimately extended, beyond the 20 year period, connector taxiways to each runway end should be developed. Additional details on the rough scope and order of magnitude costs associated with projects within the planning period will be provided in the Chapter 6, *Financial Analysis*.

Airfield Navigational Aid Improvements

The land requirements for the MALS, MALSF and ODALS lighting systems are similar in that they require a site approximately 400 feet wide and extend 1,600 to 1,700 feet from the runway threshold. ODALS are recommended for GPM because the system is less expense to purchase and operate than other systems and it is better suited for airports in an urban setting like GPM.

The existing airfield navigation aids are adequate within the planning period. If there is ever a need to extend the runway, it is recommended that ODALS be included with the extension. ODALS, and any other ALS, would require the acquisition of land or easement off the end of Runway 35, across Mayfield Road from the Airport.

Landside

The preceding section provided a variety of landside development concepts for based aircraft and commercial activities at GPM. In order to determine a recommended terminal area layout, the alternatives must be evaluated for the benefit they provide and the revenue they may likely generate, while considering the realistic possibilities for meeting actual demand. The analysis of these alternatives compares and contrasts each development alternative standard, using quantifiable measures:

Hangar Capacity – comparison of aircraft storage units added

Cost of Development versus Revenue Generation – estimated return on investment

Hangar Capacity Matrix

Table 4-2 compares the number of hangars in each alternative. For all T-hangar buildings, it is assumed that each structure will house 12 aircraft. Corporate/commercial hangars are divided into three size; small, medium and large. Small hangars are defined as buildings that are roughly 50 feet by 50 feet and house a single multi-engine aircraft or a small aviation business. A medium building, sized approximately 80 feet by 80 feet, will most likely house multiple aircraft or a small to medium-sized business. A large hangar about 100 feet by 100 feet houses multiple aircraft and a large business or multiple businesses.

In some cases, larger corporate/commercial hangars may be divided in sections in order to house multiple tenants. Therefore, while a specific alternative may show what appears to be a large single structure, it may in fact be subdivided into 4 to 6 units. Reasonable assumptions will be made as to how these structures are subdivided. Actual structural development may vary from building to building. The intent, however, is to show the greatest and most efficient use of space when comparing the alternatives.

Table 4-2:
Additional Hangar Capacity
Aircraft Storage Units

Hangar	Alternative 1 Corp/Maint Focus	Alternative 2 GA Focus	Alternative 3 Hybrid
T-hangars	36	156	144
Corporate/Commercial			
Small	4	12	4
Medium	2	0	5
Large	10	1	3
Total	**52**	**169**	**156**

Source: CDM Smith

Alternative 1 provides significantly fewer T-hangars than the other alternatives while having a similar number of corporate/commercial type hangars. Although Alternative 1 contains a considerable number of large hangars, the demand for such a facility of this magnitude may be limited, given the limited airfield (runway length) and number of businesses at the Airport today.

Alternative 2 contains the greatest number of new storage spaces, however, the majority of these hangars are T-hangars designed to accommodate small single engine or light twin aircraft. This alternative also contains the greatest number of small corporate/commercial hangars designed to accommodate a single business aircraft or small business. Compared to other alternatives, Alternative 2 leaves the least amount of development for medium or large corporate/commercial hangars designed to accommodate multiple aircraft or larger aviation business.

The basic demands of the Airport indicate a need to accommodate a mix of users from small single-engine based aircraft needing T-hangar storage to large maintenance and aviation-related businesses requiring large facilities. Therefore, a development plan to meet this wide range of user should be considered.

Alternative 3, the Hybrid concept, provides a mix of T-hangar construction with a focus on corporate/commercial development as well. Alternative 3 provides 144 T-hangars, more than three times the number contained in Alternative 1. Alternative 3 shows one less corporate/commercial hangar than Alternative 2, but provides a wider range of facility types for a broader range of tenants. Alternative 3 provides an abundance of apron space that could be used for helicopter parking, run-up and hover operations. Therefore, from a hangar capacity standpoint, Alternative 3 provides the greatest flexibility for development and the most opportunity to meet the needs of a wider tenant base.

Cost of Development versus Revenue Generation – Return on Investment

Another important factor in the evaluation of terminal area development alternatives is the estimated return on investment associated with each alternative. As presented in **Table 4-3**, development costs are in current year (2011) dollars and are based on estimated unit costs and planning order of magnitude estimates. It is important to note, that while development costs are shown to be an Airport capital expense, some of these costs may likely be born by private development. The figures for anticipated revenue generation are over a 20-year period. Similar to costs related to private development mentioned above, revenues to the Airport would likely be less with private developer involvement. Rent for hangars and corporate/commercial space is based on average current rates for facilities and includes a 3 percent yearly increase for inflation. The return on investment represents the difference between the cost of development and anticipated revenue generated by the facility over the 20-year period.

Table 4-3
Return on Investment

	Alternative 1 Corp/ Maint Focus	Alternative 2 GA Focus	Alternative 3 Hybrid
Sponsor Development Costs			
Zone 1	$ 2,700,000	$ 3,200,000	$ 2,700,000
Zone 2	4,900,000	4,900,000	4,900,000
Zone 3	-	-	-
Zone 4	3,250,000	5,700,000	5,700,000
Total	**$ 10,850,000**	**$ 13,800,000**	**$ 13,300,000**
Revenue Generation (20 years)			
Zone 1	$ 2,200,000	$ 3,000,000	$ 2,200,000
Zone 2	4,400,000	4,400,000	4,400,000
Zone 3	-	-	-
Zone 4	3,400,000	6,900,000	6,900,000
Total	**$ 10,000,000**	**$ 14,300,000**	**$ 13,500,000**
Return on Investment	**($ 850,000)**	**$ 500,000**	**$ 200,000**
Net Present Value(NPV)	*$ 6,535,000*	*$ 11,894,000*	*$ 10,657,000*

Source: CDM Smith
Note: Net Present Value (NPV) is the current dollar amount of future payments.

For Alternatives 2 and 3, the overall return on investment, based on estimated development costs and typical hangar rates and inflation, is positive. Although Alternative 1 shows the lowest development cost over 20 years, the development focused on corporate/commercial expansion shows a negative return on the investment of $850,000 when considering future rental payments. This is an indication that development centered on just expanding corporate/ commercial development should not be pursued with the current corporate/ commercial rate structure. Alternatives 2 and 3 have the greatest potential for profitability, showing a return of $500,000 and $200,000 million, respectively. Most revenue projected in Alternative 2 is generated from the successful leasing of 156 new T-hangars. On the other hand, revenue generated in Alternative 3 is generated through a combination of T-hangars and various corporate/commercial hangars. Although the return on investment of landside facilities may be less in Alternative 3 than Alternative 2, a diversified mix of hangar facilities that spreads risk across different aviation market segments while providing additional revenue from various sources such as fuel, maximizes flexibility.

4.5 Conclusions and Recommendations

The process of selecting a development concept for the Airport begins with identifying alternatives for meeting the future needs of the Airport followed by an evaluation of each alternative. As each of the alternatives was developed and evaluated in this chapter, clear preferences and adjustments to each began to emerge as a result of their impact on certain criterion.

As alternatives and a recommendation for the extension of Runway 17-35 were presented in the 2003 master plan, discussions with the Airport through this master planning effort have resulted in a continued philosophy to show the extension beyond the planning period. Similarly, to make the most out of costly property acquisitions related to the runway extension, it is recommended that an ODALS approach lighting system be installed once the extension takes place. Taxiway and other airfield lighting improvements should take place within the planning period in order to update the current system and make the most of the benefits they have to offer. T-hangar, conventional hangar and associated apron development will foster growth of based aircraft and financial success of the Airport. It is recommended that Alternative 3 – Hybrid Concept of the landside alternatives be implemented in order to provide a wide range of facilities to the various users, tenants and businesses at GPM. While this alternative may not represent the greatest forecasted return on investment, it provides airport management the greatest flexibility in light of uncertain market forces.

The preferred alternatives discussed in this chapter, and illustrated on the following page as **Figure 4-5: Recommended Plan** will be shown on detailed drawings in the form of Airport Layout Plans. Additionally, the next chapters will review the land use and environmental aspects of the proposed development plan as well as address any existing environmental concerns. Finally, the development plan of execution will include phasing and costs for implementing each recommended project as well as a financial plan to discuss how capital and revenue can be made available to support airport development.

Figure 4-5: Recommended Plan

Chapter

5

Environmental Overview

In addition to identifying airport projects that are financially and technically sound, an important part of the master planning process is to ensure that future airport developments minimize impacts to the environment. Council on Environmental Quality (CEQ) 1501.2 states, "Agencies shall integrate the National Environmental Policy Act (NEPA) process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts." Accordingly, identifying potential environmental impacts of proposed airport projects has become an integral part of the master planning process.

This environmental overview has been prepared to identify potential environmental issues at the Grand Prairie Municipal Airport and the surrounding area to assist in the avoidance and minimization of environmental effects of future airport projects during the master planning process. This environmental overview discusses potential environmental impacts of the following proposed airside improvements, as well as proposed landside developments identified in Chapter 4, "Alternative Development Concepts." The proposed improvements include:

Recommended Airside Improvements

- Extend Runway: Extension of Runway 17-35 from 4,000 feet to 4,600 feet to accommodate a greater share of larger aircraft that have to lighten their loads in order to use the runway today. This project is not included in the 20-year planning period but has been included on the Airport Layout Plan in order to preserve the airspace, land use, and potential interest/funding for a future year.
- Taxiway Improvements: During the 20-year planning period, taxiway improvements would include: 1) construction of a connector taxiway between two taxiways leading from Runway 17 to the west side of the airport; and 2) construction of a connector taxiway from the threshold of Runway 35 to primary Taxiway A. At the time when the runway extension occurs, the taxiway would be connected with each end of Runway 17-35.
- Upgrade Runway Lighting: Replacement of the existing medium intensity runway lights with more efficient LED lights.
- PAPI and REIL Installation: Replacement of the current VASI system installed on Runway 17 and 35 with a PAPI system.
- Approach Lighting System: Installation of an Omni-Directional Approach Lighting System (ODALS) on Runway 35 in order to lower visibility minimums for an instrument approach.

Recommended Landside Improvements

- Additional T-hangars and conventional hangars to accommodate aircraft demand.
- Apron area expansion consistent with providing efficient airfield access from planned hangar development.

5.1 Environmental Impact Categories

While this environmental overview is not intended to satisfy environmental clearance requirements outlined in Federal Aviation Administration (FAA) Order 1050.1E, *Environmental Impacts: Policies and Procedures,* or to fulfill the requirements of the National Environmental Policy Act (NEPA), it does consider each of the potential environmental impact categories included in FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects,"* and FAA Order 1050.1E, which would enable follow-on environmental review (i.e., NEPA) and/or implementation of the required permitting processes.

These impact categories are:

- Air Quality
- Biotic Resources/Federally-listed Endangered and Threatened Species
- Coastal Barriers/Coastal Zone Resources
- Compatible Land Use
- Construction Impacts
- Section 4(f)
- Energy Supplies, Natural Resources, and Sustainable Design
- Farmlands
- Floodplains
- Hazardous Materials
- Historical and Archaeological Resources
- Light Emissions and Visual Impacts
- Noise
- Social Impacts/Environmental Justice and Children's Environmental Health and Safety Risks
- Solid Waste
- Water Quality
- Wetlands
- Wild and Scenic Rivers
- Induced Socioeconomic/Cumulative Impacts

5.2 Air Quality

The National Environmental Policy Act of 1969 (NEPA), the Clean Air Act (CAA), as amended, and Title 49 U.S.C. 47106 (c) (1) (B), as amended (formerly sections 509 (B) (5) and (B) (7) of the Airport and Airway Improvement Act of 1982, as amended; PL 97-248) are the primary laws that apply to air quality. NEPA requires Federal agencies to prepare an environmental document (i.e., environmental impact statement (EIS) or environmental assessment (EA) for major Federal actions that have the potential to affect the quality of the environment, including air quality.

The Clean Air Act (CAA) established National Ambient Air Quality Standards (NAAQS) for six pollutants, termed "criteria pollutants." The six pollutants are: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO2), ozone (O3), particulates (PM10 and PM2.5), and sulfur dioxide (SO2). The CAA requires each state to adopt a State Implementation Plan (SIP) to achieve the NAAQS for each pollutant within time frames established under CAA. Grand Prairie Municipal Airport is located in Tarrant County, Texas, which is currently in attainment for all criteria pollutants except 8-hour ozone.[1]

In addition to NEPA, the Clean Air Act of 1990 Amendments required the Environmental Protection Agency (EPA) to issue rules that would ensure that Federal actions conform to the appropriate SIP. The General Conformity Rule establishes the procedures and criteria for determining whether certain Federal actions conform to State or EPA (Federal) air quality implementation plans. To determine whether conformity requirements apply to a proposed Federal action, the following must be considered: the non-attainment or maintenance status of the area; type of pollutant or emissions; exemptions from conformity and presumptions to conform; the project's emission levels; and the regional significance of the project's emissions. FAA actions are subject to the General Conformity Rule. Because Grand Prairie Airport is located in an area that is non-attainment for 8-hour ozone, the proposed actions would be subject to General Conformity requirements. An "applicability analysis" would be required as part of the NEPA process to determine if the net emissions caused by the proposed actions exceed the applicable *de minimis* thresholds. If so, a Conformity Determination must be completed for the proposed projects.

[1] EPA Nonattainment Areas: http://www.epa.gov/oar/oaqps/greenbk/ancl.html#TEXAS

5.3 Biotic Resources/Federally Listed Endangered and Threatened Species

Section 7 of the Endangered Species Act (ESA), as amended, applies to Federal agency actions and requires each agency to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any Federally listed endangered or threatened species or result in the destruction or adverse modification of critical habitat. In addition, the Fish and Wildlife Coordination Act requires that agencies consult with the state wildlife agencies and the U.S. Fish and Wildlife Service (USFWS) concerning the conservation of wildlife resources where the water or any stream or other water body is proposed to be controlled or modified by a Federal agency or any public or private agency operating under a Federal permit.

There are 21 federally listed threatened, endangered, and rare species which are known to occur in Tarrant County, Texas. These species are identified on Table 5-1. The Texas Natural Diversity Database (TXNDD) also was searched for information regarding recorded locations of rare, threatened, and endangered plants, animals, invertebrates, exemplary natural communities, and other significant features. Although no information is available for the Arlington, Texas USGS quadrangle map, which includes the Grand Prairie Municipal Airport, there were occurrences of several rare plant species, as well as a bird species which were known to occur in the areas encompassed by United States Geological Survey (USGS) topographic maps next to the Arlington quadrangle. These species are identified in Table 5-2. As part of the NEPA documentation, an on-site biotic survey would be conducted to identify the presence of any of these species listed in Tables 5-1 or 5-2 or their habitats within the project area. If these species are located within the project area, Section 7 coordination with the USFWS would be required.

Table 5-1:
Threatened, Endangered, and Rare Species in Tarrant County, Texas

Common Name	Scientific Name	Federal Status	State Status
Henslow's Sparrow	*Ammodramus henslowii*		
Sprague's Pipit	*Anthus spragueii*	C	
Western Burrowing Owl	*Athene cunicularia hypugaea*		
Peregrine Falcon	*Falco peregrinus*	DL	T
American Peregrine Falcon	*Falco peregrines anatum*	DL	T
Arctic Peregrine Falcon	*Falco peregrines tundrius*	DL	
Whooping Crane	*Grus Americana*	LE	E
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Interior Least Tern	*Sterna antillarum athalassos*	LE	E
Shovelnose sturgeon	*Scaphirhynchus platorynchus*		T
Gray wolf	*Canis lupus*	LE	E
Red wolf	*Canis rufus*	LE	E
Plains spotted skunk	*Spilogale putorius interrupta*		
Louisiana pigtoe	*Pleurobema riddellii*		T
Texas heelsplitter	*Potamilus amphichaenus*		T
Fawnsfoot	*Truncilla donaciformis*		
Little spectaclecase	*Villosa lienosa*		
Glen Rose yucca	*Yucca necopina*		
Timber/Canebrake rattlesnake	*Crotalus horridus*		T
Texas horned lizard	*Phrynosoma cornutum*		T
Texas garter snake	*Thamnophis sirtalis annectens*		

KEY: C – Federal Candidate for Listing
DL – Federally Delisted/Proposed for Delisting
E/T – State Listed Endangered/Threatened
LE – Federally Listed Endangered/Threatened

Source: Texas Parks and Wildlife Department website:
http://gis.tpwd.state.tx.us/TpwEndangeredSpecies/DesktopDefault.aspx?tabindex=0&tabid=9&type=county&parm=Tarrant

Table 5-2:
Threatened, Endangered, and Rare Species
Occurring in Surrounding USGS Quadrangle Maps

Common Name	Scientific Name	Federal Status	State Status
Warnock's coral-root	*Hexalectris warnockii*		
Ashe Juniper-Oak Series	Juniperus ashei-quercus spp.series		
Little Bluestem-Indiangrass Series	*Schizachyrium scoparium-sorghastrum nutans series*		
Black-capped Vireo	*Vireo atricapilla*	LE	E

Key: LE – Federally Listed Endangered/Threatened
E - State Listed Endangered/Threatened
Source: Texas Natural Diversity Database (TXNDD), 2011.

5.4 Coastal Barriers/Coastal Zone Resources

The Coastal Barriers Resources Act and the Coastal Zone Management Act govern federal activities involving or affecting coastal resources. These environmental issues do not apply to the proposed improvements at Grand Prairie Municipal Airport.

5.5 Compatible Land Use

FAA Order 5050.4B states that the compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of noise impacts related to that airport.

The 2010 and 2030 noise contours were developed as part of the Noise Analysis discussed in Section 5.14 to evaluate the impact of aircraft noise on sensitive land uses in the airport areas. Sensitive land uses include: residential areas, parks, hospitals, churches, amphitheaters, and libraries. FAA Advisory Circular 150/5020-1, Noise Control and Compatibility Planning for Airports, has identified land use compatibility guidelines that relate types of land uses to airport noise levels. Based on these guidelines, all land uses are considered to be compatible with yearly day-night sound levels below 65 DNL. As shown on Figures 5-1 and 5-2, which are included in Section 5.14, no existing residences or other sensitive land uses would be exposed to 65 or more DNL noise. Most of the year 2030 65 DNL noise contour occurs on airport property. Part of the 65 DNL noise contour extends off airport property on the west side of the airport. The area that would be affected is Trader's Village, a large flea market, which is not considered a sensitive land use. Therefore, there are no incompatible land use impacts as a result of the noise from the airport.

Compatible land use impacts also can occur it the proposed airport projects result in other impacts exceeding thresholds of significance which have land use ramifications such as disruption of communities; residential and business relocations; and induced socioeconomic impacts (FAA Order 1050.1E). The proposed improvements to the airport do not result in any community disruptions, residential or business relocations, or induced socioeconomic impacts, therefore, there would be no incompatible land use impacts resulting from the proposed airport projects.

