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Executive Summary

INTRODUCTION. Lancaster Regional Airport is a busy and unique facility that is in an exceptional support position driven by its proximity to a variety of transportation connections. In 2005, the Texas Department of Transportation reported that Lancaster Regional Airport generated approximately $12.9 million in total economic output[1]. At the present time, the Airport is primarily a general aviation facility with a designated role as a "reliever airport" to relieve aircraft operational congestion at the region's two main commercial passenger service airports (Dallas Love Field Airport and Dallas/Fort Worth International Airport). This is indicative of the fact that the Airport is an important element of the national airport system and an integral component of the rich transportation infrastructure for the Dallas/Fort Worth Metroplex.

An overall master planning study of airport facilities has not been completed since 2006. Since that time, aviation issues on local, regional, and national levels have changed. The comprehensive re-evaluation of these issues requires an understanding of existing and likely future aviation needs. The Airport Master Plan is intended to address a variety of concerns with the formulation of a long-range physical development plan for the Airport. The primary goal is the continued growth of the Airport in a manner that is financially realistic and that is compatible in consideration of its surroundings.

The Master Plan has been conducted under the direction of the City of Lancaster. It has been prepared to assess and direct improvements that will be necessary to accommodate future aviation needs. Like a long-term plan for any major institutional campus (e.g., a hospital or university), the long-term development program for an airport should reserve room for potentially needed facilities. However, those potential future facilities for which a site has been reserved are only constructed when actual demand occurs. Thus, the Airport Master Plan is not a decision document on whether or not an improvement will be built; it is a planning tool that indicates how the land at the Airport might best be used in consideration of anticipated future demand.

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[1] *The Economic Impact of Lancaster Airport*, 2005, Texas Department of Transportation, Economic Impact of General Aviation.

The long-term development program for Lancaster Regional Airport is intended to establish a strategy to fund airport improvements and maximize the potential to receive federal and state matching funds, while also establishing a financially prudent plan for improvement funding on a local level.

The master planning process has made use of a Study Committee to provide input concerning airport development issues to craft a vision for the Airport's future, and to provide insight with regard to Lancaster's aviation assets. During the course of the study, three Study Committee meetings were held, along with a Chartering Session (with over 60 Stakeholders), and three Public Information meeting opportunities. The purpose of the Study Committee meetings was to gather input on the operational and capital improvement issues facing the Airport and to establish a concept for future development from a broad range of interested parties. In addition, the development of the Airport Master Plan has been coordinated with airport staff, City of Lancaster staff, the Texas Department of Transportation (TxDOT) Aviation Division, and the Federal Aviation Administration (FAA).

Concerns expressed and input received from the various committees and groups during the master planning process were varied and diverse. However, recurring themes included the following:

- **The need for a runway extension to the south to meet possible future demand and ultimate design requirements.**
- **The potential need for an additional runway east of the existing runway to meet future aviation needs.**
- **The need for improved instrument approach capabilities to facilitate the accommodation of larger, more sophisticated business jet aircraft.**
- **The need to relocate the existing parallel taxiway to the west to allow larger aircraft to operate on the existing runway and meet FAA design criteria.**
- **The need for expansion of west side aviation facilities to meet future demand, and ease the ability for aircraft to circulate on the taxilane/aircraft parking apron system.**
- **The potential need for an Airport Traffic Control Tower.**
- **The need for a concept layout for expanded landside facilities on the west side of airport property.**
- **The need for infrastructure development to support industrial and transportation logistics facilities on the east side of the Airport.**
- **The need for a comprehensive approach to defining and mitigating any potential environmental issues.**
- **The need to continue to program for compatible land uses in the vicinity of the Airport.**

- **The need for a comprehensive evaluation related to the potential for significant air cargo activity at the Airport.**

Development Considerations and Assumptions

Lancaster Regional Airport will continue to be a busy general aviation reliever airport. The Airport is an important transportation facility, a center for aviation-related business; and, it supports City and regional economic development activity.

The aircraft types projected to be used at Lancaster Regional Airport, during the next 20 years, include the same types that use the Airport presently with the addition of larger, faster business jets in the future. These types include small single engine prop-aircraft, turboprop aircraft, and larger business-use jet aircraft (as large as the Gulfstream V and the Boeing Business Jet). The number of annual aircraft operations (landings and takeoffs) at the Airport is forecast to increase modestly during the next 20 years. The total number of aircraft operations is forecast to increase from 49,550 (currently) to approximately 66,350 by 2030. The number of based aircraft at the Airport is expected to increase from the current number of approximately 165 to 221 by the end of the planning period.

In concert with the historical and predicted future status of Lancaster Regional Airport, some basic assumptions, which are intended to direct the future development, have been established. The aviation activity forecasts and the various considerations on which the forecasts have been based upon support these assumptions.

Assumption One. The Airport will be developed and operated in a manner that is consistent with local ordinances and codes, federal and state statutes, federal grant assurances, and Federal Aviation Administration (FAA) regulations.

Assumption Two. This assumption recognizes the role of the Airport. The Airport will continue to serve as a facility that primarily accommodates general aviation activity, with a special focus on increased use by business jet aircraft. In addition, it is recognized that there is potential for cargo activity at the Airport, which was taken into consideration as the Airport's development program was finalized. Scheduled passenger service activity does not occur at the Airport presently and is not anticipated in the future.

Assumption Three. This assumption relates to the size and type of aircraft that utilize the Airport and the resulting setback and safety criteria used as the basis for the layout of airport facilities. The largest aircraft using the Airport on a regular basis are business jets such as the Canadair CL-600 (currently based at the Airport), the Gulfstream IV, and the Cessna Citation X. Runway 13/31 is currently designated to accommodate Airport Reference Code (ARC) C-II aircraft (e.g., the Canadair CL-600). The design requirements for ARC C-II and D-II are essentially the same; therefore, the existing Airport Reference Code for the Airport has been identified as ARC C/D-II.

Assumption Four. The fourth assumption relates to the need for the Airport to accommodate aircraft operations with great reliability and safety. This indicates that the Airport's runway system should be developed with instrument approach guidance capabilities, adequate runway length, and adequate crosswind coverage to accommodate the forecast aircraft operations safely and efficiently under most weather conditions.

- **In consideration of the ARC C/D-II criteria used for Runway 13/31, its programmed length (6,500 feet) should be considered as the minimum length necessary to accommodate the forecast aircraft fleet. Depending on the community's view of the Airport's future, reservation of space for a longer runway may be important.**
- **Improved instrument approach capabilities to both ends of the existing runway should be considered (with the examination of the Metroplex airspace).**

Assumption Five. Available sites for the construction of additional landside facilities on the west side of the runway at Lancaster Regional Airport are limited. The fifth assumption recognizes the importance of understanding the development potential for aviation-use facilities on the east side of the runway.

Assumption Six. Economic development in the vicinity of Lancaster, including the ongoing activity related to the logistics hub initiatives, is significant. The Airport's future role will include continued growth as a center for business-related aviation activity.

Assumption Seven. This assumption focuses on the relationship of the Airport to off-airport land uses and the compatible and complementary development of each. This is inherent in the design considerations and placement of facilities so as to complement, to the maximum extent possible, off-airport development, and to ensure the continued compatibility of the airport environs with the operation of the Airport.

Development Recommendations

Following an examination of several alternatives, along with input received from the Study Committee, the public, City staff, and TxDOT, a recommended long-term development plan was formulated and is summarized below. It is also graphically depicted at the end of this *Executive Summary* in a figure entitled *CONCEPTUAL DEVELOPMENT PLAN*.

- **Runway 13/31.** The runway is currently programmed for a 1,500-foot extension to the south for a total runway length of 6,500 feet (construction is anticipated for completion in 2010[2]). Ultimately, room is reserved for Runway 31 to be extended an additional 1,500 feet to the south, providing a total runway length of 8,000 feet. An ultimate extension to the south will also require the relocation of Ferris Road. Runway 13 is proposed to be upgraded to non-precision instrument approach capabilities of not lower than ¾-mile visibility minimums. Runway 31 will be programmed to be upgraded with a precision instrument approach with ½-mile visibility minimums [this approach improvement will likely be implemented with a Localizer Performance with Vertical Guidance (LPV) or other Global Positioning System (GPS) Technologies]. The Airport Reference Code will be upgraded to ARC C/D-III [an airport designed to regularly accommodate aircraft as large as the Gulfstream V or Boeing Business Jet (Boeing 737)].

- **Taxiway System.** Taxiway "A" will be extended 1,500 feet to the south, located 400 feet west of the runway centerline in conjunction with the currently programmed 1,500-foot runway extension. The existing Taxiway "A" is programmed to be relocated 400 feet west of the runway centerline. In conjunction with the ultimate Runway 31 extension, Taxiway "A" is programmed for an additional 1,500-foot extension to the south. A full-length parallel taxiway is proposed for the east side of the runway.

- **Aircraft Parking.** An appropriate taxiway/taxilane/aircraft parking apron layout for the Westside Development Area is programmed to maximize the ability to efficiently support future hangar development.

- **Aviation-Use Facilities.** Aviation-use facilities required for aircraft operation, storage, maintenance, and safety will occupy the majority of airport property on the west side. Aviation forecasts indicate that areas should be reserved for the storage of approximately 56 additional based aircraft. For the short-term, future facilities should be developed in the existing general aviation development area (Westside Development Area). In order to maximize the future aviation-use facility development potential for the west side of the Airport, it is recommended that approximately 14 acres of land be acquired in the area south of the existing general aviation development area. As demand for larger aviation-use facilities or mixed-use facilities increase, the east side of the Airport may be the preferred location. Because of the timing and scope of the demand for these "larger" aviation-use facilities, there is no recommendation for near-term land acquisition on the east side of the Airport.

- **Terminal Facilities.** The existing terminal facilities at the Airport are appropriately located on the west side of the Airport; however, a more progressive terminal facility is essential for the anticipated growth in business aviation operations. It is recommended that space be reserved to the south of the existing general aviation development area for the construction of a new terminal building when needed in the future.

- **Airport Traffic Control Tower.** A potential site for a future Airport Traffic Control Tower (ATCT) facility has been identified on the west side of airport property.

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[2] At the time of this report's publication, construction for the runway extension was complete.

Development Program

In overview, the Development Program for Lancaster Regional Airport calls for the retention of the Airport's basic layout of facilities. As described above, major airside improvements are related to the extension of Runway 13/31, the re-alignment and enhancement of the taxiway system, and the expansion of the aircraft parking apron. Other major improvement recommendations are related to the layout of aviation-use facility development areas.

During the initial development phase (the first five years of the 20-year planning period), when detailed Capital Improvement Program (CIP) project needs can best be identified, specific improvements include:

- **Relocate/construct the west side parallel taxiway system 400 feet west of the runway.**
- **Acquire land on the west side of airport property for future general aviation development.**
- **Construct a new terminal building and associated auto parking/entrance road.**
- **Rehabilitate and strengthen existing pavement on the west side aircraft ramp.**
- **Construct/expand the west side aircraft ramp.**
- **Construct general aviation hangars, access taxilanes/taxiways, and parking aprons.**
- **Construct an Airport Traffic Control Tower facility.**
- **Instrument approach improvements.**

Potential Funding Sources

Funding sources for the CIP depend on many factors, including project eligibility for state/federal matching funds, the ultimate type and use of facilities to be developed, the debt capacity of the Airport Sponsor (City of Lancaster), the availability of other financing sources, and the priorities for scheduling project completion. For planning purposes, assumptions (which are identified in the CIP) were made relating to the likely funding source of each capital improvement.