5.6 Construction Impacts

Specific impacts that would occur as a result of construction activities include noise from construction equipment on the site, noise and dust from the delivery of materials through local streets, disposal of soil, air pollution from construction equipment exhaust and dust, and water pollution from erosion. To the extent necessary, mitigation of construction impacts would be accomplished by incorporating in the project specifications from the provisions of FAA Advisory Circular 150/5370-10, *Standards for Specifying Construction of Airports,* and FAA Advisory Circular 150/5370-10, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion, and Siltation Control.* Potential construction-related water quality impacts would be minimized through the implementation of a sediment and erosion control plan.

Construction would require workers and machinery in and about the operations of the airport. In some cases, runway or taxiway closures may be required for short periods of time. FAA guidelines provided in FAA Advisory Circular 150/5370/2C, *Operation Safety on Airports During Construction,* would be enforced where applicable. Runway or taxiway closure conditions would be kept to a minimum in an effort to minimize inconvenience to airport users.

5.7 Department of Transportation Acts, Section 4(f)

The Department of Transportation Act of 1966, Section 4(f), recodified at 49 USC, Subtitle I, Section 303, prohibits the taking of public parkland, recreation areas, wildlife and waterfowl refuges, or historic sites unless there is “no feasible and prudent alternative.” There are no historic or archaeological properties within the Area of Potential Effect of the proposed airport projects. In addition, the project would not impact any parks, recreational areas, or other Section 4(f) resources. Therefore, there would be no direct or indirect impacts to Section 4(f) lands as a result of the proposed airport development projects.

5.8 Energy Supplies, Natural Resources, and Sustainable Design

Energy Supply

In accordance with 40 Code of Federal Regulations (CFR) 1502.16(3) and (f) and Executive Order 13123, *Greening the Government Through Efficient Energy Management* (64 Federal Register 30851, dated June 8, 1999), Federal agencies must assess each alternative’s energy requirements, energy conservation, and the use of natural or consumable resources in reviewing the environmental

effects of a proposed action. Also, each Federal agency is encouraged to expand the use of renewable energy in its facilities and its actions.

FAA Order 1053.1, *Policies and Procedures for Energy Planning and Conservation,* provides for assessing energy demands related to airport improvement projects. The effects of airport development on energy supply typically related to the amount of energy required for:

- Stationary facilities (such as terminal building heating and cooling and airfield lighting)
- Movement of air and ground materials

It is anticipated that the local power company, Texas Utilities Energy, would have no difficulty in meeting the energy demands of the increased energy required by the hangars and the navigational aids. In addition, energy consumption by aircraft and vehicles is not expected to significantly increase as a result of the proposed airport development.

Natural Resources

The impacts of airport development on natural resources are primarily related to the use of materials such as gravel, fill dirt, etc. that are required for construction. It is anticipated that the natural resources required for the construction of the runway extension, taxiways, hangars, and apron are available in sufficient quantities locally.

5.9 Farmlands

The Farmland Protection Policy Act (FPPA) regulates Federal actions with the potential to convert farmland to nonagricultural uses. The proposed airport development projects will primarily occur on airport property, which is dedicated to airport use. There are no prime farmland soils on the airport property. Therefore, there would be no impacts to farmlands as a result of the proposed projects.

5.10 Floodplains

Executive Order 11988 directs Federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains. Agencies are required to make a finding that there is no practicable alternative before taking action that would encroach on 100-year floodplains (7 CFR Section 650.250).

According to the Flood Insurance Rate Map (FIRM) for Tarrant County, Texas dated September 25, 2009 (Panel 360 of 495), there are no 100-year floodplains within the airport property. Therefore, there would be no floodplain impacts as a result of the proposed projects at Grand Prairie Municipal Airport.[2]

5.11 Hazardous Materials

The two statutes of most importance in ensuring that the construction and operation of airport facilities and navigational aids do not impact hazardous materials are the Resource Conservation and Recovery Act (RCRA), as amended by the Federal Facilities Compliance Act of 1992, and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended (also known as Superfund). RCRA governs the generation, treatment, storage, and disposal of hazardous waste and CERCLA provides for the cleanup of any releases of a hazardous substance (excluding petroleum) into the environment. FAA actions to fund, approve, or conduct an activity require consideration of hazardous material and solid waste impacts.

To identify the presence of known hazardous waste sites within the airport property that could be impacted by the construction of the proposed improvement projects, the EPA databases for hazardous waste information were searched. These databases provide information on hazardous waste generators, as well as hazardous waste sites. There is only one RCRA-listed facility on the airport property which is Uniflight, a helicopter operator which handles small quantities of hazardous waste. There would be no impacts to the airport or proposed airport development projects as a result of this facility. In addition, there are no hazardous waste disposal areas or cleanup sites reported on the airport property.[3]

5.12 Historical and Archaeological Resources

The National Historic Preservation Act of 1966 (NHPA), as amended, provides for the preservation of properties that are eligible for inclusion in the National Register of Historic Places (NRHP). In addition, Section 106 of the NHPA directs the heads of federal agencies, federal departments, or independent agencies that have direct or indirect jurisdiction over a federal or federally assisted undertaking to "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register."

[2] FIRM Flood Insurance Rate Map, Tarrant County, Texas, Panel 360 of 496, Map Number 48439CO360K, Map Revised September 25, 2009.
[3] http://www.epa.gov/waste/hazard/index.htm

The Archaeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistorical, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project. Correspondence received from the State Historic Preservation Office (SHPO) indicated that there are no historic or archaeological resources within the Area of Potential Effect (APE) of the proposed airport projects. (See letter dated November 17, 2011 in Appendix A) Therefore, there would be no impacts to historic or archaeological resources as a result of the proposed airport projects and no additional historic or archaeological investigations would be required to fulfill the Section 106 and NEPA requirements.

5.13 Light Emissions and Visual Impacts

Light emissions caused by airport-related lighting can create an annoyance to residents in the vicinity of the airport. In general, however, light emissions created by general aviation airports are minimal. As indicated in FAA Order 1050.1E, light emissions are unlikely to have an adverse impact on human activity or the use or characteristics of the protected properties because of the relatively low levels of light intensity compared to background levels associated with most air navigation facilities and other airport development actions.

The proposed airport improvements include the replacement of the existing medium intensity runway lights with more efficient LED lights. In addition the current VASI system will be replaced with a PAPI system and an approach lighting system will be installed. The light emissions from the LED runway lights will not be significantly changed from the light emissions of the existing medium intensity runway lights. The PAPI lights are positioned on the left side of an airport runway threshold and provide visual descent guidance information during the approach to a runway. These lights are low to the ground and not overly bright and therefore do not usually result in light emission impacts. The Omni-Directional Approach Lighting System (ODALS) is installed on the approach end of the runway and consists of a series of lightbars and strobe lights, or a combination of the two that extends outward from the runway end. There is a vegetative buffer between the location of the ODALS lights and the residential area to the south of the airport runway, therefore, there would be no anticipated light impacts as a result of the proposed lighting improvements.

5.14 Noise

The standard practice for evaluating noise impacts at airports involves the use of the FAA-approved Integrated Noise Model (INM). INM version 7.0b was used in this analysis to develop noise contours for Grand Prairie Municipal Airport based on operational activity in the current year (2010) and the forecast year (2030).

Methodology

The INM works by defining a network of grid points at ground level around the airport site. It then selects the shortest distance from each grid point to each flight track and computes the noise exposure generated by each aircraft operation by aircraft type and engine thrust level, and by time of day/night along each flight track. Corrections are applied for atmospheric acoustical attenuation, acoustical shielding of the aircraft engines by the aircraft itself, and aircraft speed variations. The noise exposure levels for each aircraft are then summed at each grid location to provide a day-night level (DNL), which is the 24-hour average sound level expressed in decibels, including an additional 10-decibel penalty for night-time operations (those occurring between the hours of 10 p.m. and 7 a.m.). The cumulative noise exposure levels at all grid points are then used to plot noise exposure contours for selected values (e.g., 65, 70, and 75 DNL).

The decibel scale from zero to 120 includes most of the range of typical daily sound levels, and is shown in Table 5-3.

Table 5-3: Common Sound Levels

Decibels	Common Aircraft Sound Level	Common Daily Sound Level
110	B-747 takeoff at 2 miles	Rock Band
100	DC-10 takeoff at 2 miles	Gas Lawn Mower at 3 feet
90	B-727 takeoff at 2 miles	Garbage Disposal at 3 feet
80	Learjet 25 takeoff at 2 miles	Shouting at 3 feet
70		Normal Speech at 3 feet
60		Large business office
50	Piper Twin Comanche takeoff at 2 miles	Dishwasher in next room

Noise Contour Mapping

DNL noise levels are indicated by a series of modeled contour lines superimposed on the airport site map. These levels are calculated for designated points on the ground from the weighted summation of the effects of all aircraft operations. Some operations are far enough away from a location that their effect is minimal, while other operations may dominate noise exposure at that location. For example, a location just east of the airport may be affected by an aircraft departure to the east but unaffected by an arrival to the west.

Operational Activity

Modeling airport noise in INM requires data from parameters such as aircraft operations, fleet mix, runway utilization, operational profiles, and flight tracks. The following is a summary of the 2010 and 2030 operational data used in the noise modeling analysis.

Aircraft Operations – The annual operations for the existing year were 80,656, approximately 221 operations per day, and the annual operations for the forecast year are estimated to be 113,199, approximately 310 operations per day.

Aircraft Fleet Mix – The fleet mix consists of various categories of aircraft operating at Grand Prairie Municipal Airport, as shown in Table 5-4. Based on discussions with Grand Prairie air traffic control personnel, it was estimated that the majority of operations are the result of American Eurocopter and its helicopter manufacturing and flight training facility on the airport.

Table 5-4: Aircraft Fleet Mix

	Year	Single-engine	Multi-engine	Jet	Helicopter
Existing	2010	28%	5%	1%	66%
Forecast	2030	26%	4%	3%	67%

Source: Grand Prairie Municipal records and Wilbur Smith Associates, Inc.

Runway Utilization - The runway utilization at Grand Prairie Municipal Airport is influenced primarily by prevailing wind conditions and secondarily by aircraft departure or arrival into the terminal airspace. The air traffic control tower estimates, shown in Table 5-5, indicate runway usage is split evenly between Runway 17 and Runway 35. These utilizations rates are not expected to change throughout the forecast period.

Table 5-5: Runway Utilizations

	Day	Night
Runway 17	50%	50%
Runway 35	50%	50%

Source: Grand Prairie Municipal ATCT Records

Approach and Departure Profiles – Approach and departure profiles illustrate an aircraft's altitude along its flight path. INM's vast database includes information regarding standard approach and departure profiles for the aircraft in this analysis.

Flight Tracks – Flight tracks project an aircraft's flight path as if shown on the surface. Due to meteorological conditions, aircraft type, stage length, air traffic control instructions, and pilot judgment, flight tracks are unique to each operation. Generalized flight tracks were developed for Grand Prairie Municipal Airport based on discussion with air traffic control personnel, operations and fleet mix data, as well as deviation allowances from the main flight track. In general, fixed wing aircraft operate on the east side of the airport and helicopters operate on the west side of the airport.

Noise Exposure Impacts

FAA Order 1050.1E requires that the 65, 70, and 75 DNL noise contours be developed for existing and future airport conditions. For the purposes of this analysis, the future noise contours were developed for the 4000 foot runway. The "ultimate" extension of Runway 17-35 to 4600 feet was not modeled because this extension will not occur within the 20-year planning period for which aircraft forecast data are available. Noise levels greater than 65 DNL are generally considered unacceptable for noise-sensitive land uses, such as residences, hospitals, and schools. The existing and forecast year noise contours modeled for this analysis are displayed as Figures 5-1 and 5-2**,** respectively, on the following pages.

Throughout the forecast period, the 75 DNL area encompasses approximately 23 acres; the 70 DNL area covers approximately 57 acres; and, the 65 DNL covers approximately 120 acres. Most of this noise falls within the airport property line. The noise that falls outside of the western airport property line impacts American Eurocopter's facilities, and the parking lot and a small number of booths in Trader Village, none of which are considered noise-sensitive land uses.

Figure 5-1: Grand Prairie Municipal Airport Noise Contours for 2010

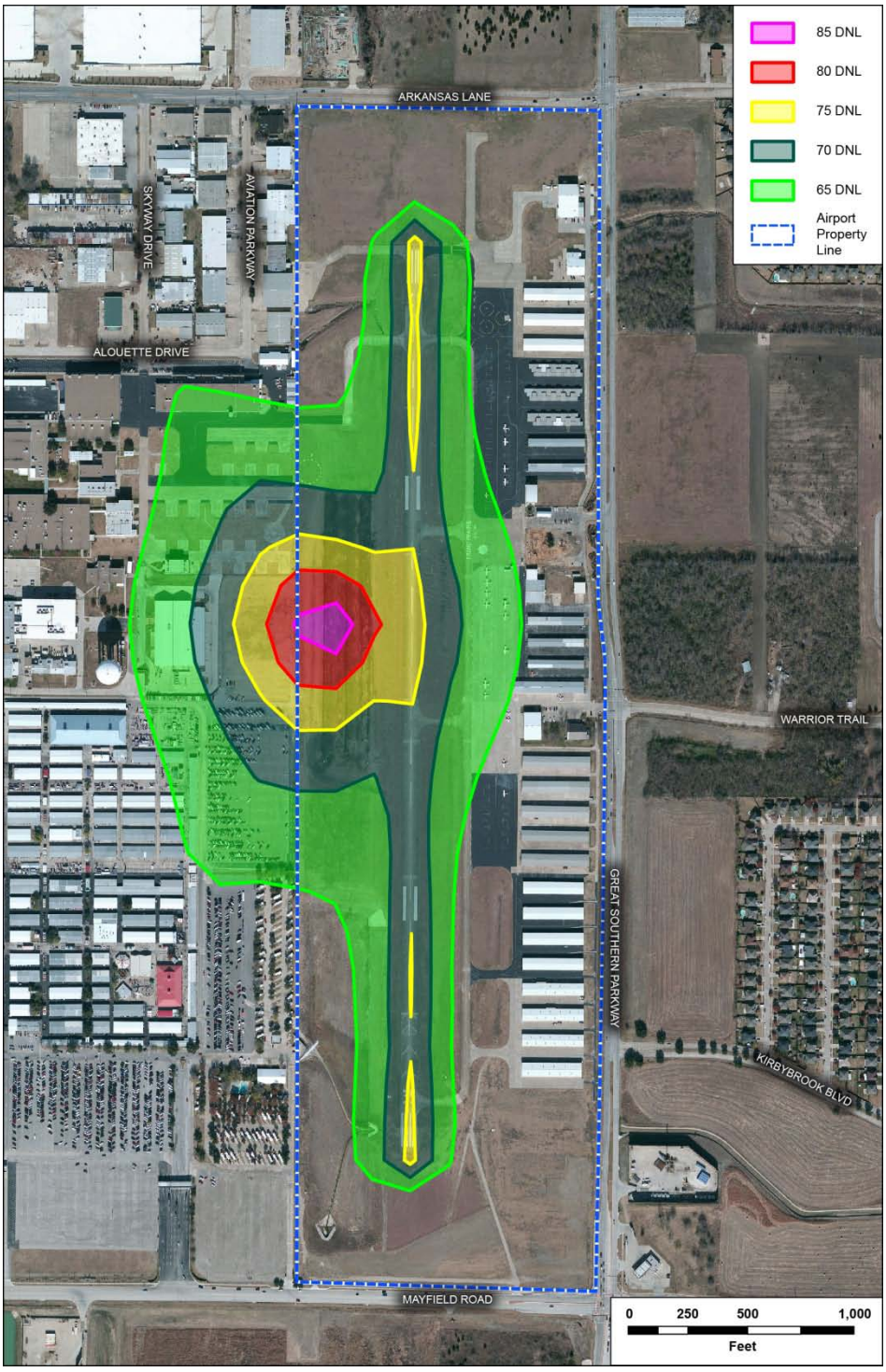
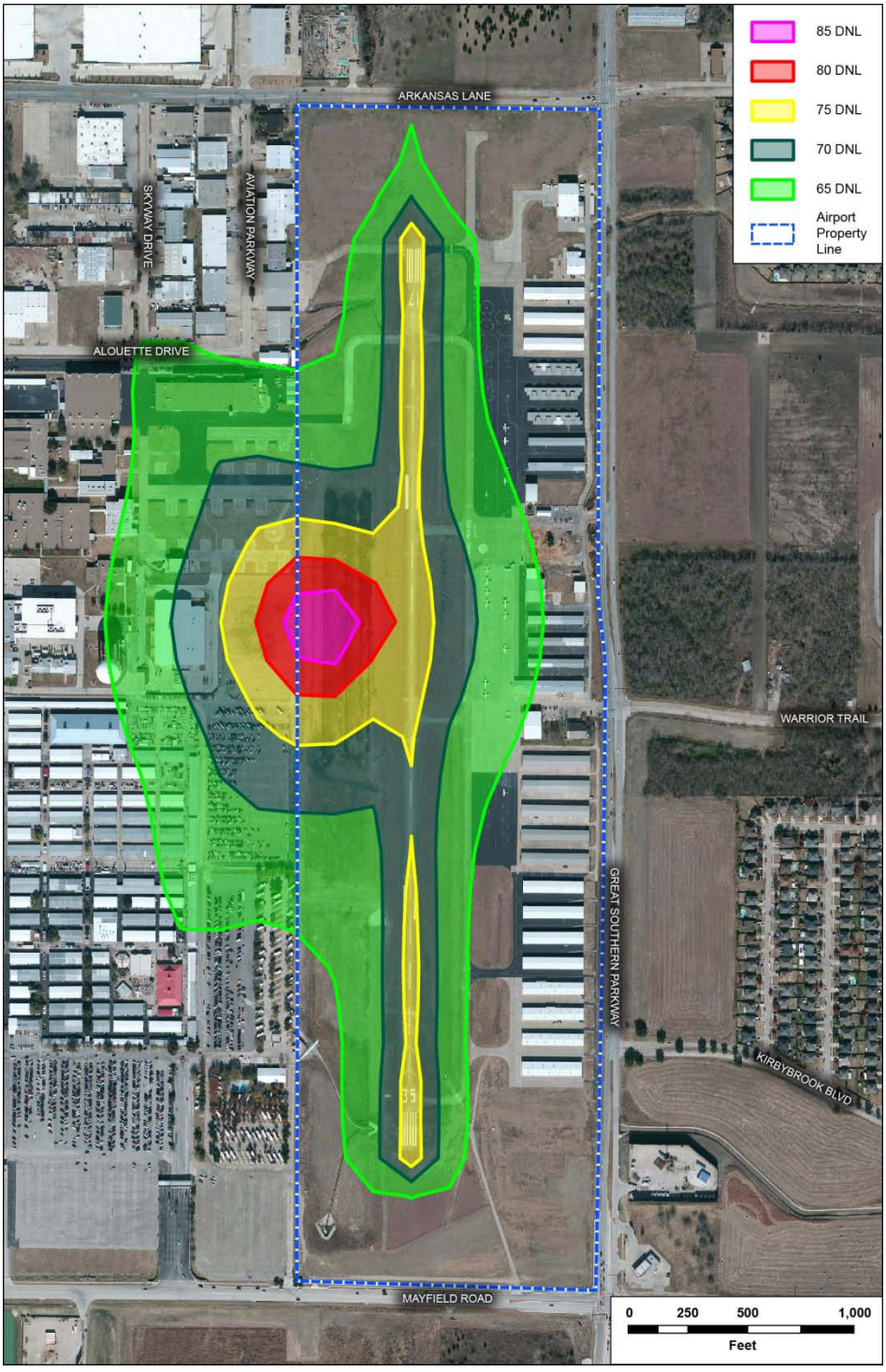


Figure 5-2: Grand Prairie Municipal Airport Noise Contours for 2030



5.15 Social Impacts/Environmental Justice, and Children's Environmental Health and Safety Risks

Social Impacts

The purpose of a social impact analysis is to determine the effect of airport development on the human environment. The types of social impacts typically evaluated include the following:

- Relocation of residences and/or businesses
- Alterations in traffic patterns that may permanently or temporarily restrict traditional community access
- Division or disruption of established communities
- Disruption of orderly, planned development
- Creation of appreciable change in employment.