Potential funding sources for any proposed improvements might be found at a variety of agencies, both federal and state. Many of the available funds come in the form of grants, should the project meet eligibility requirements, while additional financing options are available in the form of general obligation or subsidized bonds (i.e., debt). The following is a summarized list of potential funding sources identified for airport improvement projects:

- **Airport Improvement Program (AIP).** The AIP provides FAA grants to public agencies for the planning and development of public-use airports. Because Texas participates in the State Block Grant Program, TxDOT is responsible for administering all FAA funds slated for general aviation (GA) and reliever airports within Texas. TxDOT AIP funds include:

- **Non-primary entitlement funds**
- **Discretionary funds**

- **Texas Department of Transportation.** TxDOT aviation grant programs are used to allocate funds for GA and reliever airports in the State of Texas. The TxDOT Aviation Division is responsible for dispersion of these aviation funds, which are administered by the FAA AIP and Texas Aviation Facilities Development Program. Available TxDOT grants include:
  - **Capital Improvement Projects (CIP) Grant Program**
  - **Routine Airport Maintenance Program (RAMP) Grant**
  - **Terminal Building Program (TBP)**
  - **Airport Traffic Control Tower (ATCT) Program**

- **Federal Economic Development Agency (EDA) Grants.** Federal EDA grants are typically tied to job creation or projects that increase a region's economic and business competitiveness. Potential EDA grants for airport projects include:
  - **CFDA (Catalog of Federal Domestic Assistance) 11.300 Public Works and Economic Development Program**
  - **CFDA 11.307 Economic Adjustment Assistance Program**

- **Lancaster Department of Economic Development.** The Lancaster Department of Economic Development is the primary agency that assists with new business development, the coordinating of economic assistance, and incentive arrangements for the business community seeking to expand, establish, or relocate commercial operations to Lancaster. ,Depending upon the creation of new jobs meeting the predetermined threshold and location of taxable infrastructure, airport projects that typically qualify for local EDA assistance include:
  - **Construction or relocation of a corporate aviation operation**
  - **Aircraft maintenance facility**
  - **Landside commercial development**

- **Bonds.** Bonds, or debt securities, are common in the U.S. airport system and are responsible for funding large portions of improvement projects. Types of bonds that can be issued by public authorities, credit institutions, companies, and supranational institutions in the primary markets include the following:
  - **Airport or Municipal Bond**
  - **American Recovery & Reinvestment Act (ARRA) Recovery Zone Facility (RZF) Bonds**
  - **ARRA Recovery Zone Economic Development (RZED) Bonds**

- **Other Funds.** Funding for an airport is not necessarily limited to grant and bond sources. Additional sources for the required capital can be used, at the discretion of the municipality, to finance the project either in whole, or in conjunction with other sources of funds. Other potential funding sources for airport improvements include:
  - **City funds**
  - **Airport land sales**
  - **Federal earmarks**

- Private financing
- Airport revenue

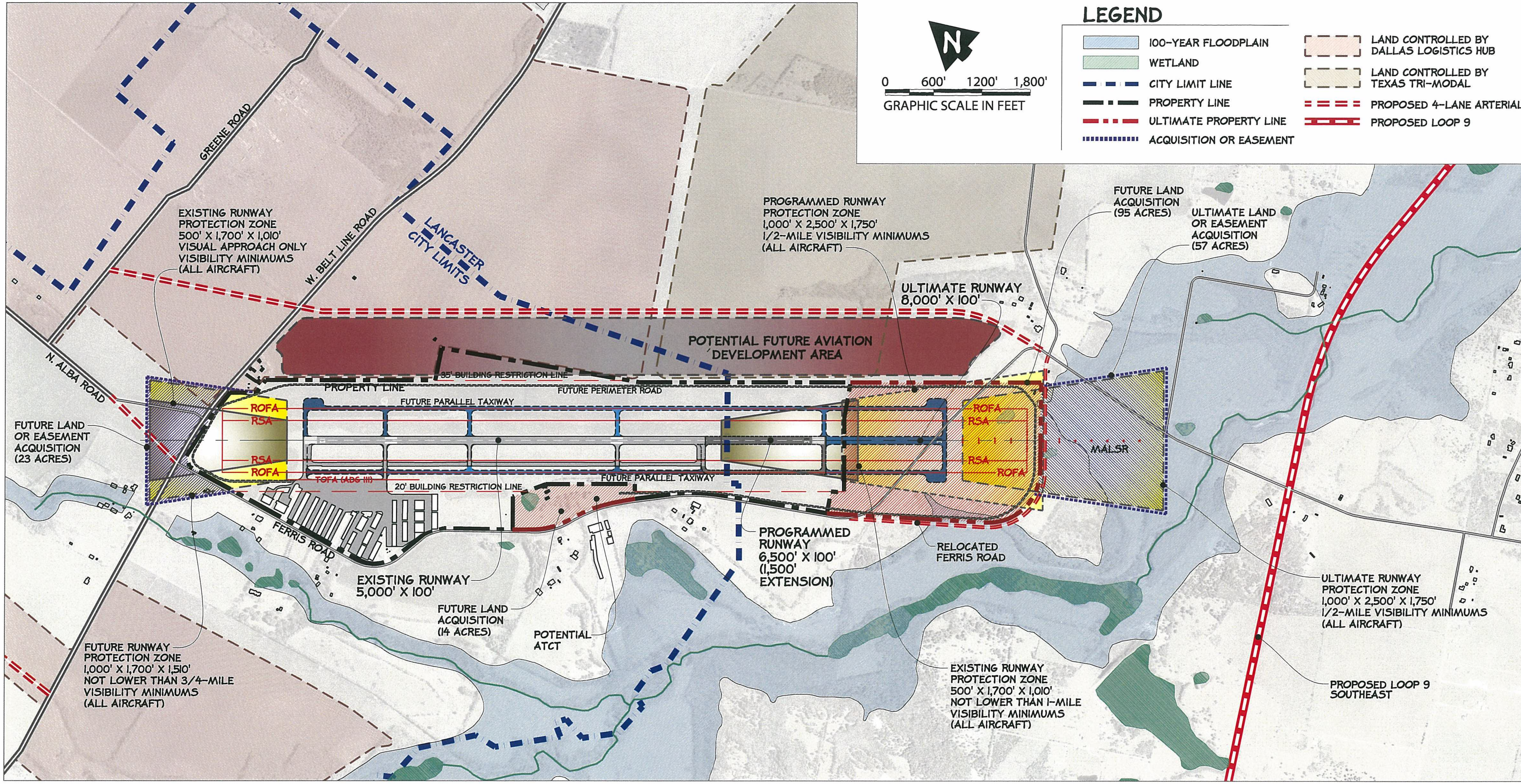
Financial Analysis

At many airports, including Lancaster Regional Airport, generating the necessary cash flow to balance the operations and maintenance, and generation of money to adequately fund capital costs associated with the operation of an airport, can be challenging. The Master Plan's financial analysis identified if, and to what extent, Lancaster Regional Airport will be able to contribute funds to satisfy the local match requirements of a project grant. Lancaster Regional Airport's calculated net revenue potential is based on current and projected operations and facilities (i.e., revenue sources), along with the planned revenue-generating improvements. The financial analysis compares projected revenue derived from the improvements versus the anticipated expenses associated with the improvements.

Projects listed in the CIP with potential to increase airport revenue over the planning period include the construction of a new terminal building, along with ground lease revenue associated with the private development of additional GA hangar facilities. Based on the scheduled completion of all revenue-producing elements listed in the CIP, the projections indicate that the Airport will break-even in 2024 and begin generating surplus revenue thereafter. These findings suggest that, until the end of the planning period, the Airport will have somewhat limited capacity to fund substantial improvements with airport-generated revenue; therefore, the funding of improvements should continue to be viewed with an eye toward the anticipated economic benefit for Lancaster and the region. This will have implications with regard to potential funding sources.

Summary

The development plan for the Airport is a comprehensive proposal. If aviation demand continues to indicate that improvements are needed, and, if the proposed improvements prove to be environmentally acceptable, the capital improvement financial implications discussed in the Master Plan are likely to be acceptable for TxDOT, the FAA, and the City of Lancaster. However, it must be recognized that this is only a programming analysis and not a commitment on the part of the Airport Sponsor, TxDOT, or the FAA. If the cost implications associated with an improvement project are not financially viable, its implementation will not be pursued.



Conceptual Development Plan

Airport Reference Code C/D III (Includes Very Large Business Jets)
General Aviation Airport with Significant Business Use
Programmed for Ultimate Runway Length of 8,000 Feet

Sources: City of Lancaster Master Thoroughfare Plan; Dallas Logisitics Hub Site Plan; Texas Tri-Modal Master Plan; FEMA, Dallas County 100-Year Floodplain.

A Inventory

INTRODUCTION. Lancaster Regional Airport [also known by its Federal Aviation Administration (FAA) identifier – KLNC], is owned and operated by the City of Lancaster and is located in north-central Texas within the Dallas/Fort Worth Metroplex. Lancaster Regional Airport is a busy and unique facility that is in an exceptional support position driven by its proximity to a variety of transportation connections. The Airport is an important element of the national airport system and an integral component of the rich transportation infrastructure for the Metroplex.

At the present time, the Airport is primarily used as a reliever airport to relieve congestion to Dallas Love Field Airport and Dallas/Fort Worth International Airport. The 2002 Texas Airport System Plan Update also designated Lancaster Regional Airport as a "Transport Reliever".

Lancaster Regional Airport is an excellent aviation facility and, along with the aviation-related businesses and facilities, represents a vital and significant economic asset to the region. Additionally, the Airport provides benefits to local businesses and industry, and encourages regional economic development and expansion.

The most recent master planning study for Lancaster Regional Airport was completed in 2006 with the *Airport Master Plan Update*. Since that time, aviation issues on the local, regional, and national levels have changed. This 2009 Airport Master Plan is intended to provide a comprehensive evaluation of the Airport and result in a well-conceived, long-term facilities plan for accommodating the anticipated future aviation demand. The future requirements will be evaluated from the standpoint of aviation needs, and from the perspective of the relationship of airport facilities to the surrounding land uses and the community as a whole. This planning document will focus on development strategies for a complete and comprehensive aviation facility, with the overall goal being an airport that can accommodate future demand and that is compatible with its surroundings.

This initial *Inventory* chapter examines three basic elements of the Airport, which are physical facilities (runways, taxiways, aircraft parking aprons, hangars, ground access, etc.); the relationship to the airport/airspace system; and, the airport environs (surrounding land uses, zoning patterns, and development in relation to the Airport). Subsequent chapters of the Master Plan detail the existing number of aircraft operations conducted and the number of based aircraft at the Airport, in addition to a forecast of future aviation activity, along with an evaluation of the existing facilities' ability to safely and efficiently meet the projected demand. Additionally, alternatives will be formulated in later chapters to examine the options for provision of facilities to meet the demand and a preferred future development plan will be recommended. Further, an implementation schedule is provided, along with improvement project cost estimates and an overview of potential environmental impacts.

Airport Role and Facilities

The Airport is owned and operated by the City of Lancaster, which has overall responsibility for the operation of the Airport on a daily basis. Airport operations are monitored by a five-member Airport Advisory Board, which makes recommendations to the Lancaster City Council. The Airport is classified as a reliever airport by the FAA's National Plan of Integrated Airport Systems (NPIAS). As illustrated in Figure A1, AIRPORT LOCATION MAP, Lancaster Regional Airport is located within Dallas County and is situated in north-central Texas. Most of the Airport is located within the city limits of the City of Lancaster (as shown in Figure A2, entitled AIRPORT VICINITY MAP), and is approximately two miles southeast of the Lancaster Central Business District (CBD). Lancaster is located approximately 13 miles south of the Dallas, Texas Central Business District (CBD), approximately 34 miles southeast of Fort Worth, Texas; 88 miles west/northwest of Tyler, Texas; and, approximately 170 miles northeast of Austin, Texas.

- **Airport Reference Point (ARP):** Latitude 32° 34′ 45.08″N, Longitude 096° 43′ 58.40″W.
- **Federal Aviation Administration (FAA) Site Number:** 24189.A.
- **National Plan of Integrated Airport Systems (NPIAS) Number:** 48-0300.
- **National Plan of Integrated Airport Systems (NPIAS) Classification:** Reliever.
- **Acreage:** 306 acres.
- **Elevation:** 501 feet above mean sea level (AMSL).
- **Average Maximum Temperature of the Hottest Month:** 96°F (July/August).

Airside Facilities

Runway System. An illustration of airport facilities is included in the following figure entitled *EXISTING AIRPORT LAYOUT*. The Airport has one runway:

Runway 13/31.

- **Length and Width:** 5,000 feet by 100 feet. (Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010[3].)
- **Pavement:** Asphalt. The runway has a gross weight bearing capacity of 20,000 pounds single wheel and 40,000 dual-wheel main landing gear configurations.
- **Lighting and Marking:** Medium Intensity Runway Lights (MIRL) and standard non-precision runway markings. The runway will be upgraded to precision runway markings following the runway extension.
- **Visual and Electronic Landing Aids:** Visual landing aids include two-light Precision Approach Path Indictors (PAPI) on both runway ends. Runway 31 has Runway End Identifier Lights (REIL).

Taxiway System. Several taxiways provide access from the runway to the terminal area and aviation facilities. Taxiway "A" is a full-parallel taxiway located 300 feet west of the runway (runway centerline to taxiway centerline), providing access to Runway 13/31. Taxiway "A" is 49 feet wide between Taxiways "B" and "C", 46 feet wide between Taxiways "C" and "E", and 41 feet wide between Taxiways "E" and "F". Taxiway "B" is a connector taxiway that connects the approach end of Runway 13 to the north end of the aircraft parking apron. Taxiway "B" is 100 feet wide from Taxiway "A" to the Runway 13 threshold and, from Taxiway "A" to the edge of the apron, it is 40 feet wide. Taxiway "C" is a 40-foot wide connecter taxiway, providing access from the runway to the south end of the apron. Taxiway "E" is a 40-foot wide connector taxiway providing access to the south end of the runway via Taxiway "A", and is located between Taxiways "D" and "F". Taxiway "F" is located at the Runway 31 end, providing access to Taxiway "A". Taxiway "F" is 100 feet wide.

[3] At the time of this report's publication, construction for the runway extension was complete.

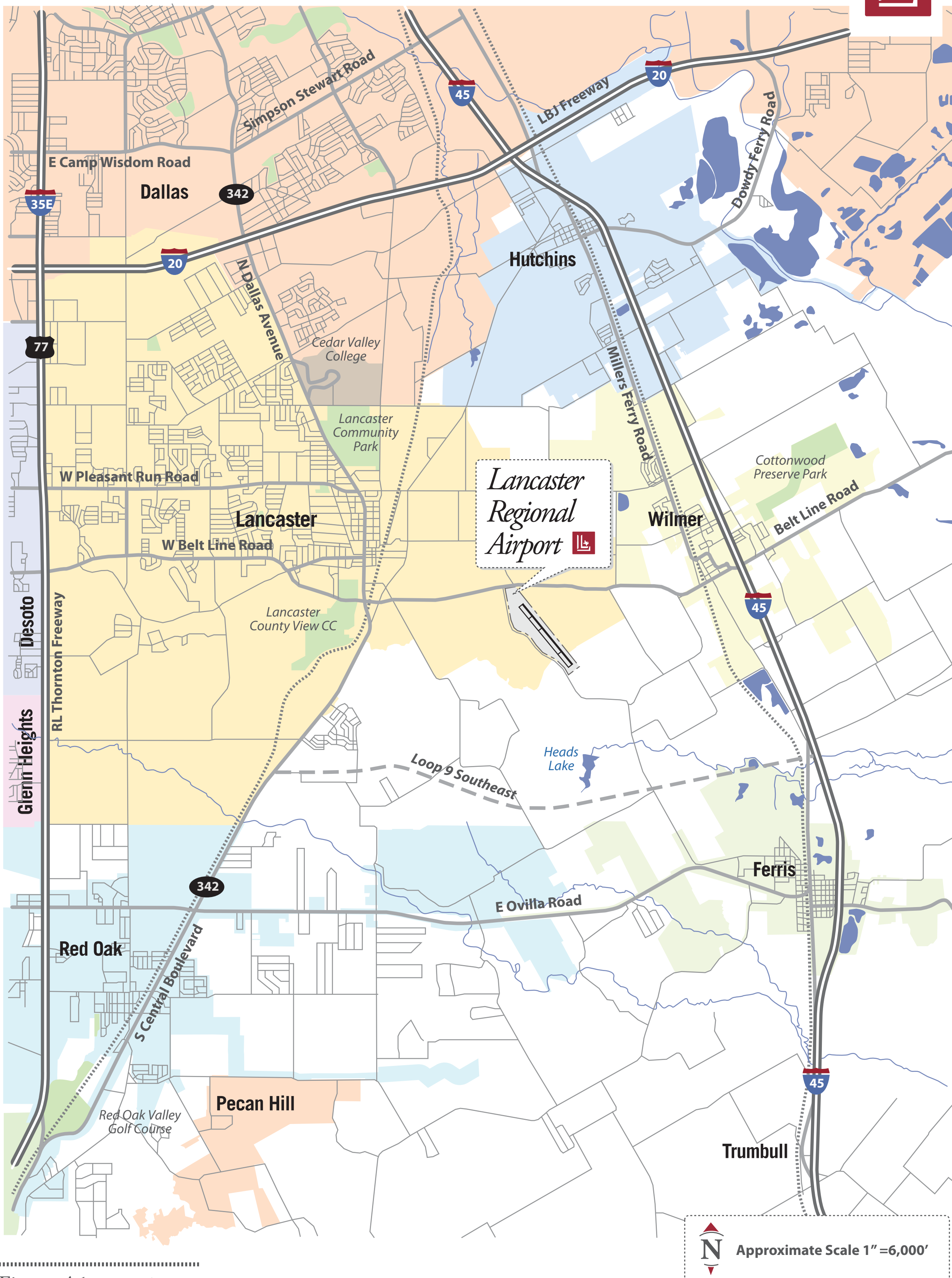


Figure A1 **Location Map**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus.

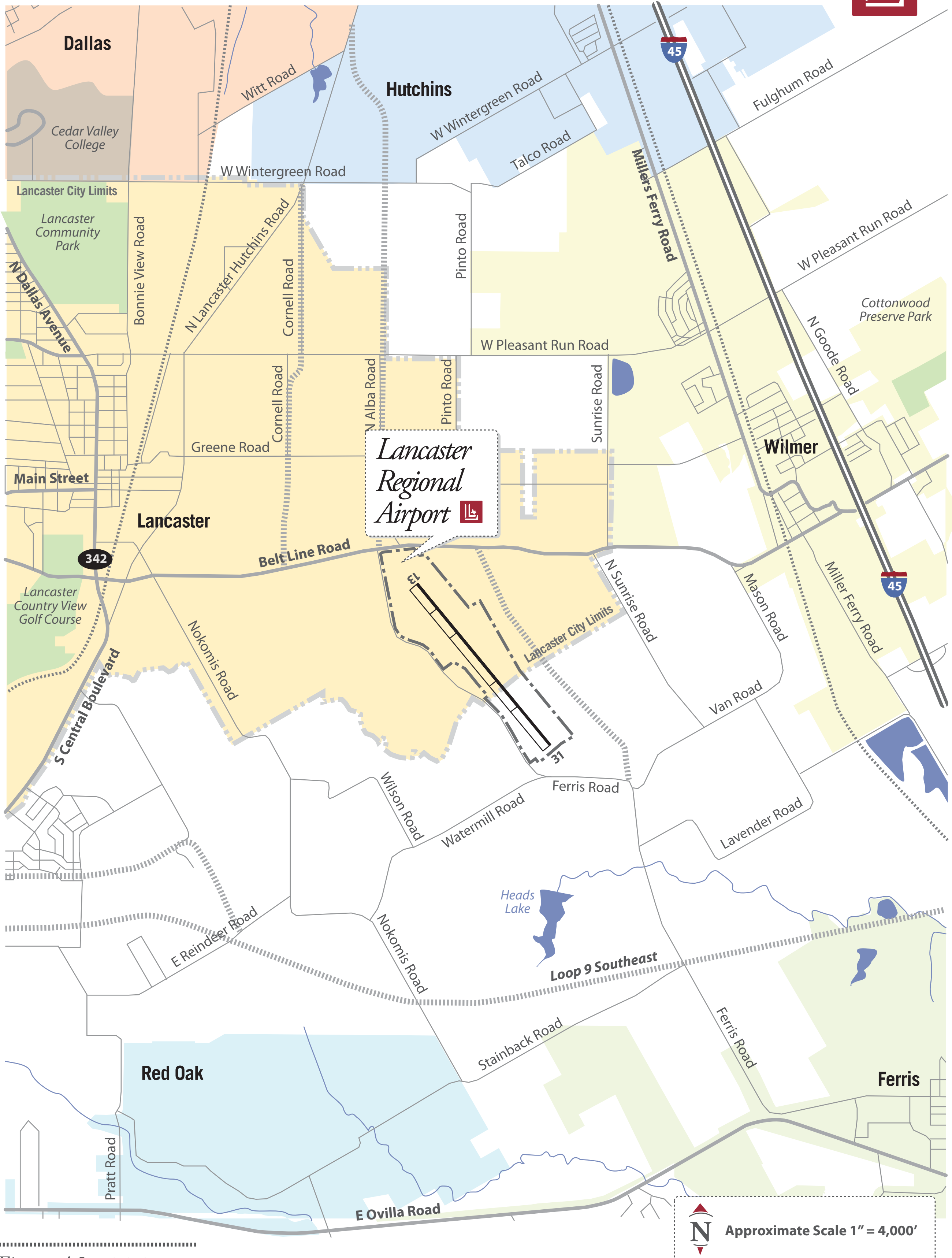


Figure A2 **Vicinity Map**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus.