The proposed airport development projects will occur primarily on airport property. The only exception is the placement of the Omni-Directional Approach Lighting System (ODALS), which are lights that are placed off-airport property to the south of the airport for the Runway 35 approach. Therefore, there would be no relocation of residences and/or businesses, alternations in traffic patterns, disruption of established communities, or disruption of orderly, planned development. In addition, while there may be some short-term employment created from the construction of the proposed airport projects, there would be no long-term changes in employment.

Environmental Justice

Executive Order 129898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, requires the Department of Transportation (DOT) to identify and address disproportionately high and adverse human health or environmental effects of their policies or programs on minorities or low-income populations. Environmental Justice must be considered in all phases of planning. It is essential that any potential impacts to minority and low-income populations be identified early in the planning process so that they can be considered during the evaluation of project alternatives.

The proposed airport development projects would not result in any disproportionate adverse impacts to minority and low-income populations because there would be no significant impacts off airport property to adjacent residential areas.

Children's Environmental Health and Safety Risks

The FAA is encouraged to identify and assess environmental health risks and safety risks that the agency believes could disproportionately affect children, including risks associated with contaminated air, food, drinking water, recreational waters, soil, or products that children might use or be exposed to.

The proposed airport projects would not result in any disproportionate health and safety risks to children.

5.16 Solid Waste

Solid waste impacts must be evaluated in conjunction with airport development. These impacts include the following:

- Impacts on solid waste generation
- Location of existing solid waste disposal facilities in the vicinity of proposed runways.

Significant increases in solid waste generation are not anticipated as a result of the proposed airport improvements. The only additional waste anticipated is that which would be associated with the construction of the aviation facilities. Existing waste collection and disposal facilities would be adequate to handle the waste associated with the construction of the airport facilities.

FAA Order 5200.5, *FAA Guidance Concerning Sanitary Landfills On or Near Airports*, states that "sanitary landfills will be considered as incompatible use" if located within 1,500 meters (approximately 4,921 feet) of all runways planned to be used by piston type aircraft and within 3,000 meters (approximately 9,843 feet) of all runways planned to be used by turbine aircraft. Airports located closer than these distances to sanitary landfills have an increased risk of bird hazards. There are no municipal landfills located within five miles of the Grand Prairie Municipal Airport. Therefore, there would be no potential bird hazards from landfills as a result of the proposed runway improvements.

5.17 Water Quality

The Federal Water Pollution Control Act, as amended (commonly referred to as the Clean Water Act), provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, establish location with regard to an aquifer or sensitive ecological area such as a wetlands area, and regulate other issues concerning water quality.

If the proposed federal action would impound, divert, drain, control, or modify the waters of any stream or other body of water, the Fish and Wildlife Coordination Act applies unless the project is for the impoundment of water covering an area of less than 10 acres. The Fish and Wildlife Coordination Act requires the responsible federal official to consult with the U.S. Fish and Wildlife Service and the applicable state agency to identify ways to prevent loss or damage to wildlife resources resulting from the proposed project.

If there is potential for contamination of an aquifer designated by the EPA as a principal drinking water resource for the area, the project needs to be coordinated with the EPA, as required by Section 1424 (e) of the Safe Drinking Water Act, as amended.

The Grand Prairie Municipal Airport is located in the Lower West Fork Trinity Watershed. Kirby Creek is located in the southeastern corner of the airport property. Further coordination with the Texas Commission on Environmental Quality (TCEQ) is required as part of the NEPA process to determine if a Section 401 water quality certification would be required.

Under the existing Construction General Permit (CGP) No. TXR150000, dated March 5, 2008, a Construction General Permit (CGP) would be required from TCEQ for any construction activities one acre or more from which runoff goes into or adjacent to any surface water in the state. This permit is required for any disturbance over one acre. The airport construction also would be required to follow the erosion control plan requirements for the City of Grand Prairie to minimize nonpoint source pollution. In addition, measures identified in FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion, and Siltation Control,* should be incorporated into the design and construction of the proposed airport development projects to minimize adverse water quality effects, including control of water pollution during construction.

If the construction of the ultimate 300 foot extension of Runway 35 and the ultimate taxiway expansion require modification of Kirby Creek, further coordination would be required with the USFWS to ensure project compliance with the Fish and Wildlife Coordination Act.

The Grand Prairie Municipal Airport is not located within an area of a Sole Source Aquifer; therefore, Section 1424(e) of the Safe Drinking Water Act, as amended, does not apply. (http://www.epa.gov/region6/water/swp/ssa/maps.html)

5.18 Wetlands

Executive Order (E.O.) 11990, "Protection of Wetlands," DOT Order 5660.1A, the Rivers and Harbors Act of 1899, and the Clean Water Act, Section 404, address activities in wetlands. E.O. 11990 requires federal agencies to ensure that their actions minimize the destruction, loss, or degradation of wetlands. It also ensures the protection, preservation, and enhancement of the Nation's wetlands to the fullest extent practicable during the planning, construction, funding, and operation of transportation facilities and projects (7 CFR Part 650.26, August 6, 1982). DOT Order 5660.1A sets forth DOT policy that transportation facilities should be planned, constructed, and operated to ensure protection and enhancement of wetlands.

Based on a review of the National Wetlands Inventory (NWI) map for the airport, there are potential wetlands, including Kirby Creek, in the southeastern corner of the airport property. Therefore, further coordination with the U.S. Army Corps of Engineers would be required prior to construction for airport development that would impact Kirby Creek. If it is determined that wetland impacts would occur as part of project implementation, a Section 404 permit would be required from the U.S. Army Corps of Engineers and Section 401 water quality certification would be required from the Texas Commission on Environmental Quality (TCEQ).

5.19 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (P.L. 90-542, as amended) protects rivers that are listed on the National Inventory of Wild and Scenic Rivers. There are no rivers listed on the U.S. Department of Interior's Inventory of National Wild and Scenic Rivers in the vicinity of the airport. Therefore, there would be no impacts to designated wild and scenic rivers as a result of the implementation of the proposed airport projects.

5.20 Induced Socioeconomic/Cumulative Impacts

Certain airport development projects could impact the socioeconomic characteristics of the surrounding communities. Induced socioeconomic impacts occur when significant impacts in resource categories result in socioeconomic impacts. For example, airport projects that result in noise impacts or resulting in additional land could cause local land use changes. Cumulative impacts occur if the proposed airport development projects, combined with other local development projects, such as road improvements or local development, create significant socioeconomic impacts for the surrounding area. These impacts are assessed by evaluating the following factors:

- Shifts in patterns of population movement and growth;
- Increases in public service demands
- Changes in business and economic activities; or
- Other factors identified by the public.

The proposed airport development projects would not result in shifts in patterns of population movement or growth. Most of the proposed projects would occur on airport-owned land and would not require any re-zoning of adjacent land. The proposed projects would not require increases in utilities; the existing electrical, sewer, and water systems are adequate to meet the needs of the proposed projects.

In addition, the proposed airport development would not result in significant economic changes. There would be some construction-related employment generated by the projects that would result in minor short-term economic benefits to Tarrant County. However, these economic impacts, while beneficial to the local economy, are not anticipated to be significant enough to result in shifts in population or changes in local land use.

5.21 Summary

There are no major environmental issues identified at the Grand Prairie Municipal Airport that would impede the implementation of the proposed airport development projects. As identified in this Environmental Overview, an air quality assessment would be required as part of the NEPA process to determine if the proposed airport development's total net emissions equal or exceed the *de minimis* thresholds. If the net emissions exceed the *de minimis* thresholds, a General Conformity Determination must be conducted. In addition, further coordination would be required with the U.S. Army Corps of Engineers and the Texas Commission on Environmental Quality (TCEQ) during the NEPA process if the proposed construction of the runway extension and taxiway expansion on the Runway 35 end impacts Kirby Creek, requiring a Section 404 permit and Section 401 water quality certification. Coordination also would be required with TCEQ regarding a Construction General Permit (CGP) for any earth disturbance greater than one acre and the City of Grand Prairie to ensure that the project conforms to the city's erosion control requirements.

References

Environmental Protection Agency, *The Green Book Nonattainment Areas,* Retrieved, December 20, 2011. http://www.epa.gov/oar/oaqps/greenbk/.

Environmental Protection Agency, *Sole Source Aquifers,* retrieved December 20, 2011, http://www.epa.gov/region6/water/swp/ssa/maps.html.

FAA Advisory Circular 150/5370/2C, *Operation Safety on Airports During Construction,* 2003.

FAA Advisory Circular 150/5370-10F, *Standards for Specifying Construction of Airports,* 2011.

FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures,* 2004.

FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects,* April 2006.

FAA, *Environmental Desk Reference for Airport Actions,* 2007.

Federal Emergency Management Agency, Flood Insurance Rate Map (FIRM) for Tarrant County, TX dated September 25, 2009 Panel 360 of 495).

Texas Natural Diversity Database, retrieved December 20, 2011, http://txmn.org/elcamino/files/2010/03/Natural-Diversity-Database.PDF.

Texas Parks and Wildlife Department website, retrieved December 20, 2011, http://tpwd.state.tx.us/huntwild/wild/species/endang/index.phtml.

Chapter
6

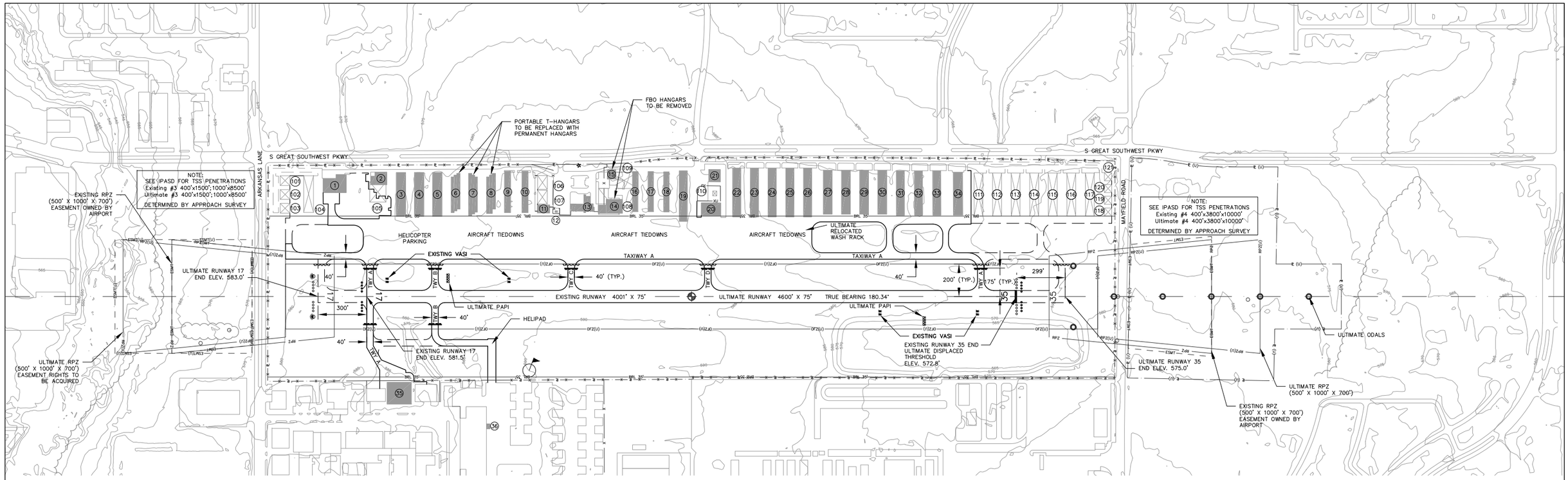
Airport Plans

The development of this master plan includes the illustration of recommended airside, landside and support facilities discussed in the preceding chapters. This chapter presents the Airport Layout Drawing (ALD) and associated Inner Portion of the Approach Surface Drawings (IPASD).

Airport Layout Drawing – The ALD is a graphic representation of the existing and future airport facilities, their location on the Airport, and the pertinent clearance and dimensional information required to show relationships with standard separations. The optional terminal area drawing is not included with this submittal as the proposed development can be adequately seen on the Airport Layout Drawing.

Inner Portion of the Approach Surface Drawings - The IPASD shows the appropriate Threshold Siting Surface (TSS) and Glideslope Qualification Surface (GQS) related to each runway end and the planned runway configuration. The objective of the IPASD is to provide an analysis of penetrations to these surfaces and recommend their disposition.

Reduced-size copies of the drawings discussed above are included on the following pages. Full-size drawings and electronic files will be submitted to the airport sponsor and TxDOT for their use, review and approval.



RUNWAY DATA TABLE				
	RW 17–35			
	EXISTING		ULTIMATE	
RUNWAY ARC	B–II		B–II	
DESIGN AIRCRAFT & ARC	KING AIR B–200		KING AIR B–200	
BALANCED FIELD LENGTH	3950'		3950'	
RUNWAY LENGTH & WIDTH (ft.)	4001' X 75'		4600' X 75'	
PAVEMENT DESIGN STRENGTH (1000 lbs.)	30 SW		30 SW	
RUNWAY LIGHTING	MIRL		MIRL	
PERCENT EFFECTIVE GRADIENT	0.22%		0.22%	
PERCENT WIND COVERAGE	98.16%		98.16%	
MAXIMUM ELEVATION ABOVE MSL	588.4'		588.4'	
RW SURFACE TYPE	CONCRETE		CONCRETE	
RSA – LENGTH BEYOND RW END	300'		300'	
RSA – WIDTH	150'		150'	
OFA – LENGTH BEYOND RW END	300'		300'	
OFA WIDTH	500'		500'	
OFZ – LENGTH BEYOND RW END	200'		200'	
OFZ WIDTH	400'		400'	
RUNWAY END	17	35	17	35
APPROACH TYPE	VISUAL	RNAV GPS	VISUAL	RNAV GPS
APPROACH VISIBILITY MINIMA	VISUAL	2 1/4 MILE	VISUAL	1 MILE
THRESHOLD SITING SURFACE & SLOPE	#3 20:1	#4 20:1	#3 20:1	#4 20:1
RUNWAY MARKING	NPI	NPI	NPI	NPI
RUNWAY VISUAL AIDS	VASI	VASI	PAPI	PAPI
TOUCHDOWN ZONE ELEVATION	588.4'	588.4'	588.4'	588.4'
FAR PART 77 APPROACH CATEGORY	B(V)	C	B(V)	C
FAR PART 77 APPROACH SURFACE SLOPE	20:1	34:1	20:1	34:1
TAKE–OFF RUN AVAILABLE (TORA)	4001'	4001'	4600'	4600'
TAKE–OFF DISTANCE AVAILABLE (TODA)	4001'	4001'	4600'	4600'
ACCELERATE STOP DISTANCE AVAIL. (ASDA)	4001'	4001'	4600'	4600'
LANDING DISTANCE AVAILABLE (LDA)	4001'	4001'	4600'	4301'

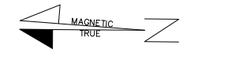
BUILDING TABLE			
BUILDING NUMBER	DESCRIPTION		TOP ELEVATION
	EXISTING	ULTIMATE	
1	CONVENTIONAL HANGAR		605.4'
2	CONVENTIONAL HANGAR	TO BE REMOVED	610.6'
3	T–HANGAR		604.8'
4	T–HANGAR		604.8'
5	T–HANGAR		599.8'
6	PORTABLE T–HANGAR	T–HANGAR	592.0'
7	PORTABLE T–HANGAR	T–HANGAR	594.0'
8	PORTABLE T–HANGAR	T–HANGAR	597.0'
9	T–HANGAR		599.5'
10	T–HANGAR		599.5'
11	CONVENTIONAL HANGAR		612.5'
12	ELECTRICAL VAULT		596.5'
13	AIRPORT TERMINAL BUILDING		615.2'
14	FBO HANGAR	TO BE REMOVED	610.3'
15	HANGAR	TO BE REMOVED	610.0'
16	T–HANGAR		599.2'
17	T–HANGAR		599.2'
18	T–HANGAR		599.2'
19	T–HANGAR		601.9'
20	CONVENTIONAL HANGAR		609.0'
21	GRAND PRAIRIE FIRE STATION NO. 5		611.5'
22	T–HANGAR		596.1'
23	T–HANGAR		596.0'
24	T–HANGAR		596.0'
25	T–HANGAR		595.8'
26	T–HANGAR		593.0'
27	T–HANGAR		593.0'
28	T–HANGAR		593.0'
29	T–HANGAR		592.0'
30	T–HANGAR		592.0'

BUILDING TABLE			
BUILDING NUMBER	DESCRIPTION		TOP ELEVATION
	EXISTING	ULTIMATE	
31	T–HANGAR		592.8
32	T–HANGAR		592.0
33	T–HANGAR		590.9
34	T–HANGAR		592.8'
35	FBO HANGAR		613.5'
36	AIR TRAFFIC CONTROL TOWER		636.0'
101		EXECUTIVE HANGAR	605.0'
102		EXECUTIVE HANGAR	605.0'
103		EXECUTIVE HANGAR	605.0'
104		CONVENTIONAL HANGAR	607.0'
105		CONVENTIONAL HANGAR	610.0'
106		CONVENTIONAL HANGAR	612.0'
107		CONVENTIONAL HANGAR	611.0'
108		FBO HANGAR	618.0'
109		FBO HANGAR	617.0'
110		AIR TRAFFIC CONTROL TOWER	642.0'
111		T–HANGAR	593.0'
112		T–HANGAR	592.0'
113		T–HANGAR	592.0'
114		T–HANGAR	591.0'
115		T–HANGAR	591.0'
116		T–HANGAR	592.0'
117		T–HANGAR	593.0'
118		EXECUTIVE HANGAR	595.0'
119		EXECUTIVE HANGAR	595.0'
120		EXECUTIVE HANGAR	595.0'
121		EXECUTIVE HANGAR	595.0'

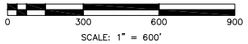
COMMENTS

TOP ELEVATIONS FOR ULTIMATE BUILDINGS ARE ESTIMATED.