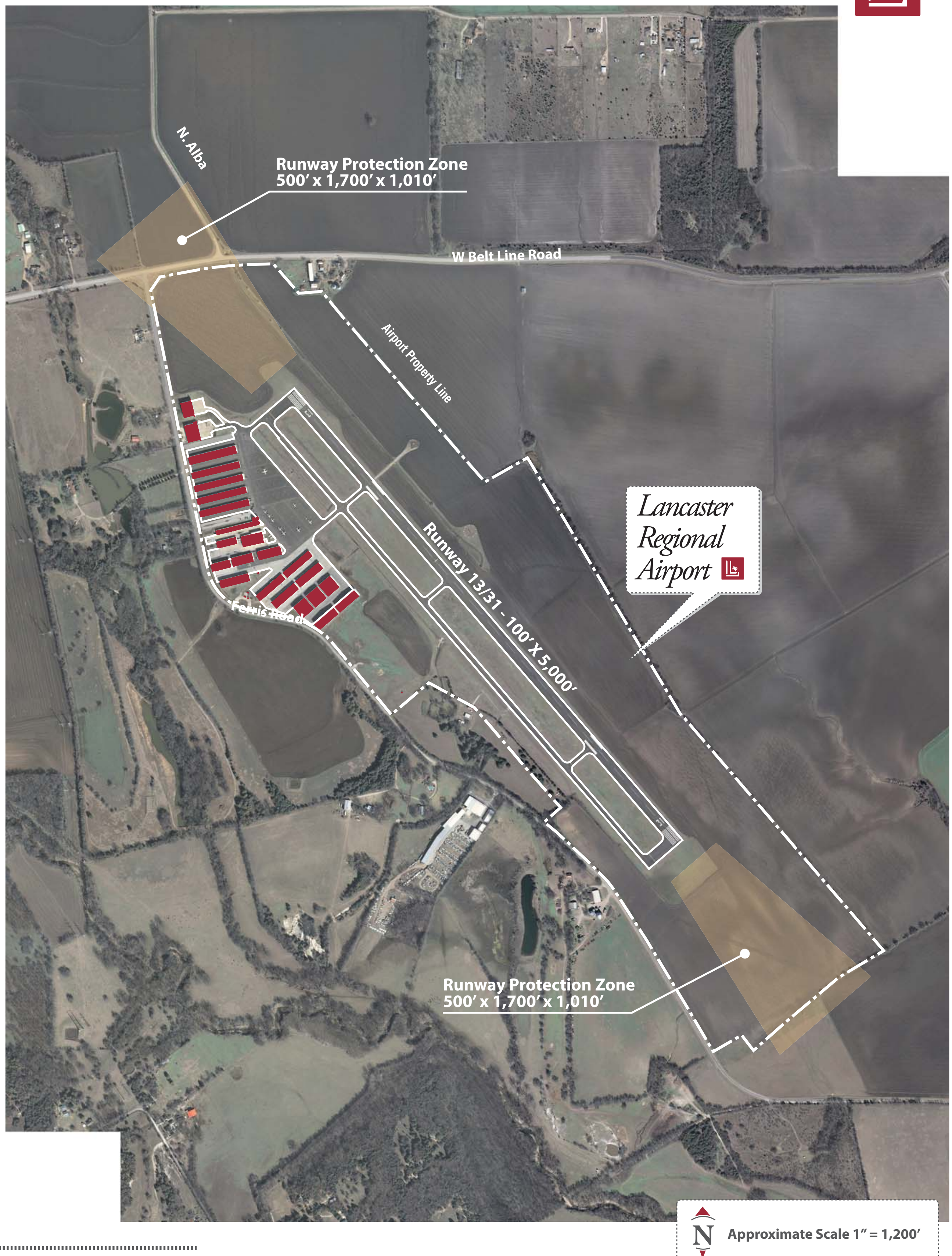


Figure A3 **Existing Airport Layout**

Source: Airport Layout Drawing, GRW Willis Inc., July 2005. Aerial, North Central Council of Government, 2007.

Note: Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010. At the time of this report's publication, the construction for the runway extension was complete.

Instrument Approach and Capabilities. There are presently two published public-use instrument approach procedures at Lancaster Regional Airport. The instrument approach procedures are presented in the following table entitled *INSTRUMENT APPROACH PROCEDURES*. In addition, regional airspace considerations are illustrated in the following illustration entitled *AIRSPACE/NAVAIDS SUMMARY*.

Due to the Airport's close proximity to Dallas Love Field and Dallas/Fort Worth International Airports, lying northwest and west/northwest of KLNC, respectively, Runway 31 has take-off minimums with climb gradients and only one departure procedure. The departure procedure requires a 1,900-foot climb on a heading of 314° before turning left. The take-off minimums require a standard minimum climb of 222 feet per nautical mile to 800 feet.

Table A1 **INSTRUMENT APPROACH PROCEDURES**

Type of Approach	Runway Designation	Ceiling Minimum	Visibility Minimum
RNAV (GPS)	31	258' AGL	1-Mile
NDB	31	588' AGL	1-Mile

Source: U.S. Terminal Procedures, South-Central (SC), Volume 2, April 9, 2009-May 7, 2009.

Note: For Categories A and B aircraft only. Not applicable for Categories C and D aircraft.

Landside Facilities

Aprons. The Airport has one public aircraft parking apron, which is located approximately 492 feet west of the runway centerline. The apron provides approximately 37,500 square feet of aircraft parking and movement space, and is paved with asphalt. The aircraft parking apron provides for a total of 75 tie-downs that are not designated for based or itinerant aircraft, and 10 tie-downs are occupied by based aircraft.

Fixed Base Operator (FBO)/Terminal Building. The City of Lancaster (COL) operates the airport FBO and is the only FBO on the Airport. The FBO offices are located within the FBO/terminal building, located on the aircraft parking apron, near the center of the hangar development area. The FBO facilities consist of several large aircraft storage and maintenance hangars. The terminal building is open for business seven days a week, from 7:00 a.m. to 7:00 p.m. Lancaster Regional Airport also provides aircraft parking and pilot supplies. Additionally, several other airport tenants located on and off the Airport provide a variety of aviation-related services. The following table summarizes the services provided by other significant/supporting businesses located on the Airport.

Table A2 **ADDITIONAL AIRPORT SERVICES**

Airport Business	Services Provided
Air Salvage of Dallas, Inc.[1]	Aircraft salvage Airframe/parts/engine sales Aircraft retrieval Accident investigation Damaged aircraft storage Engine testing Problem aircraft purchase/sales
Beacon Aircraft Interiors	Aircraft interior repair/replacement
Cold War Air Museum	Former Soviet Bloc aircraft display
Commemorative Air Force	U.S. Military World War II aircraft
Cross Country Aviation	Aircraft repair
ENPARTS	Aircraft parts
The Runway Café	Restaurant
Select Aircraft Services	Aircraft accessory repair/overhaul

Sources: Lancaster Regional Airport, www.airnav.com. [1] Located off airport property, southwest of the Airport off Ferris Road.

Hangar Facilities. The general aviation aircraft storage hangar areas at the Airport are located north, southwest, and south of the FBO/terminal building. There are three 20-unit T-hangars, one 18-unit, and one 14-unit T-hangar located north of the terminal building. Additionally, the Commemorative Air Force (CAF) owns one box hangar, and the Cold War Air Museum also owns three box hangars. Seven private hangars are located to the west/southwest of the terminal building, and five additional private hangars are located on the southern end of the apron. Four 10-unit T-hangars are located in between the terminal building and the southern end of the apron, for a total of nine T-hangar facilities (private and City owned) and 12 private box hangar facilities. Hangar facilities on the north side of the apron have airside access via Taxiway "B", and hangar facilities west/southwest and south of the terminal building have airside access via Taxiway "C". Landside access to hangar facilities is provided via Ferris Road to the west of the Airport. There is also ample space to expand taxilanes and hangar facilities within the existing development area, as well as airport property east of Runway 13/31.

Utility and Other Facilities. Major utilities at the Airport include electricity, water, and sewer service. A lighting vault is located next to the rotating beacon, southwest of the terminal building. Additional infrastructure information is provided in a following section of this chapter.

Fuel Storage Facilities. Aviation fuel is presently stored in three tanks located southwest of the terminal building, adjacent to the rotating beacon. Capacity of these facilities consists of two 10,000-gallon 100LL AVGAS underground storage tanks and a 10,000-gallon Jet-A underground storage tank. All tanks comply with all federal, state, and local regulations. The City of Lancaster owns all of the storage tanks and maintains and sells the fuel using two fuel trucks. One fuel dispensing truck has a capacity of 1,000 gallons for 100LL AVGAS and the other has a capacity of 2,600 gallons for Jet-A.

Aircraft Rescue and Fire Fighting (ARFF) Facility. The Airport does not presently have an Aircraft Rescue and Fire Fighting (ARFF) facility on the field; however, fire protection services for the Airport are provided by the Lancaster Fire Department from the fire station located in downtown Lancaster.

Automated Weather Observing System (AWOS). The Airport is served by an Automated Weather Observing System (AWOS) III, which is located 495 feet east of the runway centerline, and is approximately 1,005 feet south of the Runway 13 threshold. This facility measures the following weather parameters: temperature, altimeter setting, dew point, density altitude, wind speed, wind gust, wind direction, variable wind direction, visibility, variable visibility, day/night, precipitation, sky condition, and cloud height. The AWOS III provides a minute-by-minute update to airborne pilots via VHF radio frequency. The radio frequency for the Lancaster Regional Airport AWOS III is 118.975 MHz and its land line telephone number is 972-227-0471.

Aviatour Flight School. The Aviatour Flight School offers flight instruction at Lancaster Regional Airport. The Aviatour Flight School is located on the second floor of the terminal building. Flight School Aircraft are stored in a hangar located on the south end of the apron.

Vehicular Access and Parking. Lancaster Regional Airport is accessed via Ferris Road from the west. Ferris Road is connected to the north by Belt Line Road, which runs east and west, and provides access to Interstate 45 to the east and South Dallas Avenue to the west. Additionally, Belt Line Road continues west past South Dallas Avenue and connects with Interstate 35E/U.S. Highway 77. Ferris Road continues south of the Airport and connects to East Ovilla Road, which also runs east and west, providing access to Interstate 45 and South Dallas Avenue. The vehicle parking area serving the terminal building is located immediately northwest of the terminal. The parking area is accessed via Ferris Road.

Non-Transportation Infrastructure Inventory

Lancaster Regional Airport is serviced by most essentially utilities, including: water, sanitary sewer, electric, and telecommunication lines. These utilities are connected to the terminal building and all other major facilities/businesses on the Airport. The Airport is not currently serviced by any natural gas service facilities or infrastructure. Utility service providers include Encore Energy (electricity); AT&T (telephone); and, City of Lancaster (water and sewer).

There is one primary electrical line that serves the Airport. It is located along Ferris Road on the Airport's east side. From that primary line stems one secondary line that connects to three service lines. These service lines connect both the primary and secondary lines to all of the Airport's facilities that require electrical power.
The Airport's telephone cables also originate from alongside Ferris Road. There are three high-wire overhead cables that feed seven secondary cables. These secondary cables lead directly to the various on-airport facilities.

Water service is provided from a 12-inch main that is located under Ferris Road. Sanitary sewer service is fed from a 15-inch main that is then reduced to eight inches upon entering the Airport. Figure A4, *UTILITIES INFRASTRUCTURE MAP*, depicts the locations of the water, sewer, and electric lines serving the Airport and its adjacent areas.