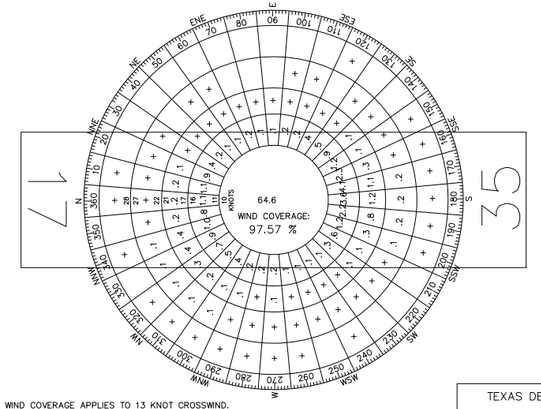
RUNWAY END COORDINATES AND ELEVATIONS			
RUNWAY END	LATITUDE	LONGITUDE	ELEVATION
EXISTING END OF RWY 17	32°42'15.41" N	97°02'48.76" W	581.5'
ULTIMATE END OF RWY 17	32°42'18.38" N	97°02'48.74" W	583.0'
EXISTING END OF RWY 35	32°41'35.82" N	97°02'49.04" W	572.8'
ULTIMATE END OF RWY 35	32°41'32.87" N	97°02'49.06" W	575.0'
ULT. DISPLACED END OF RWY 35	32°41'35.82" N	97°02'42.04" W	572.8'



DECLINATION 4° 1' E (MAY 2012)
ANNUAL RATE OF CHANGE 0° 7' W



SCALE: 1" = 600'



WIND COVERAGE APPLIES TO 13 KNOT CROSSWIND.
SOURCE: DALLAS/FORT WORTH INTERNATIONAL AIRPORT
DALLAS, TEXAS
83,153 OBSERVATIONS IN PERIOD 1995–2004

AIRPORT DATA TABLE		
	EXISTING	ULTIMATE
AIRPORT ELEVATION (MSL)	588.4'	588.4'
AIRPORT NAVIGATION AIDS	RNAV GPS, VOR/DME	RNAV GPS, VOR/DME
MEAN MAX TEMP (Hottest Month °F)	96°F	96°F
AIRPORT REFERENCE CODE (ARC)	B–II	B–II
TAXIWAY MARKING	STD W/ Q REF	STD W/ Q REF
TAXIWAY LIGHTING	MITL	MITL
AIRPORT REFERENCE POINT COORDINATES	32°41'55.6" N 97°02'48.9" W	32°41'55.6" N 97°02'48.9" W

NOTES

DATUM COORDINATE SYSTEMS – HORIZONTAL DATUM NAD 1983 State Plane Texas North Central 4202 Feet, VERTICAL DATUM NAVD88.

A TOPOGRAPHIC SURVEY WAS COMPLETED USING CONVENTIONAL, GPS, AND OBSERVATION SURVEY METHODS.

ALD LEGEND		
FEATURE	EXISTING	ULTIMATE
RUNWAY/TAXIWAY OUTLINE		
RUNWAY/TAXIWAY TO BE REMOVED		
BUILDINGS/FACILITIES		
AIRPORT PROPERTY LINE		
AIRPORT PROPERTY LINE w/FENCE		
FENCE LINE		
BUILDING RESTRICTION LINE (BRL)		
AIRPORT REFERENCE POINT		
WIND CONE & SEGMENTED CIRCLE		
THRESHOLD LIGHTS		
RW END IDENTIFIER LIGHTS (REILS)		
ROTATING BEACON		
VGSI		
HOLD POSITION AND SIGN		
ASOS/AWOS		
SURVEY MARKERS		
GROUND CONTOURS		
SIGNIFICANT OBJECT LOCATION		
TREES/BRUSH		
NONDIRECTIONAL BEACON (NDB)		

TEXAS DEPARTMENT OF TRANSPORTATION
AVIATION DIVISION

ALP APPROVED ACCORDING TO FAA AC 150/5300–13 CHANGE 18 PLUS THE REQUIREMENTS OF A FAVORABLE ENVIRONMENTAL FINDING AND FAA NRA STUDY PRIOR TO THE START OF ANY LAND ACQUISITION OR CONSTRUCTION ON AIRPORT PROPERTY.

DAVID FULTON, DIRECTOR, AVIATION DIVISION — DATE

AIRPORT SPONSOR

CURRENT AND FUTURE DEVELOPMENT DEPICTED ON THIS ALP IS APPROVED AND SUPPORTED BY AIRPORT SPONSOR

SPONSOR ACKNOWLEDGES APPROVAL OF ALP BY TXDOT DOES NOT CONSTITUTE A COMMITMENT TO FUNDING.

SIGNATURE — DATE

TITLE, AIRPORT SPONSOR'S REPRESENTATIVE

PREPARED BY:

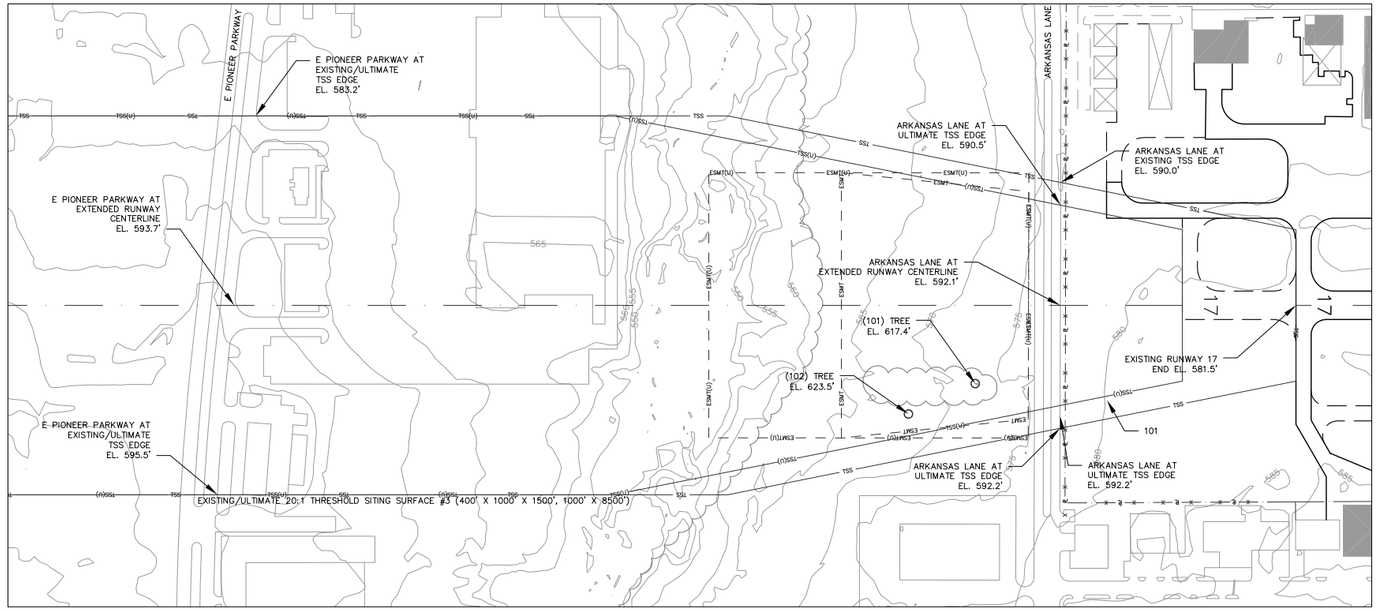
CDM Smith
8805 Governor's Hill Drive
Suite 305
Cincinnati, OH 45249
513-583-9800

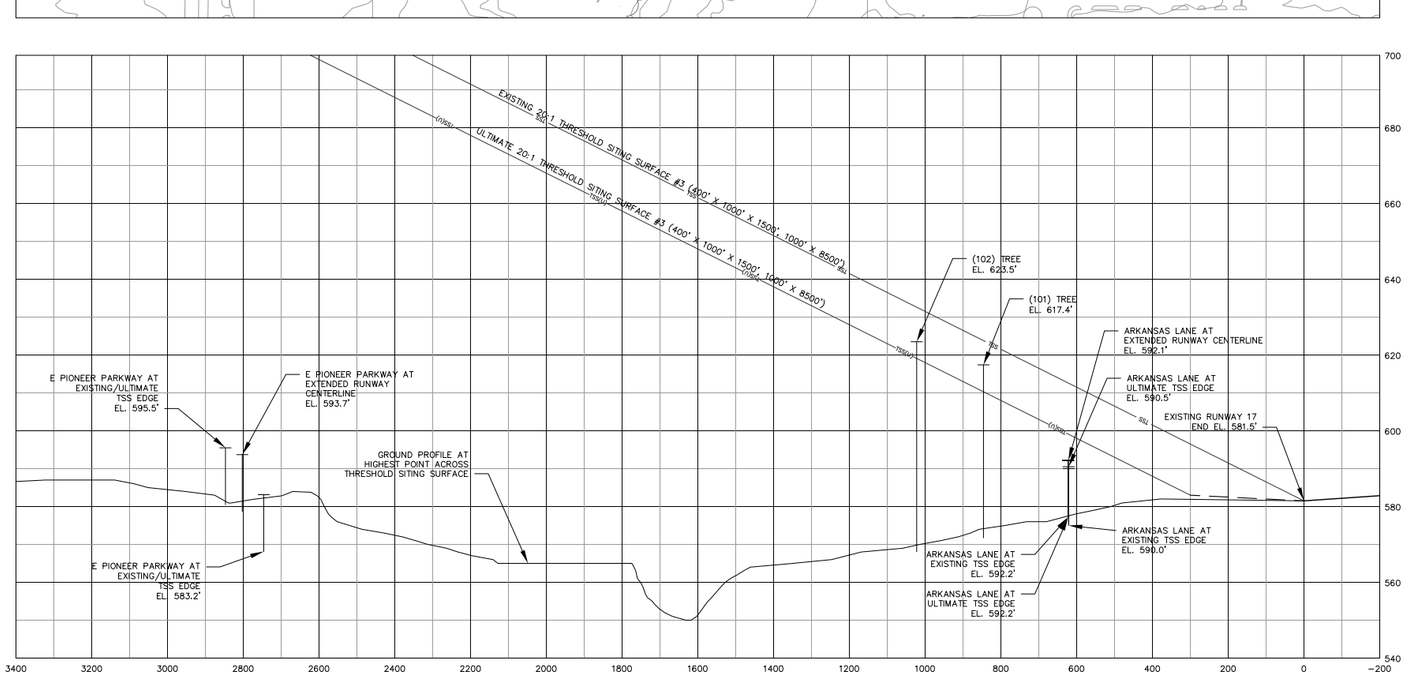
T DAVIS — AUG 8 2012
DESIGNED BY — DATE

J DENNISON — AUG 8 2012
DRAWN BY — DATE

AIRPORT LAYOUT DRAWING
GRAND PRAIRIE MUNICIPAL AIRPORT (GPM)
GRAND PRAIRIE, TEXAS

Texas Department of Transportation
Aviation Division





Penetrations to Threshold Siting Surface

No.	Object Description	Latitude (N)	Longitude (W)	Distance fm RW end	Offset fm RW C/L*	Top Elevation**	Amt of Penetration	REMEDIATION
101	TREE	32°42'23.80"	97°02'51.12"	847'	207' R	617.4'	7.1' U	REMOVE
102	TREE	32°42'25.55"	97°02'52.05"	1023'	287' R	623.5'	4.4' U	REMOVE

* OFFSETS FROM CENTERLINE ARE DESCRIBED RIGHT OR LEFT OF THE RUNWAY CENTERLINE AS SEEN BY A PILOT APPROACHING THE RUNWAY TO LAND
** ELEVATIONS ADJUSTED UPWARD 15' FOR PUBLIC ROADWAY, 17' FOR INTERSTATE HIGHWAY, 23' FOR RAILROADS

DISTANCES TO PENETRATIONS ARE MEASURED FROM EXISTING RUNWAY END.

NOTES

APPROACH SURVEY WAS CONDUCTED IN NOVEMBER, 2011 UNDER THE SUPERVISION OF JEFFREY ELSWORTH HUDSON, RPLS, TEXAS REGISTRATION NO. 4850.

APPROACH OBSTRUCTIONS WERE DETERMINED BY TRIANGULATION AND DIRECT OBSERVATION AND MEASUREMENTS USING CONVENTIONAL SURVEYING EQUIPMENT AND METHODS.

DATUM COORDINATE SYSTEMS – HORIZONTAL DATUM NAD 1983 STATE PLANE TEXAS NORTH CENTRAL FIPS 4202 FEET, VERTICAL DATUM NAVD88.

ALL EXISTING COORDINATES AND ELEVATIONS IN THIS ALP FROM AVIATION STANDARD INFORMATION SYSTEM (ASIS), http://avnwww.jccbi.gov/datasheet/

ULTIMATE COORDINATES CALCULATED USING FAA'S GEODETIC CALCULATOR.

IPASD LEGEND

FEATURE	EXISTING	ULTIMATE
RUNWAY/TAXIWAY OUTLINE		
RUNWAY/TAXIWAY TO BE REMOVED		
BUILDINGS/FACILITIES		
AIRPORT PROPERTY LINE	℄	℄ (U)
AIRPORT PROPERTY LINE w/FENCE	℄	℄ (U)
THRESHOLD SITING SURFACE	TSS	TSS (U)
FENCE LINE		XU XU XU
THRESHOLD LIGHTS		
RW END IDENTIFIER LIGHTS (REILS)		
GROUND CONTOURS	1620	
SIGNIFICANT OBJECT PLAN VIEW		
SIGNIFICANT OBJECT PROFILE VIEW		
TREES/BRUSH		

MAGNETIC
TRUE

DECLINATION 4° 1' E (MAY 2012)
ANNUAL RATE OF CHANGE 0° 7' W

0 200 400 600
HORIZONTAL SCALE: 1" = 400'

0 20 40 60
VERTICAL SCALE: 1" = 40'

TEXAS DEPARTMENT OF TRANSPORTATION
AVIATION DIVISION

ALP APPROVED ACCORDING TO FAA AC 150/5300-13 CHANGE 18 PLUS THE REQUIREMENTS OF A FAVORABLE ENVIRONMENTAL FINDING AND FAA NRA STUDY PRIOR TO THE START OF ANY LAND ACQUISITION OR CONSTRUCTION ON AIRPORT PROPERTY.

DAVID FULTON, DIRECTOR, AVIATION DIVISION — DATE

AIRPORT SPONSOR

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PREPARED BY:

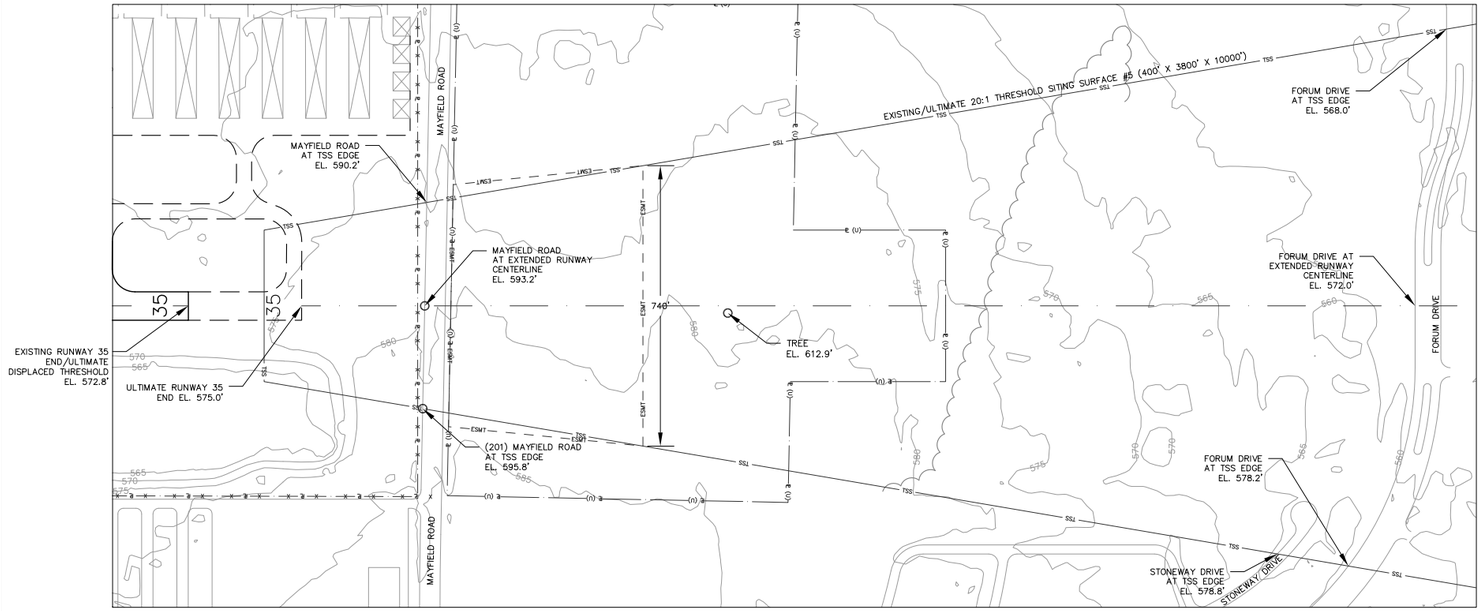
CDM Smith
8805 Governor's Hill Drive
Suite 305
Cincinnati, OH 45249
513-583-9800