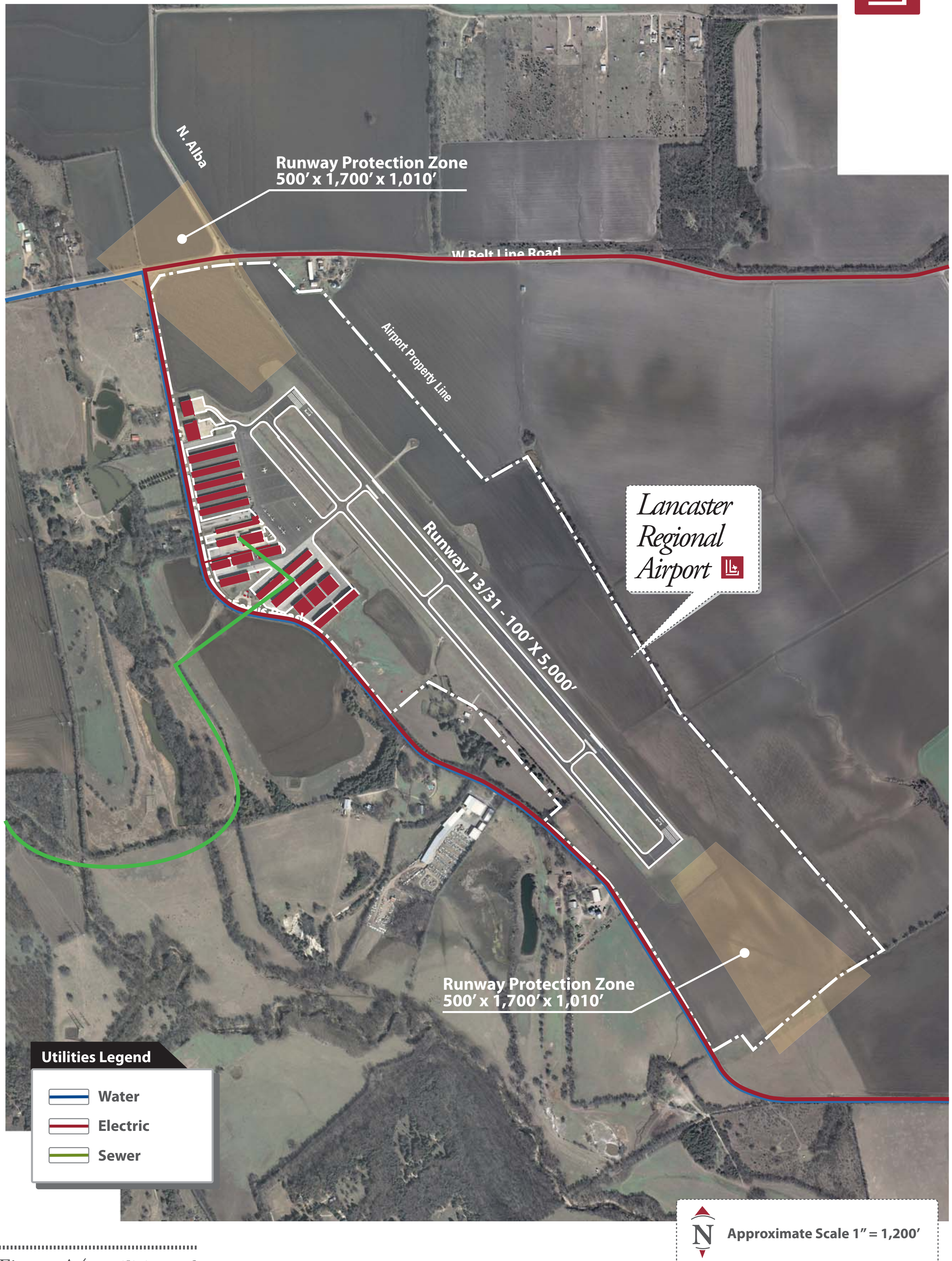


Figure A4 **Utilities Infrastructure Map**

Source: Airport Layout Drawing, GRW Willis Inc., July 2005. Aerial, North Central Council of Government, 2007.

Note: Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010. At the time of this report's publication, the construction for the runway extension was complete.

Airspace System/Navigation and Communication Aids

As with all airports, Lancaster Regional Airport functions within the local, regional, and national system of airports and airspace. The following narrative gives a brief description of the Airport's role as an element within these systems.

Air Traffic Service Areas and Aviation Communications

Within the continental United States, there are some 22 geographic areas that are under Air Traffic Control (ATC) jurisdiction. Air traffic controllers in Air Route Traffic Control Centers (ARTCC) provide air traffic services within each area. Lancaster Regional Airport is contained within the Fort Worth ARTCC service area, which includes the airspace in portions of Texas, Oklahoma, New Mexico, Arkansas, and Louisiana. The Airport is equipped with an Aeronautical Advisory Station (UNICOM) and Common Traffic Advisory Frequency (CTAF) on frequency 122.7 MHz.

Airspace and NAVAIDS Analysis

Navigational aids (NAVAIDS) are ground based instruments providing navigation readings to pilots in appropriately equipped aircraft. The primary navigational aid available for use by pilots in the vicinity of Lancaster Regional Airport is the Lancaster non-directional beacon (NDB) (239 LNC), which is located west of the runway, south of the apron area. NDBs are general purpose low- or medium-frequency radio beacons that an aircraft equipped with a loop antenna can home in on or determine its bearing relative to the sending facility.

Lancaster Regional Airport is located within the Dallas/Fort Worth terminal area airspace. Local controlled airspace surrounding the Airport is designated as Class B with floor established at 4,000 feet mean sea level (MSL). Class B airspace aids in the protection of airspace from non-participating aircraft, allowing the Airport to operate as a Visual Flight Rules (VFR) general aviation airport without significant interaction with the terminal area airspace restriction. Since Lancaster Regional Airport is uncontrolled (no local airport traffic control tower), pilots are required to contact the Class B controller after departure and maintain contact with the controller if entering Class B airspace. The following illustration, entitled *AIRSPACE/NAVAIDS SUMMARY*, depicts the Airport, local airspace, and navigational facilities in the vicinity of Lancaster Regional Airport.

Figure A5 **Airspace/NAVAIDS Summary**

Source: Dallas-Fort Worth Sectional Aeronautical Chart, 78th Edition, March 2007.

Airports Inventory

An airport service area evaluation has been prepared, which identifies key surrounding airports relative to Lancaster Regional Airport, and assesses their existing role, airside facilities/services, and operational data. Fifteen airports [Addison Airport, Dallas Executive Airport, Dallas Love Field Airport, Grand Prairie Municipal Airport, Dallas/Fort Worth International Airport, Fort Worth Meacham International Airport, Northwest Regional Airport (Roanoke), Fort Worth Alliance Airport, Denton Municipal Airport, Arlington Municipal Airport, Fort Worth Spinks Airport, Ennis Municipal Airport, Mid-Way Regional Airport, Mesquite Metro Airport, and Rockwall Municipal Airport] have been identified for analysis in the following figure entitled *METROPOLITAN AIRPORTS VICINITY MAP*. The following table, entitled *METROPOLITAN AIRPORTS INVENTORY*, summarizes and compares the information compiled for the nine surrounding airports with the existing data for Lancaster Regional Airport. This information will be utilized to assess the varying degrees of influence that surrounding airports have on Lancaster Regional Airport's demand for aviation-related services.

Table A3 **METROPOLITAN AIRPORTS INVENTORY**

Airport Name/ (FAA Identifier)	City	Distance to LNC	Aircraft Storage	Total Based Aircraft	Approximate Annual Operations	ATCT	Instrument Approach
Lancaster Regional Airport (LNC)	Lancaster	---	Hangars Tie-downs	166	45,097[1]	No	Yes
Addison Airport (ADS)	Dallas	24 NMs N	Hangars Tie-downs	563	131,833[1]	Yes	Yes
Dallas Executive Airport (RBD)	Dallas	10 NMs NW	Hangars Tie-downs	185	144,083[1]	Yes	Yes
Dallas Love Field Airport (DAL)	Dallas	17 NMs NW	Hangars Tie-downs	740	247,334[1]	Yes	Yes
Grand Prairie Municipal Airport (GPM)	Grand Prairie	18 NMs NW	Hangars Tie-downs	199	87,805[1]	Yes	Yes
Dallas/Fort Worth International Airport (DFW)	Dallas	25 NMs NW	Tie-downs	0	689,363[1]	Yes	Yes
Fort Worth Meacham International Airport (FTW)	Fort Worth	36 NMs NW	Hangars Tie-downs	215	100,732[1]	Yes	Yes
Northwest Regional Airport (52F)	Roanoke	38 NMs NW	Hangars Tie-downs	616	166,000[2]	No	No
Fort Worth Alliance Airport (AFW)	Fort Worth	39 NMs NW	Hangars Tie-downs	155	82,251[1]	Yes	Yes
Denton Municipal Airport (DTO)	Denton	44 NMs NW	Hangars Tie-downs	179	91,858[1]	Yes	Yes
Arlington Municipal Airport (GKY)	Arlington	20 NMs W	Hangars Tie-downs	250	155,862[1]	Yes	Yes
Fort Worth Spinks Airport (FWS)	Fort Worth	30 NMs W	Hangars Tie-downs	199	58,690[1]	Yes	Yes
Ennis Municipal Airport (F41)	Ennis	15 NMs S	Tie-downs	11	7,120[1]	No	Yes
Mid-Way Regional Airport (JWY)	Midlothian/ Waxahachie	12 NMs SW	Hangars Tie-downs	91	37,300[1]	No	Yes
Mesquite Metro Airport (HQZ)	Mesquite	14 NMs NE	Hangars Tie-downs	212	118,998[1]	No	Yes
Rockwall Municipal Airport (F46)	Rockwall	26 NMs NE	Hangars Tie-downs	78	38,020[1]	No	Yes

Sources: www.airnav.com. [1] FAA *Terminal Area Forecasts*, 2007. [2] FAA Form 5010-1, *Airport Master Record.*

Notes: NM = Nautical Miles, ATCT = Airport Traffic Control Tower.

Figure A6 **Metropolitan Airports Vicinity Map**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus.

Airport Environs

An inventory of the land uses, zoning patterns, and the various land use planning and control documents used to guide development of property surrounding the Airport is an important element in the airport planning process. Land use compatibility with airport development is made through knowledge of what land uses are proposed and what, if any, changes need to be made.

Lancaster Regional Airport is located two miles south of downtown Lancaster. The following paragraphs provide a generalized description of the existing zoning, height hazard zoning, and existing and future land use patterns for the areas surrounding the Airport.

Existing Zoning

The City of Lancaster adopted zoning and development codes in the 2006 *Lancaster Development Code* to help guide development. The City's zoning and development codes pertain to the area within its corporate limits and is intended to enable the City of Lancaster to "protect, promote, improve and provide for the public health, safety, and general welfare of the citizens of the City of Lancaster."

Geographic Information System (GIS) data provided by the City of Lancaster and the North Central Texas Council of Governments (NCTCOG) indicate that airport property is zoned Light Industrial (LI), which, according to the *Lancaster Development Code*, is zoned for the creation of a "limited industrial zone that provides for the modern type of industrial uses or industrial park." The Airport is also located within the LanPort Overlay District, which was created to ensure that the development that will occur around the Airport will support its economic growth, and, take advantage of the opportunities that exist within the intermodal facility. Land to the northeast and east of the Airport is zoned as Planned Development. Areas to the west of the Airport are zoned Agricultural-Open, and are included within the LanPort Overlay District. Areas to the south and southeast of the Airport are outside of the existing corporate city limit boundary and are subject to Dallas County jurisdiction, which does not have land use zoning. However, this territory is located within Lancaster's Extra-territorial jurisdiction, which makes Lancaster's subdivision regulations applicable in this area. Additionally, this area is included within the City of Lancaster's 3-Year *Annexation Plan*. Existing zoning is depicted in the following figure entitled *GENERALIZED EXISTING ZONING*.