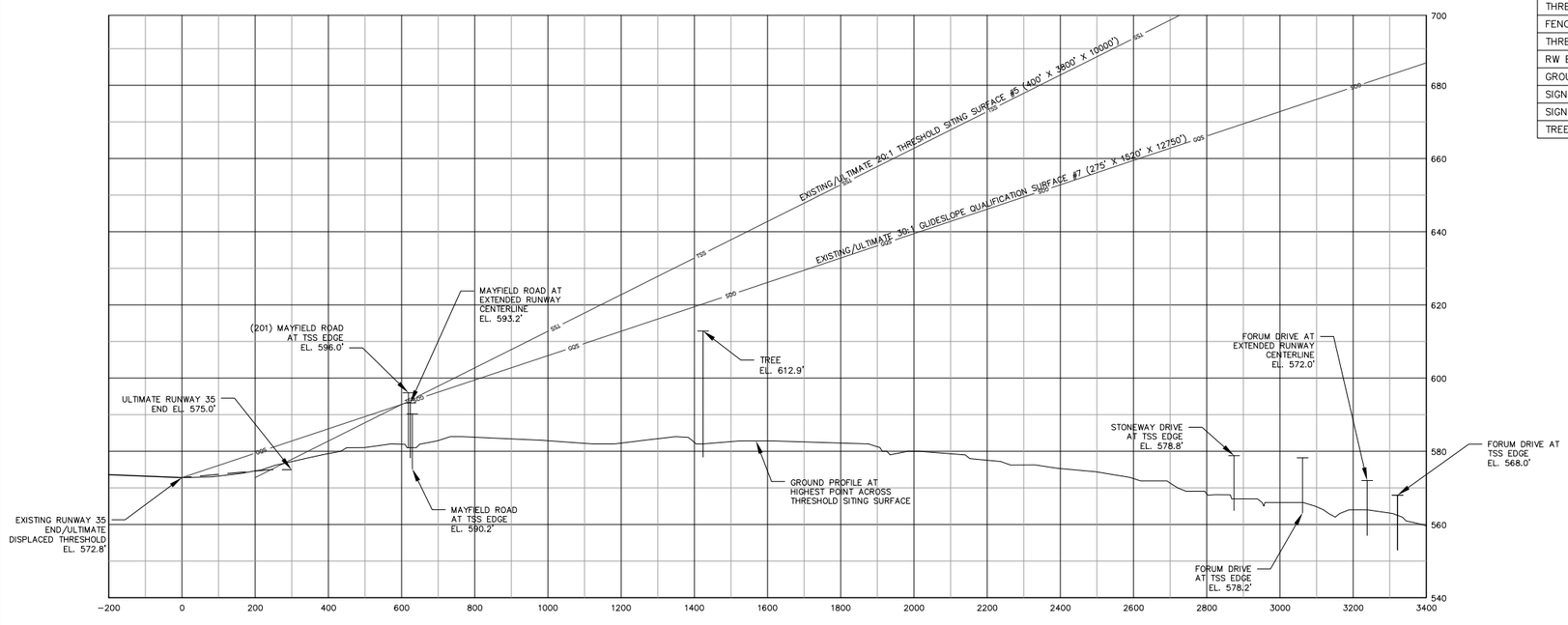
T DAVIS — AUG 8 2012
DESIGNED BY — DATE

J DENNISON — AUG 8 2012
DRAWN BY — DATE

IPASD RW 17
GRAND PRAIRIE MUNICIPAL AIRPORT (GPM)
GRAND PRAIRIE, TEXAS

Texas Department of Transportation
Aviation Division





Penetrations to Threshold Siting Surface

No.	Object Description	Latitude (N)	Longitude (W)	Distance fm RW end	Offset fm RW C/L*	Top Elevation**	Amt of Penetration	REMEDIATION
201	MAYFIELD ROAD	32°41'29.72"	97°02'52.26"	619'	271' L	596.0'	2.3'	

* OFFSETS FROM CENTERLINE ARE DESCRIBED RIGHT OR LEFT OF THE RUNWAY CENTERLINE AS SEEN BY A PILOT APPROACHING THE RUNWAY TO LAND
** ELEVATIONS ADJUSTED UPWARD 15' FOR PUBLIC ROADWAY, 17' FOR INTERSTATE HIGHWAY, 23' FOR RAILROADS

DISTANCES TO PENETRATIONS ARE MEASURED FROM EXISTING RUNWAY END.

NOTES

APPROACH SURVEY WAS CONDUCTED IN NOVEMBER, 2011 UNDER THE SUPERVISION OF JEFFREY ELSWORTH HUDSON, RPLS, TEXAS REGISTRATION NO. 4850.

APPROACH OBSTRUCTIONS WERE DETERMINED BY TRIANGULATION AND DIRECT OBSERVATION AND MEASUREMENTS USING CONVENTIONAL SURVEYING EQUIPMENT AND METHODS.

DATUM COORDINATE SYSTEMS – HORIZONTAL DATUM NAD 1983 STATE PLANE TEXAS NORTH CENTRAL FIPS 4202 FEET, VERTICAL DATUM NAVD88.

ALL EXISTING COORDINATES AND ELEVATIONS IN THIS ALP FROM AVIATION STANDARD INFORMATION SYSTEM (ASIS), http://avnwww.jccbi.gov/datasheet/

ULTIMATE COORDINATES CALCULATED USING FAA'S GEODETIC CALCULATOR.

IPASD LEGEND

FEATURE	EXISTING	ULTIMATE
RUNWAY/TAXIWAY OUTLINE		
RUNWAY/TAXIWAY TO BE REMOVED		
BUILDINGS/FACILITIES		
AIRPORT PROPERTY LINE	℄	℄ (U)
AIRPORT PROPERTY LINE w/FENCE	℄	℄ (U)
THRESHOLD SITING SURFACE	TSS	TSS (U)
FENCE LINE		
THRESHOLD LIGHTS		
RW END IDENTIFIER LIGHTS (REILS)		
GROUND CONTOURS	1620	
SIGNIFICANT OBJECT PLAN VIEW		
SIGNIFICANT OBJECT PROFILE VIEW		
TREES/BRUSH		

MAGNETIC
TRUE

DECLINATION 4° 1' E (MAY 2012)
ANNUAL RATE OF CHANGE 0° 7' W

0 200 400 600
HORIZONTAL SCALE: 1" = 400'

0 20 40 60
VERTICAL SCALE: 1" = 40'

TEXAS DEPARTMENT OF TRANSPORTATION
AVIATION DIVISION

ALP APPROVED ACCORDING TO FAA AC 150/5300-13 CHANGE 18 PLUS THE REQUIREMENTS OF A FAVORABLE ENVIRONMENTAL FINDING AND FAA NRA STUDY PRIOR TO THE START OF ANY LAND ACQUISITION OR CONSTRUCTION ON AIRPORT PROPERTY.

DAVID FULTON, DIRECTOR, AVIATION DIVISION — DATE

AIRPORT SPONSOR

CURRENT AND FUTURE DEVELOPMENT DEPICTED ON THIS ALP IS APPROVED AND SUPPORTED BY AIRPORT SPONSOR

SPONSOR ACKNOWLEDGES APPROVAL OF ALP BY TXDOT DOES NOT CONSTITUTE A COMMITMENT TO FUNDING.

SIGNATURE — DATE

TITLE, AIRPORT SPONSOR'S REPRESENTATIVE

PREPARED BY:

CDM Smith
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Suite 305
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513-583-9800

T DAVIS — DESIGNED BY — AUG 8 2012 DATE
J DENNISON — DRAWN BY — AUG 8 2012 DATE

IPASD RW 35
GRAND PRAIRIE MUNICIPAL AIRPORT (GPM)
GRAND PRAIRIE, TEXAS

Texas Department of Transportation
Aviation Division

Chapter
7

Recommended Development Plan Execution

This chapter presents a summary of the Grand Prairie Municipal Airport (GPM) recommended capital improvement program (CIP), its anticipated phasing and funding sources, as well as the estimated financial implications to the Airport. In addition, this chapter examines historic operating revenues and expenses at the Airport and develops projections of future operating results. Financial projections of revenues and expenses at the Airport focus on the short- and mid-term planning period and are used to identify the ability of the Airport to contribute to the local share of anticipated project costs, if necessary. Airport lease rates and other user charges, including comparison of rates and charges by surrounding airport facilities, will be evaluated.

The recommended development plan execution strategy developed for GPM, as part of the master plan update, is presented in the following sections:

- Capital Improvement Program (CIP)
- Airport Financial Structure
- Overview of Airports Finances
- Competitive Analysis
- Conclusion

The analyses of capital costs and potential funding sources provide estimates of the local share of project costs and the total amount of capital investment that may be required from the Airport sponsor over the planning period.

7.1 Capital Improvement Program

In Texas, all airports that receive federal or state funding for airport projects must keep a CIP on file with TxDOT. The CIP identifies improvement projects that are recommended for an airport over a specific period of time, estimates the order in which the projects are to take place, and calculates the total costs and funding sources of the projects. As the CIP progresses from projects planned in the current year to those planned in future years, it becomes less detailed and more flexible. Additionally, the CIP is typically modified on an annual basis as new projects are identified or as projects and priorities change.

Project Cost Estimates

For the purposes of this analysis, a CIP was developed that includes all new projects and facility development improvements recommended within the 20-year planning period. Projects identified as ultimate development beyond the 20-year planning period are not included in this CIP as they are not required or necessary to meet demand and their construction timeframe is undetermined.

In addition to the facility requirements identified in this Airport Master Plan, the near-term planning period (Phase I) also includes current development initiatives identified by Airport management and TxDOT. Because it is impossible to reasonably estimate all required rehabilitation projects at the Airport in the mid-term (Phase II) and long-term (Phase III) planning periods in the CIP, the planning periods include only new facility construction projects. Projects are phased based on requirements/needs established by the Airport and TxDOT as well as scheduled in a way to distribute the cost obligations evenly throughout the planning period. A summary of the projects within each phase is provided below.

Phase I (Current to 5 years):

A) Air Traffic Control Tower (ATCT) Relocation – The Airport has begun initial steps to relocate and rebuild the ATCT. The new ATCT will be approximately 60 feet tall and located near the central terminal area on the east side of the Airport. The engineering and design phases of the project are complete and construction is expected to take place in the summer of 2012 and be completed within Phase I. The estimated construction cost associated with this project is $2,067,000.

B) Portable Hangar Replacement (Zone 2) – Portable hangars are to be replaced by traditional T-hangars. This project will create updated covered aircraft storage for based aircraft. Total estimated cost associated with this project is $2,800,000.

C) Westside Taxiway Connector – On the Airport's west side, a connector between Taxiways A and B is recommended for improved access to facilities in that area and the runway system. This project includes earthwork and culvert construction to provide proper drainage to the area and allow for taxiway development. Total costs associated with this project are estimated at $500,000.

Phase II (6 to 10 years):

D) T-hangars and Conventional Hangars (Zone 4) – To keep pace with demand and provide long-term aircraft storage capacity, seven 12-unit T-hangar buildings, configured similarly to the recently completed hangars in the southern terminal area are recommended in this phase. In addition, four small, executive style hangars are recommended along the south

boundary of the Zone 4 to accommodate corporate based aircraft or other key tenants and make the best use out of available space. Taxiway A would be extended and connected to the aircraft apron in order to provide multiple paths for aircraft access. This project provides a dedicated entry for vehicles from Great Southwest Parkway to the new hangars in this zone. The cost of this project, including all hangars as well as roadway and taxilane pavement development, is estimated at $11,300,000.

E) Initial Taxiway A South Extension – As a part of the pavement development identified in the previous project highlighted above, it is recommended that Taxiway A be extended and connected to the end of Runway 35. Doing these projects simultaneously will save on mobility and other costs that could be shared by the two projects. This project will reduce the need for aircraft to back taxi on the runway to use its entire length. The estimated cost for this project is $350,000.

F) Corporate Hangar Development (Zone 2) - Two large corporate hangars will be located near the Airport entrance and new terminal building. Aircraft staging and automobile parking areas associated with these hangars will be a part of this $1,500,000 project.

G) T-hangars South of FBO (Zone 2) – Two rows of T-hangar buildings will be constructed south of the FBO area. Necessary earthwork and pavement along with hangar buildings will cost approximately $3,000,000.

Phase III (11 to 20 years):

H) Corporate/Conventional Hangars (Zone 1) – This project provides a wide variety of hangar options to meet the needs of corporate tenants, aviation businesses and/or maintenance operations. The Airport's northeast terminal area will be developed to support future commercial activities at the Airport and includes an abundance of apron pavement space that could be used for helicopter operations, increased automobile parking and improved roadway access. Costs for projects indentified above are estimated at $5,000,000.

I) FBO – Redevelopment/Expansion (Zone 2) - This $6,300,000 project includes the expansion of the FBO located near the terminal building. Aircraft and automobile pavement and parking areas associated with the FBO development is included in this project. This expansion will call for the relocation of the wash rack which will be moved to an area on the aircraft apron which is convenient to based aircraft and away from movement areas.

On-going Maintenance Projects:

Throughout the 20-year planning period, on-going pavement and airfield maintenance projects will be required as needed. This includes pavement crack and seal or rehabilitation projects necessary to maintain a safe environment for aircraft operations. As part of on-going airfield maintenance requirements, the Airport should regularly inspect airfield pavement and grounds to ensure that issues are addressed.

To aid the Airport in these efforts, TxDOT's Routine Airport Maintenance Program (RAMP) grants provides matching funds up to $50,000 per year of state funds for eligible airport maintenance and improvements. Key on-going maintenance efforts that could qualify for funding assistance under this program includes pavement maintenance/rehabilitation and vegetation control. The Airport should take advantage of RAMP grants in order to gain as much funding assistance for routine airport maintenance as well as minor capital improvement projects.

Capital Improvement Program Funding

Cost estimates were prepared for each recommended project and analyzed for federal or state Airport Improvement Program (AIP) funding eligibility. A breakdown of estimated project costs by phase and a funding scenario for each project is presented in **Table 7-1**. Detailed cost estimates for each project are provided in Appendix B. Based on the analysis, it is estimated that approximately $11.2 million of the total CIP cost is eligible for federal or state funding. The remaining share of estimated project costs, approximately $21.6 million over the planning period, would be funded through sponsor (City of Grand Prairie) or private participation. The relatively large share of local/private funding is due to the substantial amount of hangar development which is not eligible for federal or state funding. Portions of these hangar projects which are considered common-use to all airport users (such as taxiway pavement) are eligible for federal and state funding.

Table 7-1: Recommended Capital Improvement Projects

Project	Total	Federal Share	State Share	Local/Pvt. Share
A) Air Traffic Control Tower Relocation	$ 2,067,000	$ 2,000,000	$ -	$ 67,000
B) Portable Hangar Replacement (Zone 2)	2,800,000	150,000	-	2,650,000
C) Westside Taxiway Connector	500,000	450,000	25,000	25,000
Subtotal	**$ 5,367,000**	**$ 2,600,000**	**$ 25,000**	**$ 2,742,000**
D) T-hangars and Conventional Hangars (Zone 4)	$ 11,300,000	$ 3,500,000	$ 150,000	$ 7,650,000
E) Initial Taxiway A South Extension	350,000	315,000	17,500	17,500
F) Corporate Hangar Development (Zone 2)	1,500,000	365,000	50,000	1,085,000
G) T-Hangars South of FBO (Zone2)	3,000,000	800,000	50,000	2,150,000
Subtotal	**$ 16,150,000**	**$ 4,980,000**	**$ 267,500**	**$ 10,902,500**
H) Corporate/Conventional Hangars (Zone 1)	$ 5,000,000	$ 1,500,000	$ 82,500	$ 3,417,500
I) FBO Redevelopment/Expansion (Zone 2)	6,300,000	1,600,000	150,000	4,550,000
Subtotal	**$ 11,300,00**	**$ 3,100,000**	**$ 232,500**	**$ 7,967,500**
TOTAL	**$ 32,817,000**	**$ 10,680,000**	**$ 525,000**	**$ 21,612,000**

Source: CDM Smith

The FAA and TxDOT collaborate to distribute funds to Texas airports in the form of grants from the FAA's Airport Improvement Program and the Texas Aviation Facilities Development Program. By law, TxDOT is the agent of the state and each political subdivision for the purpose of "applying for, receiving, and disbursing…" federal funds for the benefit of general aviation airports. The legislation allows state funding assistance on federally-funded projects. The state may also fund projects not eligible for federal funding. In addition, the state was selected in 1993 to participate in the State Block Grant Pilot Program which gives the state the lead in carrying out the Airport Improvement Program for the non-reliever general aviation airports. In 1996, the State Block Grant Program was made permanent and TxDOT's responsibility was expanded to include the reliever airports as well.

TxDOT identifies aviation facility requirements, airport locations, and timing for development of non-reliever general aviation airports. Under the State Block Grant Program, the department refines the projects and determines funding eligibility. The current AIP legislation provides both entitlement funds and discretionary funds for projects that are eligible, according to FAA Order 5100.38B, Airport Improvement Handbook. Following are the general types of projects that are eligible to be funded with AIP grants:

- Projects that preserve or enhance safety, security, or capacity of the airport or national air transportation system.
- Projects that reduce noise or mitigate noise impacts resulting from aircraft.
- Projects that furnish opportunities for enhanced competition between or among air carriers, if applicable.

Airports also compete for federal discretionary funds, which are awarded based on priority ratings given to each potential project by the FAA. The prioritization process ensures that the most important and most beneficial projects are the first to be completed, given the availability of adequate discretionary funds.

As a general rule, airport projects that are related to non-revenue producing facilities, such as airfield improvements and land acquisition, can be eligible for up to 90 percent federal or state funding. TxDOT may provide up to 90 percent of state-funded project costs, depending on the availability of funds, airport sponsor actions, department priorities, and actual project costs. Only those airports deemed as being crucial to the national system, which includes airports in the NPIAS, are eligible for funding. Grand Prairie Municipal Airport is included in the NPIAS as a reliever airport. Whether eligible at the federal or state level, the use of AIP funds at any airport requires a 10 percent local match from sponsor/owner sources. Funding is limited to development that is justified to meet aviation demand according to FAA or TxDOT standards.

Each airport development project, including those recommended in this master plan, will be subject to eligibility and justification requirements in the normal CIP funding process.

Projects beyond the 20-Year Period

Several significant projects discussed throughout this master plan are expected to take place beyond the 20-year planning horizon. These projects are deemed unnecessary within the 20-year period because they are not required to satisfy safety requirements or are not necessary to meet demand. These projects, as highlighted in **Table 7-2,** include tasks related to the Runway 17/35 extension and associated taxiway and lighting enhancements. Approximately $2.1 million (in 2012 dollars) in airfield enhancements are expected to take place after the planning period, as demand warrants. A detailed breakdown of the costs associated with each project highlighted below is incorporated into the estimated provided in Appendix B.

Table 7-2: Cost Estimates for Projects beyond the Planning Period

Project	Total
Runway 35 Extension (300')	$ 950,000
Extend Taxiway A to new Runway 35 end	350,000
Runway 17 Extension (300')	540,000
Install ODALS lighting	200,000
Install PAPI – 4 light system	100,000
TOTAL	**$2,140,000**

Source: CDM Smith

7.2 Airport Financial Structure

The City of Grand Prairie owns the Airport and manages its operation and development. To aid the airport in identifying needs and achieving goals, a nine member Airport Advisory Committee (AAC) has regular meetings to discuss on-going issues involving the Airport. Many of the daily administrative and operational tasks associated with running the Airport are carried out by airport staff employed by the City. The Airport Manager and designated staff assist with the management, development, operation and maintenance of the Airport facilities. As the Airport becomes busier with additional based and transient aircraft as well as increased business activity on the field, there may be a need to hire additional airport-dedicated staff to meet the needs of airport users.