Existing and Future Land Use

Existing and future land use information was obtained from the NCTCOG GIS Data Clearinghouse, which includes city land use publications for cities within the North Central Texas region. Within the City of Lancaster, the 2005 existing land use for airport property is classified as Airports. Currently, the majority of the land surrounding the Airport is classified as undeveloped. Small portions of Residential land uses are located to the northwest, west, and southwest of the Airport. Additionally, a small section of Industrial land use is located west/southwest of the Airport.

The City of Lancaster adopted a comprehensive land use plan in 2002 known as the *City of Lancaster Comprehensive Plan*. The *Comprehensive Plan* was created to direct the "growth and development", respond to environmental, social, economic, and physical changes, and to re-examine previous planning efforts of the community. In conjunction with the *Comprehensive Plan*, the NCTCOG and the City of Lancaster provided GIS existing and land use data. The Future Land Use Plan indicates that future land use for airport property is classified as Industrial. Recommended land uses northeast, east, southeast, southwest, and west of the Airport include Industrial, with a small portion of Residential west of the Airport. Land uses northwest and north of the Airport include Commercial, Retail, Office, and Mixed Use.

The following figure, entitled *GENERALIZED EXISTING LAND USE*, illustrates the future land uses surrounding Lancaster Regional Airport, as indicated by the NCTCOG Land Use by City publications, which is followed by a figure that illustrates *GENERALIZED FUTURE LAND USE*.

Adjacent Development. In January 2008, a *Demonstration Encroachment Analysis* for Lancaster Regional Airport was completed as a part of the *Regional General Aviation and Heliport System Plan*, facilitated by the NCTCOG. The *Encroachment Analysis* identified potential zoning and development patterns that could be incompatible with future airport operations. The *Encroachment Analysis* also provided recommendations and guidance for action by the Airport Sponsor and impacted communities. In an effort to preclude future incompatible development around the Airport, this analysis recommended to immediately implement the *LanPort Zoning District* as determined in the 2007 *Lancaster Airport Sector Plan* analysis. The *Sector Plan* was an update relative to the Airport from the City's *Comprehensive Plan* for the purpose of addressing development concerns for the undeveloped land surrounding the Airport. The Airport is surrounded by approximately 6,000 acres of undeveloped land. As indicated previously, land to the northeast and east of the Airport is zoned as Planned Development. Areas to the west of the Airport are zoned Agricultural-Open.

Two major developers own land within the airport vicinity. The Dallas Logistics Hub (DLH) is a major transportation hub/port for centralized trucking and rail operations that have been planned and portions of which are in place. The DLH includes approximately 6,000 master planned acres, with portions that are located north, northeast, east, and northwest of the Airport, bordering the Airport's property fence line.

Texas TriModal is an industrial/distribution park also located within the airport vicinity. Texas TriModal has approximately 700 master planned acres available for development, and borders the Airport's fence line east/southeast of the south end of the Runway.

Additionally, the Texas Department of Transportation (TxDOT) Dallas District is currently undergoing a study for a proposed highway alignment (Proposed Loop 9 Southeast) in the southeastern corridor of Dallas County and northern Ellis County. Proposed Loop 9 Southeast is located just south of the Airport, connecting Interstate 35E from the west and Interstate 45 to the east. Loop 9 Southeast would be located approximately less than one mile south of the Airport.

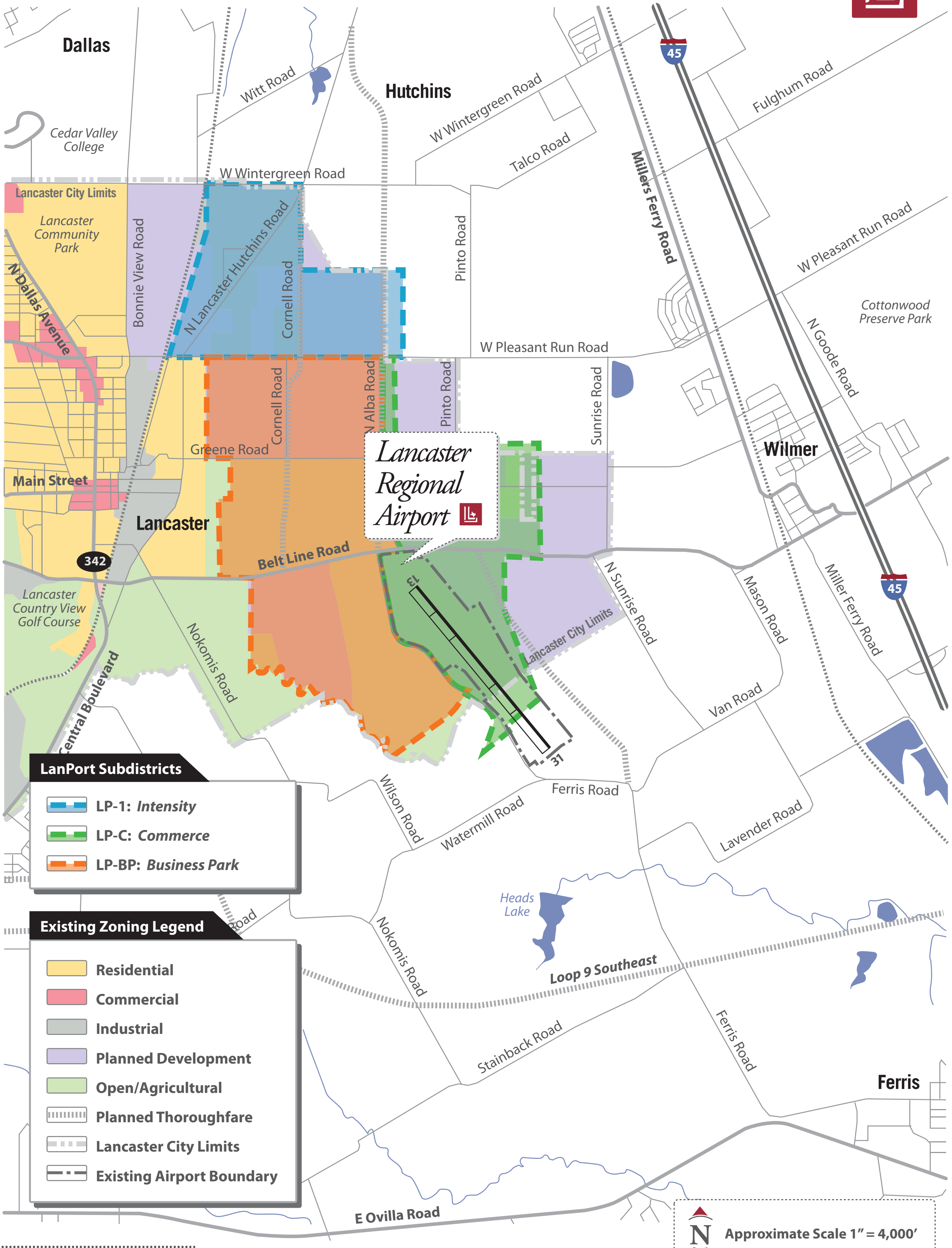


Figure A7 **Generalized Existing Zoning**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus & City of Lancaster GIS Planning Date. North Texas Council of Governments (NCTCOG).

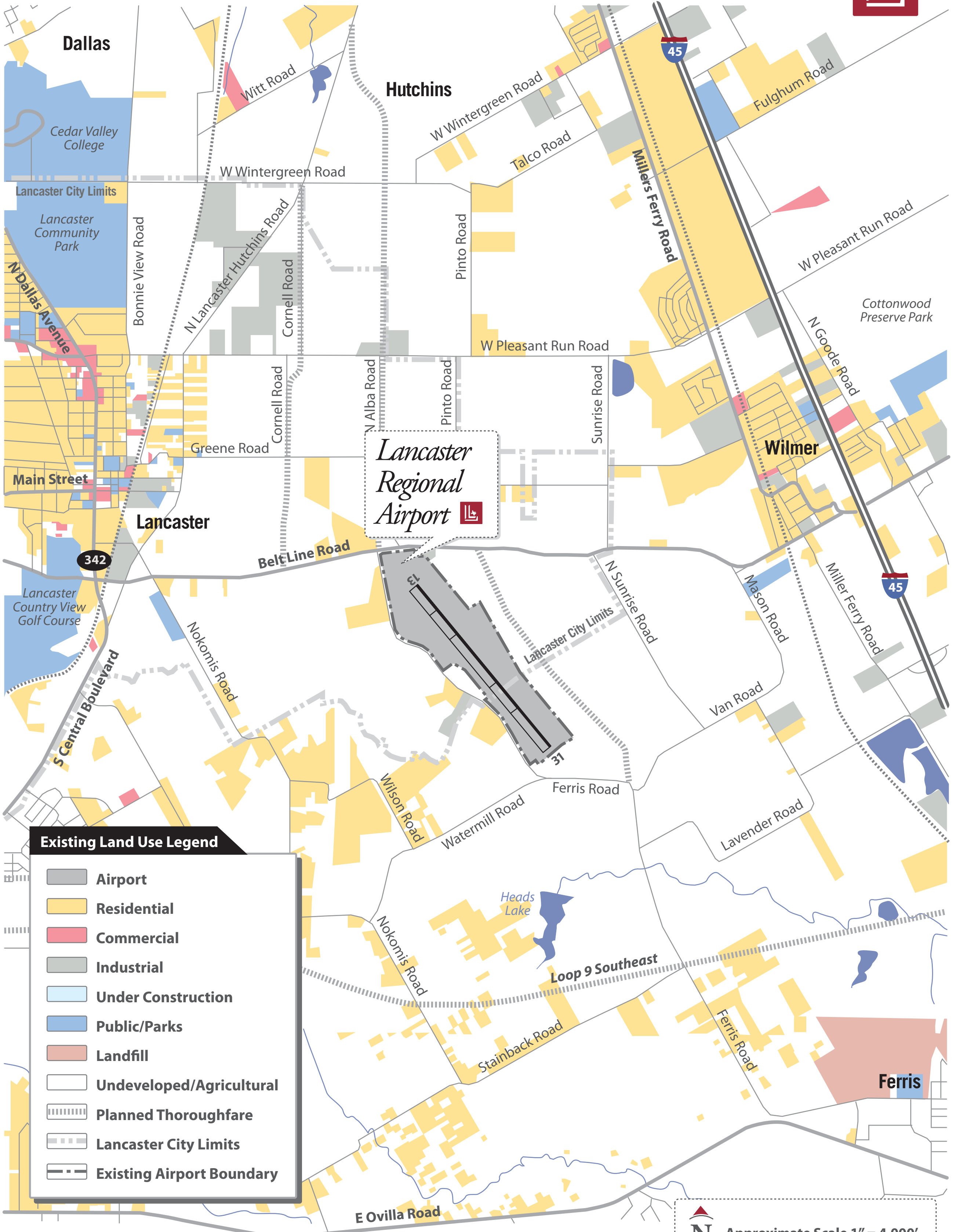


Figure A8 **Generalized Existing Land Use**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus & City of Lancaster GIS Planning Date. North Texas Council of Governments (NCTCOG).