While some general aviation reliever and large general aviation airports do indeed have substantial revenue sources, most general aviation airports do not and often struggle for matching funds to maintain their pavement and other key operational areas. Even though general aviation airports are not typically known to be financially self-sufficient, GPM has maintained self sufficiency primarily through rent payments, fuel sales and commercial operator payments.

7.3 Overview of Airport Finances

In 2011, TxDOT undertook a study of the impact and relationship of airports in Texas with the statewide economy. The study found that Texas general aviation airports provide more than 56,000 jobs, with $3.1 billion in payroll and $14.6 billion in total economic output. Of those totals, Grand Prairie Municipal Airport accounts for almost 400 jobs, with $17.7 million in payroll and approximately $47 million in direct output from on-airport spending.[1]

[1] Economic Impact of General Aviation in Texas, Center for Economic Development and Research, University of North Texas, December 2011.

The relationship between operating revenues and operating expenses at Grand Prairie Municipal Airport is one representation of the overall financial condition. The comparison of operating revenues and expenses can identify, from a cash-flow perspective, whether the revenues generated at the Airport are sufficient to cover the facility's operating costs. It is important to remember that the revenue and expense comparison provides an important, but narrow, view of the financial and economic implications of the Airport. This financial data must also be examined in the context of other economic benefits and tax revenues that are accrued as a result of Airport operations.

In general, where operating revenues are greater than operating expenses, an airport can be considered profitable, and excess revenues are often used to establish airport reserve funds and/or help fund airport capital development. Where operating revenues are less than expenses, an airport experiences a net operating loss and requires subsidy to meet operating requirements.

In this instance, the operating profit at Grand Prairie Municipal Airport can be used toward airport capital improvements such as those shown in this master plan or used to establish reserve funds. In addition, the City recognizes the economic benefits that the Airport brings to the area, the tax revenues generated by the Airport and Airport-related businesses as well as the social and quality-of-life benefits that the Airport supports.

Airport Revenues and Expenditures

Airport revenues are typically generated through user fees charged by the airport for the facilities and services that are provided. These user fees are typically established by the airport based on market conditions in the area and vary airport-to-airport. Airport operating revenues are collected at Grand Prairie Municipal Airport from the following primary sources:

- Leases (Hangar, Space & Land Fees)
- Commercial Operator Payments
- Aviation Fuel Sales
- Trash Collection Service
- Miscellaneous

Landside facility development and levels of aviation activity are typically the primary factors affecting airport operating revenues. As additional development occurs, the number of based aircraft and itinerant aircraft operations increase and leases are updated at Grand Prairie Municipal Airport, it is likely that Airport operating revenues will increase in a corresponding fashion.

Airport operating revenues are offset by operating expenses which are comprised of the day-to-day costs incurred by operating the Airport. They do not include

non-cash and capital costs associated with depreciation, debt service, and infrastructure development but do include capital costs for small equipment and minor improvements. Primary components of expenses at Grand Prairie Municipal Airport include the following:

- Personnel (salaries, wages, and benefits)
- Aviation Fuel for resale
- Supplies
- Other Services
- Miscellaneous Expenses
- Capital Outlay

Like operating revenues, certain components of Airport operating expenses fluctuate with activity levels. However, there are some significant fixed expenses, such as personnel, that could be maintained at or near current levels while accommodating significant increases in Airport activity. Historic airport operating revenues and expenses for Grand Prairie Municipal Airport over the most recent fiscal years are presented in **Table 7-3**.

Table 7-3: Historic Airport Operating Revenues, Expenses, and Outcome

Category	FY2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Revenues							
Leases	$ 474,242	$ 472,843	$ 568,820	$ 650,084	$654,583	$ 692,064	$ 680,766
Comm. Operator Payments	93,896	95,812	87,450	92,197	91,723	93,989	96,203
Fuel Sales	659,592	869,116	827,972	1,583,861	952,645	984,699	1,265,243
Trash Collection	2,526	2,466	1,935	2,100	2,205	2,310	1,680
Miscellaneous	2,546	39,134	172,078	27,025	12,120	12,524	-
Total Revenues	**$1,232,802**	**$1,479,371**	**$1,658,255**	**$2,355,267**	**$1,713,276**	**$1,785,586**	**$2,043,892**
Expenditures							
Personnel	$ 350,534	$ 300,873	$ 317,310	$ 346,327	$ 286,592	$ 349,207	$ 314,705
Fuel Purchase	555,071	746,405	691,298	1,344,847	775,352	811,349	1,017,295
Supplies	9,505	11,168	7,020	15,601	7,747	7,604	9,144
Other Services	93,246	96,555	127,851	90,799	117,031	160,546	146,890
Miscellaneous Expenses	160,759	306,192	324,702	331,238	501,713	363,289	483,900
Capital Outlay	-	-	7,191	26,121	-	8,110	-
Total Expenditures	**$1,169,115**	**$1,461,193**	**$1,475,378**	**$2,154,933**	**$1,688,435**	**$1,700,105**	**$1,971,934**
Operating Income (loss)	**$ 63,687**	**$ 18,178**	**$ 182,877**	**$ 200,334**	**$ 24,841**	**$ 85,481**	**$ 71,958**

Source: Grand Prairie Municipal Airport

As shown in Table 7-3, the Airport's operating income from FY 2005 to FY 2011 has had periods of profitability ranging from $18,000 to over $200,000 per year. Over the seven year period, the total gain in operating income was almost $650,000. Growth in operating revenues at the Airport has primarily been driven

by an increase in hangar leases and fuel sales. The Airport opened addition hangars on the south side of the property in FY2007, accounting for increased lease revenue. Over this seven year period, fuel sales have consistently represented 80 to 85 percent of the revenue realized. This is an indication of proper fuel sales management and consistent profitability.

A large portion of revenue not normally realized, however, is represented by a $161,781 gain in FY2007 from a transfer of funds from the Airport's capital projects fund to the Airport as shown on the annual revenue and expenses ledger. There were decreases in Airport operating expenses experienced between FY2005 and FY2007 as well as in FY2009 through a reduction in personnel costs and supplies, which positively affected the net operating outcome

With uncertainty in the aviation market, volatility of aviation fuel prices and fluctuations in the year-to-year financial performance of the Airport, it is difficult to accurately project operating revenues and expenses. The continued growth of Grand Prairie Municipal Airport, in terms of activity, tenants, new leases and facility development, will impact the Airport's operating revenues and expenses over the planning period. Actual future financial outcomes will be determined by a variety of factors, many of which are impossible to identify at the current time.

Based on recent financial results, growth in based aircraft and activity, and the business and aviation climate throughout the region, it is likely that GPM will continue to see a demand for its facilities and maintain a positive financial position. Development of airside and landside facilities shown in this study should continue to be considered and evaluated as demand warrants.

Projected Operating Revenues and Expenses

The growth of Grand Prairie Municipal Airport, in terms of activity, tenants, new leases and facility development, will impact the Airport's operating revenues and expenses over the planning period. Any additional revenue will only act to further strengthen current airport revenues and help insure that the Airport remains self sufficient throughout the planning period. Actual future financial outcomes will be determined by a variety of factors, many of which are impossible to identify at the current time. However, the projections developed in this evaluation depict future Airport operating revenues and expenses based on recent financial results, activity/tenant growth trends identified in previous chapters and planned development. Projections of future airport revenues, expenses and resulting income for the period 2011 to 2030 are presented in **Table 7-4**.

It is important to note, grants and contributions for future years are not estimated in this analysis as they are unpredictable, may vary greatly from year to year, and are generally offset by capital expenditures. It is the goal of this effort to project operating revenue and expenses that influences the balance of Airport reserve funds which provide available funds for the local share of capital improvements.

Table 7-4: Projected Airport Operating Revenues and Expenses

		Projected			
	FY 2011	2015	2020	2025	2030
Revenues					
Leases	$ 680,766	$ 800,000	$1,250,000	$ 1,350,000	$ 1,500,000
Comm. Operator Payments	96,203	100,000	120,000	130,000	150,000
Fuel Sales	1,265,243	1,330,000	1,400,000	1,460,000	1,520,000
Trash Collection	1,680	3,000	4,000	5,000	5,000
Miscellaneous	-	12,000	16,000	20,000	25,000
Total Revenues	**$2,043,892**	**$2,245,000**	**$2,790,000**	**$2,965,000**	**$3,200,000**
Expenditures					
Personnel	$ 314,705	$ 350,000	$ 410,000	$ 480,000	$ 550,000
Fuel Purchase	1,017,295	1,100,000	1,120,000	1,172,000	1,220,000
Supplies	9,144	10,000	10,000	13,000	15,000
Other Services	146,890	150,000	160,000	170,000	180,000
Miscellaneous Expenses	483,900	490,000	500,000	510,000	520,000
Capital Outlay	-	-	-	-	-
Total Expenditures	**$1,971,934**	**$2,100,000**	**$2,200,000**	**$2,345,000**	**$2,485,000**
Operating Income (loss)	**$ 71,958**	**$145,000**	**$590,000**	**$620,000**	**$715,000**

Source: City of Grand Prairie (2011/2012), CDM Smith (Projected)

The projections presented in Table 7-4 are based on financial results for 2011, and anticipated future based aircraft and operational activity considering the full occupation of existing and future hangars. Projections are developed in 5 year increments from 2015 through 2030 based with anticipated escalations in Airport operating costs and revenue increases based on CPI and per square foot rent increases directly correlated to existing leases and future development.

Based on the Airport's current market area, it is anticipated that future growth in based aircraft will have a significant effect on airport revenues in 2015 and 2020 driven by the recommended development of conventional and T-hangars as depicted in Phases I and II. Through proper sales management and increases in operations by based and itinerant aircraft, fuel sales will continue to be the leading contributor to revenue in future years. It is assumed that the cost to purchase fuel for resale will continue to represent 80 to 85 percent of the revenue generated from fuel sales. Notwithstanding future grants, GPM operating revenues are projected to increase to approximately $3.2 million by 2030.

Over the same period, Airport expenditures are projected to increase from about $2 million to $2.4 million. Based on these projections, the Airport's total operating income is projected to improve annually between 2015 and 2030. Over the course of the 20-year planning period, with given airport infrastructure improvements, the average contribution to the Airport's surplus income fund for

capital improvements will be approximately $450,000 per year, amounting to a total contribution of about $9 million.

This will pay for a large portion of the local share of many planned airport improvements; however, some projects will require alternative funding methods, such as loans, bonds or indirect revenue. Additionally, it is understood that some of the projects recommended within this master plan will include the use of private funds to develop hangars intended to accommodate airport businesses.

Indirect Revenue

It is important to note that in addition to direct operating revenues generated at the Airport from leases and fuel flowage fees, Grand Prairie Municipal Airport also generates indirect revenues. One source of indirect revenue is generated by taxes on real property improvements and business personal property, including business aircraft. As a beneficiary of tax revenue, the City of Grand Prairie will receive indirect revenues from the Airport.

Another source of revenue generated by the Airport is through fees paid for drilling rights on the airfield. The gas revenues generated from the drilling rights on the airfield have been volatile. The Airport's gas revenues have ranged from a monthly high of $250,631 to a low of $5,056. At this time, the gas revenues are continuing to decline. These gas revenues will be used for airport capital improvements. In addition, they will be used to repay the City for previous airport projects and other costs funded by the City that benefitted the Airport.

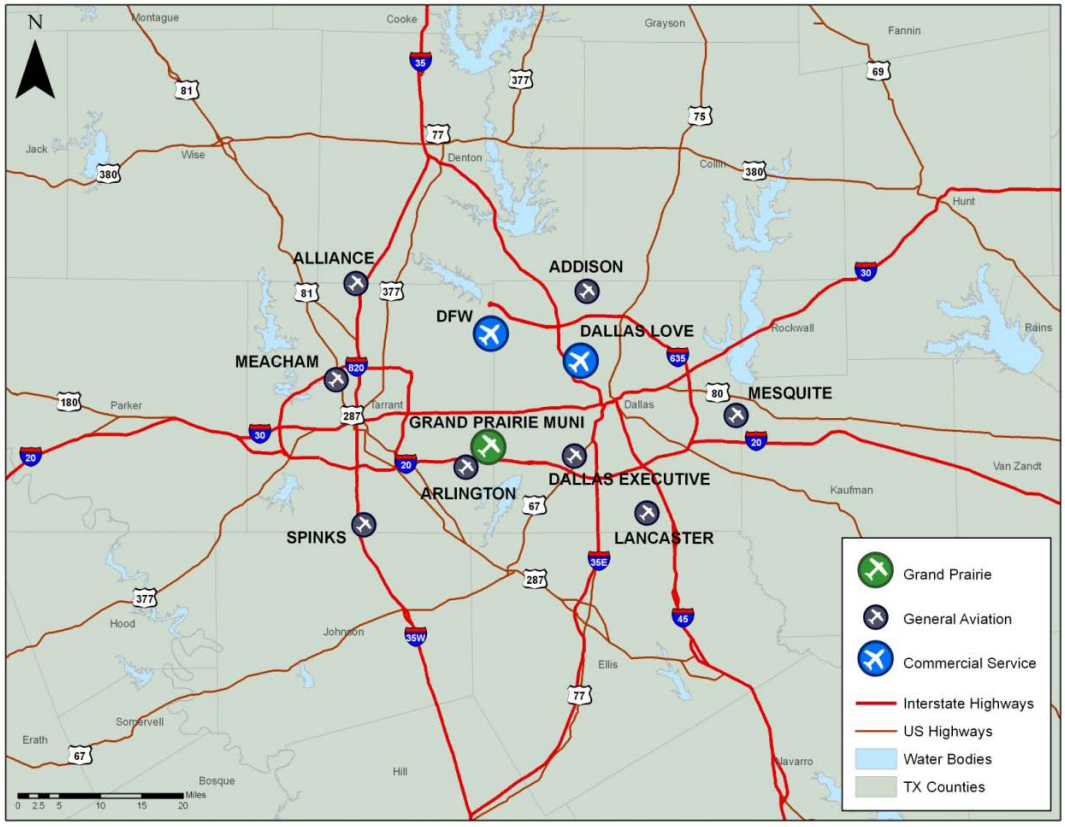
7.4 Competitive Analysis

There are 8 public-use airports (with paved runways) located within a reasonable driving distance from Grand Prairie that could be considered as competitors to GPM. While the airports serve a wide range of consumers and users (from privately owned single-engine piston aircraft that are used for recreational purposes to large jet aircraft fleets that are used to service corporations), GPM competes with each of the airports for consumers (both based and transient) who own and/or operate a full range of general aviation aircraft. The 8 competing, public-use airports outlined in this study are as follows:

Fort Worth Alliance (AFW), Fort Worth Meacham (FTW), Fort Worth Spinks (FWS), Arlington Municipal (GKY), Dallas Executive (RBD), Lancaster Regional (LNC), Mesquite Municipal (HQZ), Addison (ADS).

Figure 7-1 illustrates the location of these airports in relation to GPM and the City of Grand Prairie while Tables 7-5 through 7-7 compares the facilities and services of each airport.

Figure 7-1: Competing Airports



Facilities Comparison

There are many factors that are considered by airport tenants, transient and local aircraft operators when selecting an airport as a base of operations or destination. **Table 7-5** highlights several basic facilities at these market area airports.

Table 7-5: Airport Comparison

Airport	Airport Identifier	Distance to GPM	City	County	Runway Length (Max.)	Operations	Acreage
Grand Prairie Municipal	**GPM**	**N/A**	Grand Prairie	Tarrant	**4,001'**	**80,656**	**162**
Ft. Worth Alliance	AFW	22 miles	Ft. Worth	Tarrant	9,600'	137,607	1,198
Ft. Worth Meacham	FTW	17 miles	Ft. Worth	Tarrant	7,501'	78,499	745
Ft. Worth Spinks	FWS	15 miles	Ft. Worth	Tarrant	6,002	82,948	822
Arlington Municipal	GKY	3miles	Arlington	Tarrant	6,080'	151,600	500
Dallas Executive	RBD	9 miles	Dallas	Dallas	6,451'	134,966	1,070
Lancaster Regional	LNC	18 miles	Lancaster	Dallas	6,502'	67,100	548
Mesquite Municipal	HQZ	26 miles	Mesquite	Dallas	5,999'	100,000	399
Addison Airport	ADS	19 miles	Dallas	Dallas	7,202'	94,182	368

Source: TxDOT, AirNav.com, May 2012

The presence of navigational aids such as a precision approach or Instrument Landing System (ILS), an airport with an operating control tower and a full service FBO make operating at an airport easy and convenient and are desirable to the pilot. **Table 7-6** compares the common attributes of these nearby airports.

Table 7-6: Airport Data

Airport Name	# of FBO's	ATC	Turf Rwy	ILS	#of Based Aircraft				
					Single	Multi	Jet	Heli/ other	Total
Grand Prairie Municipal	**2**	**Y**	**N**	**N**	**198**	**18**	**0**	**20**	**236**
Ft. Worth Alliance	1	Y	N	Y	1	8	9	11	29
Ft. Worth Meacham	3	Y	N	Y	101	64	68	7	240
Ft. Worth Spinks	1	Y	Y	Y	137	29	2	2	170
Arlington Municipal	1	Y	N	Y	176	54	5	15	250
Dallas Executive	2	Y	N	Y	63	20	8	5	96
Lancaster Regional	1	N	N	N	99	18	11	12	140
Mesquite Municipal	1	N	N	Y	162	19	2	5	188
Addison Airport	3	Y	N	Y	292	94	202	15	603

Data Extracted from: FAA Airport Data (5010), May 2012

Assuming that the infrastructure, products, services, and facilities that are desired by the transient aircraft operator are provided by the FBO or other service provider and that the airport can safely and efficiently accommodate the aircraft being operated, transient aircraft will typically prefer to use the airport that is located closest to their final destination. For this reason, GPM is likely the final destination that small transient aircraft may utilize in the Dallas/Ft. Worth area. The 8 competing airports in the area were researched to determine the amenities and level of services offered to their customers. **Table 7-7** highlights the services available at the neighboring airports as well as GPM.