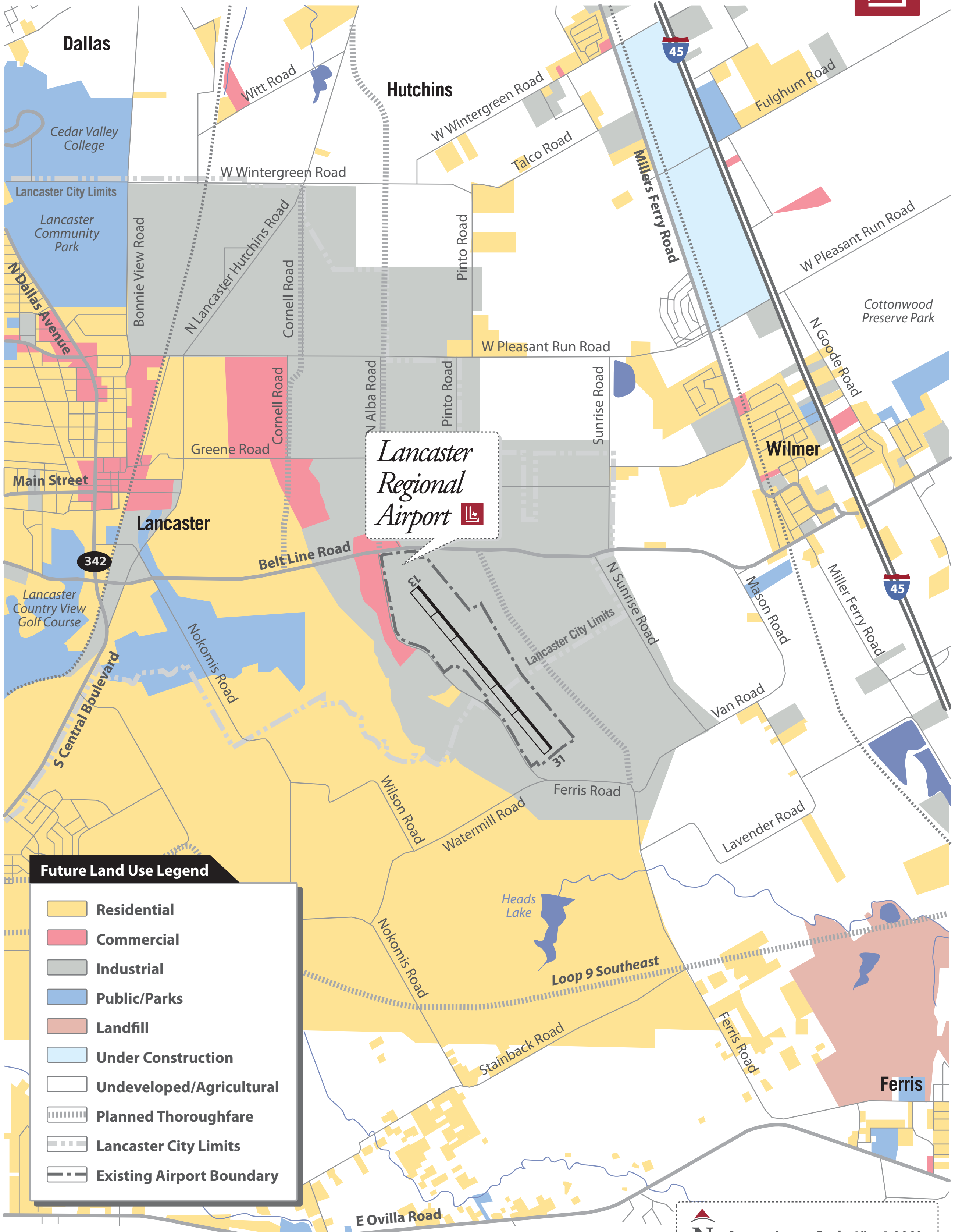


Figure A9 **Generalized Future Land Use**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus & City of Lancaster GIS Planning Date. North Texas Council of Governments (NCTCOG). Lancaster Airport Sector Plan and LanPort Zoning District and Development Standards (Draft), 2007, City of Lancaster.

Environmental Conditions Inventory

Air and Water Quality

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: carbon monoxide (CO), ozone (O_3), particulate matter (PM_{10}), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and lead (Pb). According to the EPA, the Lancaster area is currently in compliance with all National Ambient Air Quality Standards (NAAQS). The closest non-attainment area is Dallas, Texas, which is approximately 15 miles from the Airport. Generally, the FAA uses the number of passengers and number of aviation operations as an indicator of potential air quality concerns. These numbers help decide whether the project requires further air quality analysis. Federal Aviation Administration Order 5050.4A states, "No air quality analysis is needed if the airport is a commercial service airport and has less than 1.3 million passengers and less than 180,000 general aviation operations forecasts annually." The forecast operations by the end of the 20-year planning period are expected to remain well below the 180,000 operations threshold required to do an air quality analysis. Short-term air quality impacts may be expected from temporary construction activities such as heavy equipment pollutant emissions, fugitive dust resulting from cut and fill activities, and the operation of portable concrete batch plants. Compliance with all applicable local, state, and federal air quality regulations and permitting requirements will be the responsibility of all contractors.

Contractors doing work at the Airport will be required to follow guidelines outlined in the Federal Aviation Administration's Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports*, which is the FAA's guidance to airport sponsors concerning protection of the environment during construction. The final plans and specifications for any project will incorporate the provisions of AC 150/5370-10A to ensure minimal impact due to erosion, air pollution, sanitary waste, and the use of chemicals. Additionally, a National Pollutant Discharge Elimination System (NPDES) permit, administered by the Texas Commission on Environmental Quality (TCEQ), will be required for construction projects. Specific questions related to environmental issues and actual proposed construction projects will be addressed in the *Implementation Plan* chapter.

Historical, Architectural, Archaeological, and Cultural Resources

Section 106 of the National Historic Preservation Act requires federal agencies, or their designated representatives, to take into account the effects of their undertakings on historic properties, which include archaeological sites, buildings, structures, objects, or districts. Several sites in Lancaster are listed on the National Register of Historic Places (NRHP). But, none of these sites are close to airport property.

Prior to any future airport projects, the Texas Historical Commission will need to be contacted. Additionally, should any construction activity expose buried archaeological material, work would stop in that area and both the FAA and the Texas Historical Commission will be contacted.

Threatened and Endangered Species

The *Endangered Species Act*, as Amended, requires each federal agency to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species. According to the Texas Parks & Wildlife Department, there are 16 federal and state threatened and endangered species located within Dallas County. Table A3, *DALLAS COUNTY FEDERALLY LISTED & STATE LISTED WILDLIFE SPECIES*, lists the federal or state listed species (under the *Endangered Species Act*) within Dallas County. Before any projects could be undertaken, the Airport would need to determine if these threatened and endangered species are located on airport property, within the proposed project area. If the species are found to be present, and, depending on potential impact, an Environmental Assessment or Environmental Impact Statement may have to be prepared prior to project implementation.

Table A4 **DALLAS COUNTY FEDERALLY LISTED & STATE LISTED WILDLIFE SPECIES**

Common Name	Scientific Name	State Status	Federal Status
American Peregrine Falcon	*Falco peregrines anatum*	E	DL
Arctic Peregrine Falcon	*Falco peregrines tundrius*	T	DL
Bald Eagle	*Haliaeetus leucocephalus*	T	DL
Black-Capped Vireo	*Vireo atricapilla*	E	LE
Golden-Cheeked Warbler	*Dendroica chrysoparia*	E	LE
Interior Least Tern	*Sterna antillarum athalassos*	E	LE
Peregrine Falcon	*Falco peregrines*	E, T	DL
Piping Plover	*Charadrius melodus*	T	LT
White-Faced Ibis	*Plegadis chihi*	T	---
Whooping Crane	*Grus Americana*	E	LE
Wood Stork	*Mycteria Americana*	T	---
Alligator Snapping Turtle	*Macrochelys temminckii*	T	---
Texas Horned Lizard	*Phrynosoma cornutum*	T	---
Timber/Canebrake Rattlesnake	*Crotalus horridus*	T	---

Source: Texas Parks & Wildlife Department.
Notes: Species listed as "Rare" are not included.
E = Endangered
T = Threatened
DL = Federally Delisted
LE = Federally Listed Endangered
LT = Federally Listed Threatened
--- No Status

Hazardous Wildlife Attractants

Retention and settling ponds, recreational use ponds, wastewater and storm water treatment facilities, ponds resulting from mining activities, drinking water intake and treatment, and landfill facilities can frequently attract large numbers of potentially hazardous wildlife, such as birds. The City of Ferris' landfill, Skyline Landfill (operated by Waste Management of North Texas), is located approximately two and ½ miles southeast of the Airport.

According to FAA Advisory Circular 150/5200-33-B, *Hazardous Wildlife Attractants On or Near Airports*, the FAA recommends that minimum separation criteria be established between the air operations area (AOA) and certain land uses that can potentially attract hazardous wildlife. Any solid waste disposal facility (i.e., sanitary landfill) or water management facilities (i.e., wastewater treatment facilities, storm water management facilities, etc.) located within 5,000 feet of all runways planned to be used by piston-powered aircraft or within 10,000 feet of all runways planned to be used by turbine aircraft, is considered by the FAA to be an incompatible land use because of the potential for conflicts between bird habitat and low-flying aircraft.

The 2006 *Airport Master Plan Update* indicated that Waste Management/Skyline Landfill had submitted monthly bird activity reports to the FAA since 1995. In 2004, the FAA concluded the bird activity at the landfill was reasonably "well controlled" and was "compatible" with Lancaster Regional Airport's aircraft operations. Additionally, based on this rationale, the FAA, at the time, did not object to any potential airport expansion, such as a runway extension. However, the Skyline Landfill has experienced significant growth in the last few years, and a growing concern is the possible lack of covering waste, which is potential for an increase in bird activity. It may be important in the future that the City of Lancaster incorporate appropriate measures, developed in consultation with a wildlife damage biologist, to minimize hazardous wildlife attractants (i.e., the increase in bird activity at Skyline Landfill).

Wetlands

Wetlands are basically defined as areas inundated by surface or groundwater, with a frequency sufficient to support vegetation or aquatic life requiring saturated or seasonally saturated soil conditions for growth and reproduction. Tenmile Creek and Keller Branch Creek run west and north of the Airport and have several wetlands associated with these streams. According to the U.S. Fish and Wildlife Service National Wetlands Inventory Maps, there is one wetland located on airport property. A Palustrine open-water/permanently flooded/diked/impounded (POWHh) wetland is located on the west/southwest side of airport property (also known as the Smith Stock Pond). This wetland will probably fall under the jurisdiction of the U.S. Army Corps of Engineers because of its connectivity to the surrounding creeks. Water quality issues may need to be examined, particularly because of the connectivity of the wetlands to larger water sources.

If any proposed projects would impact these wetlands, the Airport must coordinate with the U.S. Army Corps of Engineers and some further environmental analysis may be necessary. Should there be any mitigation measures identified, contractors would be required to follow guidelines outlined in the FAA's AC 150/5370-10A to minimize the impacts to the environment, including wetlands.

Farmland

According to the National Soil Survey by the National Resources Conservation Service (NRCS), there are several areas of land on, and surrounding, the Airport that are considered to be prime farmland.

The north, east, and majority of the south sections of land within airport property are composed of Branyon clay, with zero to one percent slopes, and considered to be prime farmland. Several soil types are found on the western sections of land within airport property. These include Austin silty clay, one to three percent slopes; Altoga silty clay, five to 12 percent slopes, eroded; Lewisville silty clay, one to three percent slopes; and, Lewisville silty clay, three to five percent slopes. Except for Altoga silty clay, all of these soils on the western section of airport property are considered to be prime farmland. All of these soils are located on airport property, and, the soil analysis was generated through online mapping of the property from the Natural Resources Conservation Service (NRCS) website. Consultation with the U.S. Department of Agriculture (USDA) and the NRCS is required to determine if the Farmland Protection Policy Act (FPPA) applies to the land or applies to any land to be converted from non-agricultural use as a result of any of the proposed projects.