Table 7-7: Airport Services Comparison

	AIRPORTS								
	Grand Prairie Municipal	Ft. Worth Alliance	Ft. Worth Meacham	Ft. Worth Spinks	Arlington Municipal	Dallas Executive	Lancaster Regional	Mesquite Municipal	Addison Airport
Air Charter	X		X	X				X	X
Hangar Rental	X	X	X	X	X	X	X	X	X
Tie Down Rental	X	X	X	X	X	X	X	X	X
Aircraft Rental	X			X	X		X	X	X
Aircraft Sales	X			X		X	X	X	X
Flight Instruction	X		X	X	X				X
Jet Fuel	X	X	X	X	X	X	X	X	X
AvGas	X	X	X	X	X	X	X	X	X
Self Service	X			X	X	X	X	X	X
Aircraft Repair	X	X	X	X	X	X	X	X	X
Avionics	X	X	X	X	X	X	X	X	X
Public Telephone	X	X	X	X	X	X	X	X	X
Restaurant	X					X	X		X
Vending	X	X	X	X	X	X	X	X	X
Car Rental	X	X	X	X	X	X	X	X	X
Loaner Car		X	X	X	X	X	X	X	X
Bottle Oxygen	X	X	X	X	X	X	X	X	X
Transient Hangar Storage	X	X	X	X	X	X	X	X	X
Transient Tie Down	X	X	X	X	X	X	X	X	X

Source: Data Compiled by CDM Smith

Of the neighboring, competing airports, all have runway lengths greater than GPM and seek to accommodate the growing share of corporate/business jet traffic within the region. The level of operations and based aircraft at GPM are consistent within the region, given the runway length, acreage and services offered at the Airport. As shown, many of the competing airports in the Dallas/Ft. Worth metroplex have a greater number of operations and significantly more acreage, have air traffic control towers and ILS navigational aids. Considering the lack of available runway length, GPM has a high level of operations and based aircraft and provides a broad range of services that rival many of the larger general aviation airports in the region. On the list of available services, GPM offers a total of 18 out of a possible 19 separate services. In comparison, on average, the other airports studied in this section offer approximately 17 of the potential services.

There are benefits that GPM provides that may not be available at competing airports. While many may consider the Airport's relatively short runway length and lack of ILS capability a limitation, some believe this may appeal to and attract smaller aircraft and helicopters that do not have to compete for ramp/hangar accommodations and airspace with larger business jet aircraft. This provides the opportunity for pilots to train in an environment with other similar aircraft types. This allows airport management and air traffic control to focus on the needs of the general aviation pilot, business, passenger and user.

Rates and Charges Comparison

Table 7-8 contains the results of a recent rate survey which was completed by contacting the nearby public-use airports and collecting the rate data available. Airport revenues are typically generated through user fees charged by the airport for the facilities and services that are provided. These user fees are normally established by the airport based on market conditions in the area and vary airport-to-airport. The airports pricing strategy should be to charge "market" rates (as is mandated by the FAA).

Table 7-8: Fee Comparison

Airport	Fuel Flowage Fee (per gallon)	Overnight Parking Fees	Tie Down Fees Paved (per month)	Land Lease (per square foot)	T-Hangar Small (per month)	Box/T-Hangar Large (per month)	Conventional Hangar (per month)
Grand Prairie Municipal	**$.20**	**$4**	**$30**	**$.135/$.165[1]**	**$195-$205**	**$284-$542**	**$500-$1000**
Ft. Worth Alliance	$.12	$8 - $75	$300-$2,250	$.35	$80[2]	$350[2]	$303[2 3]
Ft. Worth Meacham	$.12	$5 - $72	$77	$.27	$80[2]	$350[2]	$303[2 3]
Ft. Worth Spinks	$.12	$5 - $15	$46-$90	$.20-$.27	$180-$292	$348-$450	$303[2 3]
Arlington Municipal	$.10	$10-$500[4]	$45	$.20/$.34[1]	$215	$315	$1.92 sf/yr
Dallas Executive	$.07	$0	$0	$.13/$.18[1]	$325	$550	$450-$4500
Lancaster Regional	$.10	$0	$25	$.15/$.25[1]	$150-$275	$800-$950	$1200-$1395
Mesquite Municipal	NA	$10	$65	$.28	$195-$235	$325-$400	$900-$1200
Addison Airport	$.12/$.20[5]	$15-$30	$125	$.45/$.65[1]	$335-$460	$675	$5-$8.50 sf/yr

Source: Data Compiled by CDM Smith (2012)
Note: NA = Service not provided or fee not available or does not apply to the airport.
[1] Unimproved Land/Improved Land
[2] A 10% discount for a twelve month period is available if the aircraft owner purchases an average of 50 gallons of fuel per month for the prior 12 month period from an FBO at the airport. This applies to each of the Ft. Worth Airports (Alliance, Meacham, Spinks).
[3] Community Hangar
[4] Depends on size of plane
[5] Pubic/Non-public rates

Airport operating revenues are collected at GPM from the primary sources:

- **Leases/Rentals** – The majority of the Airport tenants lease buildings or hangar space from the Airport or FBO.
- **Fuel Flowage** – The City currently collects a fuel flowage fee from the single FBO, which provides full service fuel sales. The City also sells fuel via the self service fueling station.

Grand Prairie Municipal Airport and competing airports also collect revenue from other sources such as monthly tie down rentals and land leases for unimproved or improved land owned by the Airport and developed by the tenant. The majority of the airports surveyed reported that they do not charge an overnight parking fee to those aircraft that purchase fuel.

In reviewing the rates and charges collected and illustrated above, some basic conclusions can be drawn:

- ***Fuel Flowage*** – It is not uncommon for an airport to not charge a fuel flowage fee, although this is typically relegated to airports with lower based aircraft and operational activity levels. In addition, some FBOs are managed by the local city government where the city retains all the profit associated with fuel sales. Of course, this requires additional city staff to maintain the operation and exposes the city certain liabilities.

  For airports within the region that charge a fuel flowage fee, there is a wide range from $.05 to $.20 per gallon charged by the airport/city to the fuel provider. The average fuel flowage for airports charging this fee is $.10 per gallon of fuel sold.

  At GPM, this fee is highest among any other airports studied in the market area. To be competitive, the Airport may choose to lower this rate to match market conditions if it is desirable to attract additional future fuel resellers. It is important to note, however, GPM offers competitive overall fuel prices to consumers.

- ***Overnight Parking Fee*** – Although this fee has a broad range, it is a very small percent age of airport revenue and almost all airports waive the fee with the purchase of fuel. This may be a more substantial portion of revenue at airports with a large share of transient activity where extended stays are commonplace. None of the airports surveyed fit the profile of extended transient traffic. Grand Prairie Municipal Airport has one of the lowest rates for overnight parking among competing airports and could consider increasing this rate since it has not been increased in at least 5 years.

- **Tie Down Fee (monthly)** – This fee is charged to based aircraft owners storing aircraft on the tie down apron. Although many airports in the region have established a monthly tie down parking fee, because of the extreme temperatures and wind conditions experienced in this region, most aircraft owners seek to store aircraft in hangars. Of those that provide monthly tie down parking for based aircraft in the region, GPM charges one of the lowest rates and could consider increasing the rate since it has not been increased in at least 5 years.

- **Land Lease** – A land lease fee is charged to an airport tenant who chooses to build his own hangar or facility on airport property. Some smaller airports with a limited number of tenants, based aircraft or acreage typically do not allow land leases in order to maintain control of airport development. Grand Prairie Municipal Airport, on the other hand, allows land leases to stimulate business growth and activity at the Airport. Although land lease rates have recently been increased slightly at GPM, the Airport maintains one of the lowest rates in the region. Given the limited amount of land available for lease at GPM and the rates established by the local market, it would not be unreasonable for GPM to further increase improved and unimproved land lease rates. It is important to note, land leases typically include a reversion clause which states that after the lease expires, all buildings and infrastructure constructed on the property revert to airport/city ownership.

- **T-Hangar (Small)** – A T-hangar within this category includes a basic steel structure with sufficient space to accommodate a single engine or small multi-engine aircraft. Hangars may be nested with one another or in an end-to-end configuration. They typically include manual siding doors and basic electrical service, although T-hangars within this region vary significantly in size and amenities. These differences explain the wide range ($150 - $380 per month) charged among the competing airports. The average price for a small T-hangar in this region is about $230 per month.

- **Box/Large T-hangar** – Large T-hangars and box hangars accommodate one or more aircraft and typically have a greater level of amenities than small T-hangars including: automatic bi-folding doors, enhanced electrical and plumbing. Within the increased range of amenities, comes the increase range in price ($230 - $950 per month). The average price for this type of hangar is $480 per month, but development costs, useful life and amenities should be considered when determining the price for such facilities. The average rate for this category hangar at GPM is $413 per month.

- **Conventional Hangars** – Conventional hangars typically house multiple aircraft or an aviation-related business and vary in size and amenities based on the tenant needs. The monthly rates for hangars in category start at $450 and go up to $1,500. As with large T-hangars and box hangars the price of the unit should be based on development costs, expected useful life, and amenities included in the hangar. The average conventional hangar at GPM rents for about $750 per month which is lower than the average of $1,125 in this region.

National Comparison

Though the best way to benchmark airport fees is locally, a national comparison may provide additional insight into common charges at airports similar to GPM. Up to the mid-2000s the American Association of Airport Executives produced the *General Aviation Airports Rates and Charges Survey* each year to document the range of rates and charges at general aviation airports throughout the country. Key statistics were calculated showing average, medium and standard deviation calculations by each general aviation airport. Of the airports surveyed in AAAE's last report, 2005-2006, 88 airports were similar in size and scope to GPM. This data was used to evaluate the following items:

- **Tie Down Fees** - Out of 88 airports surveyed 60 reported monthly tie-down fees for based aircraft. The average monthly tie down fee for single engine aircraft was $45.00 and $52.00 for multi-engine aircraft.
- **Unimproved Ground Lease** *(per square foot)* - Out of 88 airports surveyed 38 reported an average figure of $.24 per square foot for unimproved ground leases. For an improved ground lease, 32 airports reported $.33 per square foot as an average per month.
- **Monthly T-Hangar Rates** - Out of 88 airports surveyed 51 reported monthly hangar fees at an average of $306.00 per month. However, the survey did not differentiate if the hangars were large or small. There are numerous factors that determine an airport's ability to set hangar fees. At those airports which responded to the AAAE survey, fees ranged greatly from $78.00 to $1,200 per month. Grand Prairie Municipal Airport should rely on the local comparison and development costs for determining hangar rental fees.
- **Fuel Flowage** - Out of those surveyed, 29 reported their fuel flowage fee. Out of these 29 airports, they averaged $.07 per gallon for a fuel flowage fee with the lowest being $.03 and the highest being $.20 per gallon.

7.5 Conclusion

The financial review of GPM's operating income revealed that the Airport has had consistently positive operating income, with some periods dramatically greater than others. These differences are likely driven by the number of hangars available for lease, aviation activity, fuel costs and other market forces. Based on regular lease increases and the potential for additional sources of income, it is expected that through the 2030 planning period, incremental growth would be projected for both revenues and expenses. A majority of the projected growth in Airport operating revenues are anticipated to be driven by lease rent increases, the expansion of aircraft storage facilities and increases in fuel sales. Based on the fee comparison, both locally and nationally, the current fees reflect a reasonable fair market value, although some could be increased to fall within the

median range. The Airport should consider local market conditions, development costs and the rules of supply and demand when determining future hangar fees. Additionally, based on this incremental growth in revenues and expenses and the potential for additional leases, it is likely that the Airport will generate an operating income sufficient to independently fund a large portion of the estimated local share of some future CIP costs.

A capital improvement program has been developed showing the implementation of facilities necessary to meet the Airport's anticipated safety and demand requirements over the 20-year planning period. This program includes airfield modifications and landside improvements and expansion amounting to $32.8 million. The funding of these projects will come from a combination of sources including: federal and state grants, City of Grand Prairie (sponsor) funds, and private sources. Most of the local share of project costs can be paid for by projected airport operating income, although some may come from private investment and/or fees paid for on-airport drilling rights.

The Grand Prairie Municipal Airport provides a significant financial, quality of life and service contribution to the region, City of Grand Prairie and general aviation. In 2011, the direct output from on-airport spending was estimated at approximately $47 million. Almost 400 jobs were supported by the Airport and provided an estimated $17.7 million in payroll. The operation and expansion of the Airport should be supported to continue its tradition of economic benefit to the region as well as service to the City, area businesses and aviation community.

Appendix A

Environmental Overview

Agency Letters

ENGINEERS PLANNERS ECONOMISTS
WilburSmith ASSOCIATES

RECEIVED
NOV 2 1 2011
THC-Purchasing

November 17, 2011

Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

RE: Environmental Overview of Proposed Improvements at Grand Prairie Municipal Airport
Tarrant County, Texas

Dear Mr. Wolfe:

Acting as an agent for Texas Department of Transportation, Wilbur Smith Associates (WSA) is currently preparing an environmental overview of the proposed airport improvements that are included in the Master Plan Update for Grand Prairie Municipal Airport in Tarrant County, Texas. As part of this environmental overview, we are identifying cultural resources within the project area that would require further evaluation in accordance with Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas. If Section 106 applies to this project, this work will be done concurrently with the NEPA process, which would occur at a later time.

Enclosed please find a Request for SHPO Consultation, a Project Description, and a site plan identifying the locations of the proposed airport improvement project. Please respond to me at the address provided on the letterhead and feel free to contact me at 513-716-6562 or by e-mail at cammerman@wilbursmith.com if you have any questions or concerns. Thank you very much for your help on this important project for Grand Prairie Municipal Airport.

Sincerely,
WILBUR SMITH ASSOCIATES/CDM

Caroline Ammerman

Caroline B. Ammerman, AICP
Planner

NO HISTORIC
PROPERTIES AFFECTED
PROJECT MAY PROCEED
by
for Mark Wolfe
State Historic Preservation Officer
Date 12 December 2011

8805 Governor's Hill Drive, Suite 305 Cincinnati, OH 45249
513.583.9800 www.WilburSmith.com

Appendix B

Detailed CIP Cost Breakdown

Grand Prairie Municipal Airport
Year 2012 Master Plan
Opinion of Probable Construction Costs

August 2, 2012

Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 1: Initial Taxiway A South Expansion						
1.01	P-152-4.	Unclassified Excavation	C.Y.	4,379	$4.50	$19,705.50
1.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	1,087	$4.00	$4,348.00
1.03	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with Suitable Material as Directed by the Engineer	C.Y.	62	$19.00	$1,178.00
1.04	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	2,756	$3.50	$9,646.00
1.05	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	56	$150.00	$8,400.00
1.06	P-156-5.	Temporary Sediment Control Fence	L.F.	350	$1.65	$577.50
1.07	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
1.08	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
1.09	P-209.5.	6" Crushed Aggregate Base Course	S.Y.	2,447	$18.00	$44,046.00
1.10	P-501-8.	6" PCC Pavement	S.Y.	2,241	$32.00	$71,712.00
1.11	P-620-5.	Yellow Taxiway Markings (Reflective)	S.F.	263	$1.00	$263.00
1.12	P-620-5.	Black Taxiway Markings (Non-Reflective)	S.F.	592	$1.00	$592.00
1.13	D-701-5.	24" ASTM C-76, Class III RCP	L.F.	70	$70.00	$4,900.00
1.14	D-752-5.	Furnish and Install 6:1 Single Barrel Sloped End Treatment for 24" RCP	EA.	2	$1,500.00	$3,000.00
1.15	T-901-5.	Hydromulch, Seed, Lime, and Fertilizer (Slopes < 5%)	S.Y.	6,106	$0.60	$3,663.60
1.16	T-901-5.	Bonded Fiber Matrix Mulch, Seed, Lime, and Fertilizer (4' Adjacent to Pavement Perimeter)	S.Y.	413	$1.20	$495.60
1.17	T-905-5.	Strip and Stockpile Topsoil from Disturbed Areas	S.Y.	8,758	$3.00	$26,274.00
1.18	T-905-5.	Install 4" Topsoil on Disturbed Areas	S.Y.	6,518	$4.00	$26,072.00
1.19	L-108-5.	No. 6 Stranded Copper Counterpoise, Installed in Trench or Duct Bank	L.F.	921	$1.25	$1,151.25
1.20	L-108-5.	No. 8 AWG, 5KV L-824C Cable, Installed in Trench, Duct Bank, or Conduit	L.F.	1,029	$1.50	$1,543.50
1.21	L-110-5.	2" Sch. 40 PVC Electrical Conduit	L.F.	871	$3.00	$2,613.00
1.22	L-110-5.	4 - 4" Concrete Encased Sch. 40 PVC Duct Bank	L.F.	50	$60.00	$3,000.00
1.23	L-116A-5.	Remove Existing Light Fixture	EA.	4	$75.00	$300.00
1.24	L-116A-5.	Furnish and Install 30 W, 6.6A Quartz, L-861-T Medium Intensity Taxiway Lights (Blue Lens) in Concrete Encased L-867-B Light Base complete with Transformer	EA.	16	$620.00	$9,920.00
1.25	L-117A-5.	Furnish and Install L-858, Two Module, Size 1, Style 2, Guidance Sign, on Concrete Mounting Pad with Transformer in Concrete Encased L-867-B Light Base	EA.	2	$2,875.00	$5,750.00
1.26	L-117A-5.	Remove and Replace Existing Size 1 Guidance Sign Panel	EA.	4	$350.00	$1,400.00
1.27	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$27,000.00	$27,000.00
1.28	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$7,500.00	$7,500.00
1.29	S-5-5.	Proof Rolling	Hrs.	18	$55.00	$990.00
					Subtotal:	**$292,690.95**
					20% Contingencies:	**$58,538.19**
					Total w/ Contingencies:	**$351,229.14**

*Cost Estimates based on preliminary design estimates and are subject to change

Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 2: Runway End 35 300' Extension (Assumed takes place after Initial Taxiway A South Expansion)						
2.01	P-152-4.	Unclassified Excavation	C.Y.	2,273	$4.50	$10,228.50
2.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	1,932	$4.00	$7,728.00
2.03	P-152-4.	Offsite Material Embankment In Place	C.Y.	11,706	$11.00	$128,766.00
2.04	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with Suitable Material as Directed by the Engineer	C.Y.	130	$19.00	$2,470.00
2.05	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	5,837	$3.50	$20,429.50
2.06	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	118	$150.00	$17,700.00
2.07	P-156-5.	Temporary Sediment Control Fence	L.F.	1,240	$1.65	$2,046.00
2.08	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
2.09	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
2.10	P-209.5.	6" Crushed Aggregate Base Course	S.Y.	5,303	$18.00	$95,454.00
2.11	P-501-8.	6" PCC Pavement	S.Y.	4,947	$32.00	$158,304.00
2.12	P-620-5.	White Runway Markings (Reflective)	S.F.	4,654	$1.00	$4,654.00
2.13	P-620-5.	Yellow Taxiway Markings (Reflective)	S.F.	313	$1.00	$313.00
2.14	P-620-5.	Black Taxiway Markings (Non-Reflective)	S.F.	11,176	$1.00	$11,176.00
2.15	D-701-5.	36" ASTM C-76, Class III RCP	L.F.	70	$85.00	$5,950.00
2.16	D-752-5.	Furnish and Install 6:1 Single Barrel Sloped End Treatment for 36" RCP	EA.	2	$2,500.00	$5,000.00
2.17	T-901-5.	Hydromulch, Seed, Lime, and Fertilizer (Slopes < 5%)	S.Y.	21,617	$0.60	$12,970.20
2.18	T-901-5.	Bonded Fiber Matrix Mulch, Seed, Lime, and Fertilizer (4' Adjacent to Pavement Perimeter)	S.Y.	713	$1.20	$855.60
2.19	T-905-5.	Strip and Stockpile Topsoil from Disturbed Areas	S.Y.	27,275	$3.00	$81,825.00
2.20	T-905-5.	Install 4" Topsoil on Disturbed Areas	S.Y.	22,329	$4.00	$89,316.00
2.21	L-108-5.	No. 6 Stranded Copper Counterpoise, Installed in Trench or Duct Bank	L.F.	1,957	$1.25	$2,446.25
2.22	L-108-5.	No. 8 AWG, 5KV L-824C Cable, Installed in Trench, Duct Bank, or Conduit	L.F.	1,747	$1.50	$2,620.50
2.23	L-110-5.	2" Sch. 40 PVC Electrical Conduit	L.F.	1,907	$3.00	$5,721.00
2.24	L-110-5.	4 - 4" Concrete Encased Sch. 40 PVC Duct Bank	L.F.	50	$60.00	$3,000.00
2.25	L-116A-5.	Remove Existing Light Fixture	EA.	9	$75.00	$675.00
2.26	L-116A-5.	Furnish and Install 45 W, 6.6A Quartz, L-861 Medium Intensity Runway Lights (Clear/Amber Lens) in Concrete Encased L-867-B Light Base complete with Transformer	EA.	2	$620.00	$1,240.00
2.27	L-116A-5.	Furnish and Install 100 W, 6.6A Quartz, L-861-SE Threshold Lights (Red/Green Lens) in Concrete Encased L-867-B Light Base complete with Transformer	EA.	8	$685.00	$5,480.00
2.28	L-116A-5.	Furnish and Install 30 W, 6.6A Quartz, L-861-T Medium Intensity Taxiway Lights (Blue Lens) in Concrete Encased L-867-B Light Base complete with Transformer	EA.	23	$620.00	$14,260.00
2.29	L-117A-5.	Furnish and Install L-858, Two Module, Size 1, Style 2, Guidance Sign, on Concrete Mounting Pad with Transformer in Concrete Encased L-867-B Light Base	EA.	2	$2,875.00	$5,750.00
2.30	L-117A-5.	Remove and Replace Existing Size 1 Guidance Sign Panel	EA.	8	$350.00	$2,800.00
2.31	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$72,000.00	$72,000.00
2.32	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$7,500.00	$7,500.00
2.33	S-5-5.	Proof Rolling	Hrs.	45	$55.00	$2,475.00
2.34	S-19-4.	Pavement Marking Obliteration	S.F.	5,585	$0.25	$1,396.25
					Subtotal:	**$789,199.80**
					20% Contingencies:	**$157,839.96**
					Total w/ Contingencies:	**$947,039.76**

*Cost Estimates based on preliminary design estimates and are subject to change

Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 3: Runway End 17 300' Extension						
3.01	P-152-4.	Unclassified Excavation	C.Y.	4,090	$4.50	$18,405.00
3.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	3,476	$4.00	$13,904.00
3.03	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with Suitable Material as Directed by the Engineer	C.Y.	96	$19.00	$1,824.00
3.04	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	4,309	$3.50	$15,081.50
3.05	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	87	$150.00	$13,050.00
3.06	P-156-5.	Temporary Sediment Control Fence	L.F.	450	$1.65	$742.50
3.07	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
3.08	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
3.09	P-209.5.	6" Crushed Aggregate Base Course	S.Y.	3,943	$18.00	$70,974.00
3.10	P-501-8.	6" PCC Pavement	S.Y.	3,699	$32.00	$118,368.00
3.11	P-620-5.	White Runway Markings (Reflective)	S.F.	4,654	$1.00	$4,654.00
3.12	P-620-5.	Yellow Taxiway Markings (Reflective)	S.F.	313	$1.00	$313.00
3.13	P-620-5.	Black Taxiway Markings (Non-Reflective)	S.F.	11,176	$1.00	$11,176.00
3.14	D-701-5.	36" ASTM C-76, Class III RCP	L.F.	70	$85.00	$5,950.00
3.15	D-752-5.	Furnish and Install 6:1 Single Barrel Sloped End Treatment for 36" RCP	EA.	2	$2,500.00	$5,000.00
3.16	T-901-5.	Hydromulch, Seed, Lime, and Fertilizer (Slopes < 5%)	S.Y.	8,082	$0.60	$4,849.20
3.17	T-901-5.	Bonded Fiber Matrix Mulch, Seed, Lime, and Fertilizer (4' Adjacent to Pavement Perimeter)	S.Y.	488	$1.20	$585.60
3.18	T-905-5.	Strip and Stockpile Topsoil from Disturbed Areas	S.Y.	12,269	$3.00	$36,807.00
3.19	T-905-5.	Install 4" Topsoil on Disturbed Areas	S.Y.	8,570	$4.00	$34,280.00
3.20	L-108-5.	No. 6 Stranded Copper Counterpoise, Installed in Trench or Duct Bank	L.F.	1,155	$1.25	$1,443.75
3.21	L-108-5.	No. 8 AWG, 5KV L-824C Cable, Installed in Trench, Duct Bank, or Conduit	L.F.	1,323	$1.50	$1,984.50
3.22	L-110-5.	2" Sch. 40 PVC Electrical Conduit	L.F.	1,105	$3.00	$3,315.00
3.23	L-110-5.	4 - 4" Concrete Encased Sch. 40 PVC Duct Bank	L.F.	50	$60.00	$3,000.00
3.24	L-116A-5.	Remove Existing Light Fixture	EA.	8	$75.00	$600.00
3.25	L-116A-5.	Furnish and Install 45 W, 6.6A Quartz, L-861 Medium Intensity Runway Lights (Clear/Amber Lens) in Concrete Encased L-867-B Light Base complete with Transformer	EA.	2	$620.00	$1,240.00
3.26	L-116A-5.	Furnish and Install 100 W, 6.6A Quartz, L-861-SE Threshold Lights (Red/Green Lens) in Concrete Encased L-867-B Light Base complete with Transformer	EA.	8	$685.00	$5,480.00
3.27	L-116A-5.	Furnish and Install 30 W, 6.6A Quartz, L-861-T Medium Intensity Taxiway Lights (Blue Lens) in Concrete Encased L-867-B Light Base complete with Transformer	EA.	15	$620.00	$9,300.00
3.28	L-117A-5.	Furnish and Install L-858, Two Module, Size 1, Style 2, Guidance Sign, on Concrete Mounting Pad with Transformer in Concrete Encased L-867-B Light Base	EA.	3	$2,875.00	$8,625.00
3.29	L-117A-5.	Remove and Replace Existing Size 1 Guidance Sign Panel	EA.	4	$350.00	$1,400.00
3.30	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$41,000.00	$41,000.00
3.31	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$7,500.00	$7,500.00
3.32	S-5-5.	Proof Rolling	Hrs.	18	$55.00	$990.00
3.33	S-19-4.	Pavement Marking Obliteration	S.F.	5,585	$0.25	$1,396.25
					Subtotal:	**$449,888.30**
					20% Contingencies:	**$89,977.66**
					Total w/ Contingencies:	**$539,865.96**

*Cost Estimates based on preliminary design estimates and are subject to change

Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 4: West Ditch Culvert Fill-In and Complete Taxiway						
4.01	P-152-4.	Unclassified Excavation	C.Y.	366	$6.00	$2,196.00
4.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	311	$4.00	$1,244.00
4.03	P-152-4.	Offsite Material Embankment In Place	C.Y.	7,929	$12.00	$95,148.00
4.04	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with	C.Y.	54	$19.00	$1,026.00
4.05	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	2,688	$5.00	$13,440.00
4.06	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	55	$150.00	$8,250.00
4.07	P-156-5.	Temporary Sediment Control Fence	L.F.	245	$2.50	$612.50
4.08	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
4.09	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
4.10	P-501-8.	6" PCC Pavement	S.Y.	2,241	$32.00	$71,712.00
4.11	P-620-5.	Yellow Taxiway Markings (Reflective)	S.F.	266	$1.00	$266.00
4.12	P-620-5.	Black Taxiway Markings (Non-Reflective)	S.F.	599	$1.00	$599.00
4.13	D-701-5.	36" ASTM C-76, Class III RCP	L.F.	660	$85.00	$56,100.00
4.14	D-752-5.	Furnish and Install 6:1 Single Barrel Sloped End Treatment	EA.	6	$2,500.00	$15,000.00
4.15	T-901-5.	Hydromulch, Seed, Lime, and Fertilizer (Slopes < 5%)	S.Y.	9,119	$0.60	$5,471.40
4.16	T-901-5.	Bonded Fiber Matrix Mulch, Seed, Lime, and Fertilizer (4'	S.Y.	396	$1.20	$475.20
4.17	T-905-5.	Strip and Stockpile Topsoil from Disturbed Areas	S.Y.	10,537	$3.00	$31,611.00
4.18	T-905-5.	Install 4" Topsoil on Disturbed Areas	S.Y.	9,515	$4.00	$38,060.00
4.19	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$36,000.00	$36,000.00
4.20	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$7,500.00	$7,500.00
4.21	S-5-5.	Proof Rolling	Hrs.	24	$55.00	$1,320.00
					Subtotal:	**$392,681.10**
					20% Contingencies:	**$78,536.22**
					Total w/ Contingencies:	**$471,217.32**
Project 5: ODALS						
5.01		ODALS System	L.S.	1	$150,000.00	$150,000.00
5.02	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$15,000.00	$15,000.00
					Subtotal:	**$165,000.00**
					20% Contingencies:	**$33,000.00**
					Total w/ Contingencies:	**$198,000.00**
Project 6: PAPI-4 for Each Runway End						
6.01		PAPI-4 System	EA.	2	$40,000.00	$80,000.00
6.02	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$8,000.00	$8,000.00
					Subtotal:	**$88,000.00**
					20% Contingencies:	**$17,600.00**
					Total w/ Contingencies:	**$105,600.00**

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Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 7: Zone 1 Hangar and Pavement Developments						
7.01	P-152-4.	Unclassified Excavation	C.Y.	4,513	$4.50	$20,308.50
7.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	3,836	$4.00	$15,344.00
7.03	P-152-4.	Offsite Material Embankment In Place	C.Y.	4,513	$11.00	$49,643.00
7.04	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with	C.Y.	419	$19.00	$7,961.00
7.05	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	18,843	$3.50	$65,950.50
7.06	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	380	$150.00	$57,000.00
7.07	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
7.08	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
7.09	P-501-8.	6" PCC Pavement	S.Y.	17,801	$32.00	$569,632.00
7.10	D-701-5.	2 - 5' x 3' RCBC	L.F.	400	$270.00	$108,000.00
7.11	D-752-5.	Furnish and Install Sloped End Treatment (2 - 5' x 3' RCBC)	EA.	2	$8,000.00	$16,000.00
7.12	T-901-5.	Hydromulch, Seed, Lime, and Fertilizer (Slopes < 5%)	S.Y.	3,807	$0.60	$2,284.20
7.13	T-901-5.	Bonded Fiber Matrix Mulch, Seed, Lime, and Fertilizer (4'	S.Y.	834	$1.20	$1,000.80
7.14	T-905-5.	Strip and Stockpile Topsoil from Disturbed Areas	S.Y.	24,370	$3.00	$73,110.00
7.15	T-905-5.	Install 4" Topsoil on Disturbed Areas	S.Y.	4,640	$4.00	$18,560.00
7.16	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$395,000.00	$395,000.00
7.17	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$15,000.00	$15,000.00
7.18	S-5-5.	Proof Rolling	Hrs.	36	$55.00	$1,980.00
7.19		Remove Existing Buildings / Pavement	S.F.	39,783	$5.00	$198,915.00
7.20		Hangars / Buildings Complete-in-place with Foundations	S.F.	41,734	$65.00	$2,712,710.00
					Subtotal:	**$4,335,049.00**
					20% Contingencies:	**$867,009.80**
					Total w/ Contingencies:	**$5,202,058.80**
Project 8: Zone 2 Portable Hangar Replacements						
8.01	P-152-4.	Unclassified Excavation	C.Y.	1,500	$6.00	$9,000.00
8.02	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with	C.Y.	250	$19.00	$4,750.00
8.03	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
8.04	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
8.05	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$214,000.00	$214,000.00
8.06	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$5,000.00	$5,000.00
8.07	S-5-5.	Proof Rolling	Hrs.	25	$55.00	$1,375.00
8.08		Remove Existing Buildings / Pavement	S.F.	31,950	$5.00	$159,750.00
8.09		Hangars / Buildings Complete-in-place with Foundations	S.F.	39,000	$50.00	$1,950,000.00
					Subtotal:	**$2,350,525.00**
					20% Contingencies:	**$470,105.00**
					Total w/ Contingencies:	**$2,820,630.00**

*Cost Estimates based on preliminary design estimates and are subject to change

Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 9: Zone 2 Corporate Hangar Developments						
9.01	P-152-4.	Unclassified Excavation	C.Y.	172	$6.00	$1,032.00
9.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	146	$4.00	$584.00
9.03	P-152-4.	Offsite Material Embankment In Place	C.Y.	86	$12.00	$1,032.00
9.04	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with	C.Y.	12	$19.00	$228.00
9.05	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	565	$3.50	$1,977.50
9.06	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	11	$150.00	$1,650.00
9.07	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
9.08	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
9.09	P-501-8.	6" PCC Pavement	S.Y.	515	$40.00	$20,600.00
9.10	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$114,000.00	$114,000.00
9.11	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$5,000.00	$5,000.00
9.12	S-5-5.	Proof Rolling	Hrs.	10	$55.00	$550.00
9.13		Hangars / Buildings Complete-in-place with Foundations	S.F.	8,805	$125.00	$1,100,625.00
					Subtotal:	**$1,253,928.50**
					20% Contingencies:	**$250,785.70**
					Total w/ Contingencies:	**$1,504,714.20**
Project 10: Zone 2 FBO and Pavement Developments						
10.01	P-152-4.	Unclassified Excavation	C.Y.	1,583	$6.00	$9,498.00
10.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	1,346	$4.00	$5,384.00
10.03	P-152-4.	Offsite Material Embankment In Place	C.Y.	792	$12.00	$9,504.00
10.04	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with	C.Y.	106	$19.00	$2,014.00
10.05	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	4,749	$3.50	$16,621.50
10.06	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	96	$150.00	$14,400.00
10.07	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
10.08	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
10.09	P-501-8.	6" PCC Pavement	S.Y.	4,749	$32.00	$151,968.00
10.10	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$475,000.00	$475,000.00
10.11	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$5,000.00	$5,000.00
10.12	S-5-5.	Proof Rolling	Hrs.	20	$55.00	$1,100.00
10.13		Remove Existing Buildings / Pavement	S.F.	16,270	$5.00	$81,350.00
10.14		Hangars / Buildings Complete-in-place with Foundations	S.F.	24,000	$185.00	$4,440,000.00
					Subtotal:	**$5,218,489.50**
					20% Contingencies:	**$1,043,697.90**
					Total w/ Contingencies:	**$6,262,187.40**

*Cost Estimates based on preliminary design estimates and are subject to change

Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 11: Zone 2 T-Hangars and Pavement Developments South of FBO						
11.01	P-152-4.	Unclassified Excavation	C.Y.	114	$6.00	$684.00
11.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	97	$4.00	$388.00
11.03	P-152-4.	Offsite Material Embankment In Place	C.Y.	57	$12.00	$684.00
11.04	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with	C.Y.	8	$19.00	$152.00
11.05	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	342	$3.50	$1,197.00
11.06	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	15	$150.00	$2,250.00
11.07	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
11.08	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
11.09	P-501-8.	6" PCC Pavement	S.Y.	342	$32.00	$10,944.00
11.10	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$231,000.00	$231,000.00
11.11	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$5,000.00	$5,000.00
11.12	S-5-5.	Proof Rolling	Hrs.	10	$55.00	$550.00
11.13		Remove Existing Buildings / Pavement	S.F.	32,539	$5.00	$162,695.00
11.14		Hangars / Buildings Complete-in-place with Foundations	S.F.	32,539	$65.00	$2,115,035.00
					Subtotal:	**$2,537,229.00**
					20% Contingencies:	**$507,445.80**
					Total w/ Contingencies:	**$3,044,674.80**

*Cost Estimates based on preliminary design estimates and are subject to change

Item No.	Spec. No.	Description	Units	Estimated Quantities	Estimated Unit Price	Subtotal
Project 12: Zone 4 Hangar and Pavement Developments						
12.01	P-152-4.	Unclassified Excavation	C.Y.	3,713	$4.50	$16,708.50
12.02	P-152-4.	Onsite Borrow Embankment In Place	C.Y.	3,156	$4.00	$12,624.00
12.03	P-152-4.	Offsite Material Embankment In Place	C.Y.	7,425	$11.00	$81,675.00
12.04	P-152-4.	Undercut and Replace Unsuitable Subgrade Material with	C.Y.	520	$19.00	$9,880.00
12.05	P-155-8.	8" Lime Stabilized Subgrade	S.Y.	23,377	$3.50	$81,819.50
12.06	P-155-8.	Hydrated Lime for Lime Stabilized Subgrade (6%)	Ton	472	$150.00	$70,800.00
12.07	P-156-5.	Rock Construction Exit	EA.	1	$1,650.00	$1,650.00
12.08	P-156-5.	Storm Water Pollution Prevention Plan (SWP3) Document	L.S.	1	$5,000.00	$5,000.00
12.09	P-501-8.	6" PCC Pavement	S.Y.	21,120	$32.00	$675,840.00
12.10	T-901-5.	Hydromulch, Seed, Lime, and Fertilizer (Slopes < 5%)	S.Y.	8,945	$0.60	$5,367.00
12.11	T-901-5.	Bonded Fiber Matrix Mulch, Seed, Lime, and Fertilizer (4'	S.Y.	1,806	$1.20	$2,167.20
12.12	T-905-5.	Strip and Stockpile Topsoil from Disturbed Areas	S.Y.	40,091	$3.00	$120,273.00
12.13	T-905-5.	Install 4" Topsoil on Disturbed Areas	S.Y.	10,750	$4.00	$43,000.00
12.14	S-1-3.	Mobilization, Insurance, Etc. (10%)	L.S.	1	$856,000.00	$856,000.00
12.15	S-3-3.	Barricades and Markings for Pavement Closures	L.S.	1	$15,000.00	$15,000.00
12.16	S-5-5.	Proof Rolling	Hrs.	43	$55.00	$2,365.00
12.17		Hangars / Buildings Complete-in-place with Foundations	S.F.	114,082	$65.00	$7,415,330.00
					Subtotal:	**$9,415,499.20**
					20% Contingencies:	**$1,883,099.84**
					Total w/ Contingencies:	**$11,298,599.04**

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