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. The Airport is not located within a 100-year floodplain; however, a 100-year floodplain is located adjacent to the Airport. The flood effects are associated with Tenmile Creek, and the floodplain is located directly west and southwest of the Airport. According to FAA Orders 1050.1E and 505.4B, the FAA must determine if there would be a "significant floodplain encroachment" should development occur within a floodplain. If development occurred that may cause an impact to the 100-year floodplain located near the Airport, consultation with the FAA would be required to determine if the significant encroachment will cause "notable adverse impacts on natural and beneficial floodplain values" as a result of any of the proposed projects.

Section 4(f) Property

Section 4(f) of the Department of Transportation Act (recodified at 49 USC, Subtitle I, Section 303) provides that no publicly owned park, recreation area, wildlife or waterfowl refuge, or land of a historic site that is of national, state, or local significance will be used, acquired, or affected by programs or projects requiring federal assistance for implementation. Currently, there are no Section 4 (f) potential resources within the immediate vicinity of the Airport.

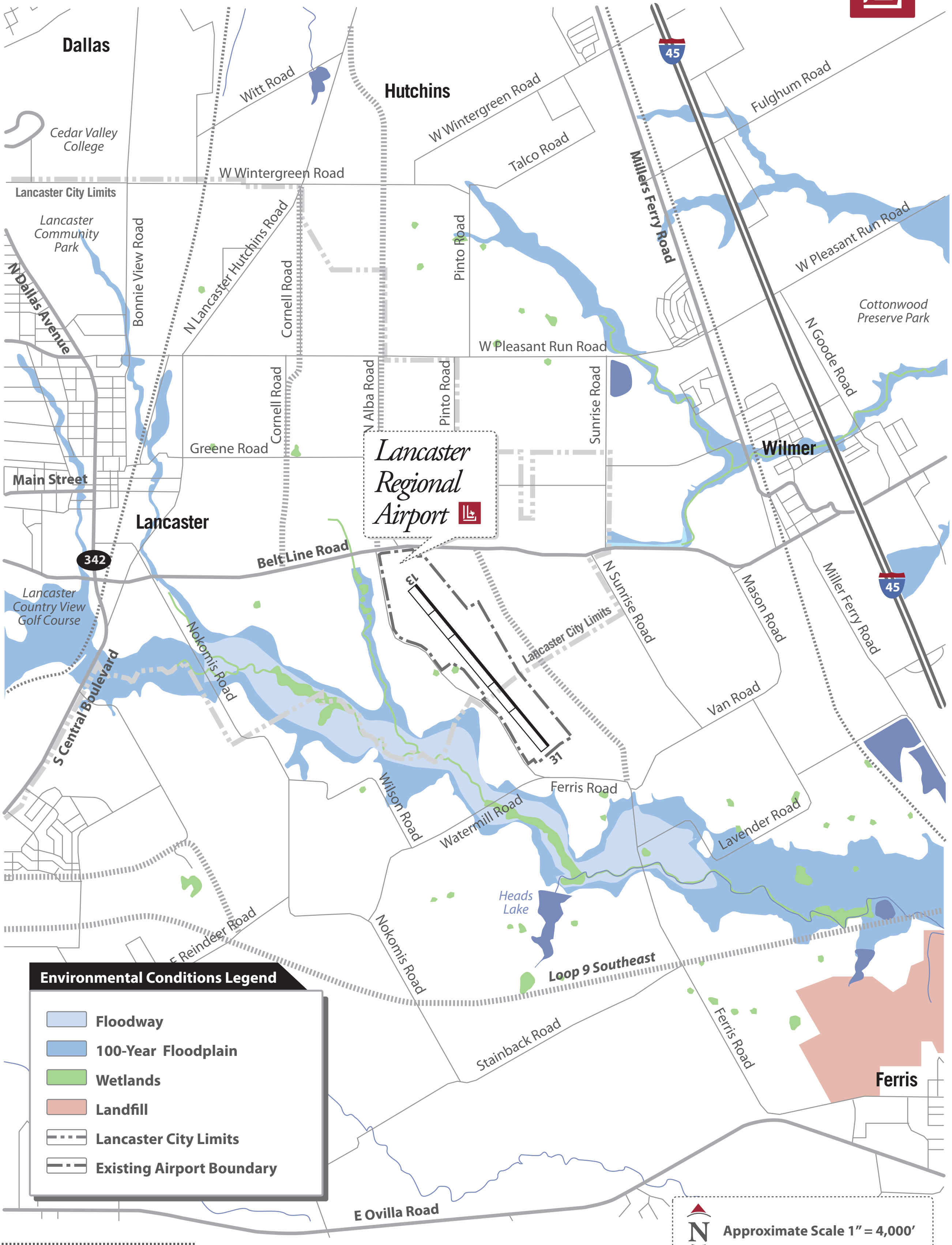


Figure A10 **Environmental Conditions Map**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus. City of Lancaster GIS Planning Data, US Fish & Wildlife Service (USFWS), and Federal Emergency Management Agency (FEMA).

Financial Inventory

The primary goal of this task is to gather materials that summarize the financial management of the Airport. In addition, it is important to develop an understanding of the financial structure, constraints, requirements, and opportunities for airport activities as related to the development of a Capital Improvement Program (CIP). The documents that have been gathered and reviewed for this financial inventory will be used to formulate a reasonable and financially sound CIP using additional sources to fund projects identified in the master planning process.

An airport is both a public service and a business, and must be operated as both. Financial assistance to public airports is often provided by the city, county, state, federal, and private sources where available. In return, the airport provides jobs, promotes development, and supplies economic benefits to the area that it serves, as well as providing a major element of the public transportation system. This is the public service component. From a business standpoint, the airport has the ability to generate certain revenues and, therefore, the obligation to do so. The most successful and satisfactory method of accomplishing this is through a combination of fair and equitable fees and charges associated with the use of airport facilities. It is a federal requirement that airport generated revenues be used at the airport. Airport revenues can be derived from leases, rental rates, airfield fees and charges, airlines, cargo operators, and other operating revenue.

In consideration of these issues, the financial statements for Lancaster Regional Airport have been gathered for fiscal years 2004 through 2008. The primary responsibility for developing the financing program rests with the City of Lancaster. Major sources of revenue for the Airport include: hangar leases, ground leases, and fuel sales. Major expenditures include: building operation and maintenance, equipment operation and maintenance, salaries, utilities, equipment rental, airfield maintenance, depreciation expenses, insurance, professional services, and administrative expenses.

Table A5 **REVENUE & EXPENSE SUMMARY**

Year	Revenues	Expenses	Net Operating Income/(Loss)
2004	$157,266	$135,450	$21,817
2005	$345,725	$288,866	$56,859
2006	$161,296	$294,362	($133,066)
2007	$329,641	$461,707	($132,066)
2008	$328,768	$475,501	($146,733)

Source: Lancaster Regional Airport.

Issues Inventory

Identification of the current and future development issues, which may impact the use of a public facility, is an important step in the planning process. This is particularly true of an airport where infrastructure investment is great, where the issues are complex, and where the entire airport facility along with its environs, should be planned in unison to minimize incompatibility between the Airport and its surroundings.

Preliminary analysis and discussions with airport administration indicate that some of the critical issues that will be of particular importance in the development of this *Master Plan* include:

- **Runway System:** potential need for an extension of Runway 31 to meet possible future demand and ultimate design requirements.
- **Runway System:** construction of an additional runway on the east of the existing runway to meet future aviation needs as may be possibly determined.
- **Taxiway System:** relocate existing parallel taxiway to the west to allow larger aircraft to operate on the existing runway.
- **Terminal Area:** expansion of west side facilities to meet future demand and ease of circulation.
- **Landside Development:** define and conceptualize new airside and landside complex on the east side to meet potential requirements for expanded facilities related to ultimate industrial aviation needs.
- **Development of Infrastructure:** utilities development for industrial and transportation logistics expansion onto the future east side development area.
- **Environmental Issues:** a comprehensive approach to defining and mitigating any potential environmental issues, including the Skyline Landfill.
- **Development Encroachment:** potential incompatible development on surrounding undeveloped land in the vicinity of the Airport.

B Forecasts of Aviation Activity

INTRODUCTION. Projecting the future demand of aviation activity at an airport is one of the most important and vital steps in the master planning process. These projections will serve as the basis for identifying the Airport's future needs. It will also serve as the foundation for major decisions that will be made for the Airport, such as, if and when future improvements are needed.

Forecasts are prepared for short, medium, and long-term time intervals. Short-term forecasts are for 1-5 years and usually address current issues that need immediate attention. Medium-term forecasts are for 6-10 years and are usually used in planning capital improvements. Long-term forecasts are usually for 10-20 years and provide information about general planning and expansion to meet future demand. The purpose of this forecast is to estimate, using multiple forecast methods, the future aviation activity and demand at Lancaster Regional Airport (KLNC) for the period 2009-2030.

For the following aviation forecasts, a combination of data and information was used. This material was provided by the Federal Aviation Administration (FAA), Texas Department of Transportation (TxDOT), North Central Texas Council of Governments (NCTCOG), Dallas County, City of Lancaster, and Lancaster Regional Airport records. The FAA also provides guidance on preparing aviation activity forecasts in Advisory Circular (AC) 150-5070-6A *Airport Master Plans*. The AC suggests that various methods and data be used to give the most accurate projections possible.

Despite the multiple sources of data available, it still must be noted that it is often difficult to project future demand. There are many uncontrollable and unforeseeable variables that could affect the actual future outcome. Since it is nearly impossible to predict these uncontrollable variables that affect the future projections, the short-term projections are usually more accurate and reliable than the 10-20 year long-term projections.

Factors Affecting Aviation Activity

As previously mentioned, there are many variables and factors that can affect the aviation activity of a particular airport. General aviation (GA) airports are typically influenced by national, regional and, more specifically, local (i.e., airport market area) trends in population, income, employment, and airport prominence within the region in which that airport is located. The population growth (or decline) could have an influence on the growth of aviation demand. Income could be considered an indicator of GA aircraft purchase trends or overall increase in flying activity. The employment rate directly relates to income; the more people that are employed, the more disposable income they will have to spend on activities such as flying, which contributes to an increase in overall aviation activity.

Airports that have better facilities and more to offer users will generally attract greater aviation activity. An airport's based aircraft is another factor that directly contributes to aviation activity. With the addition of more hangars, instrument approaches, and facilities that can accommodate a wider range of piston, twin-engine, and turbine aircraft, additional users may be attracted to the airport, thus increasing the demand. Lastly, an airport's location can certainly influence the aviation demand on an airport. The proximity of the Dallas/Fort Worth Metroplex maintains a contributing factor to the demand at Lancaster Regional Airport. With GA activity as a focus, Lancaster Regional Airport can and will attract users that are adverse to the congestion of the urban environment of the Dallas/Fort Worth Metroplex.

Socioeconomic Data

The ultimate determinants of the amount of pilots owning aircraft and utilizing a GA airport are the strength of the area's economy and the cost and availability of the service. Consequently, a clear understanding of local economic forces and trends is important for developing an accurate aviation activity forecast. Historical data of population, median income, and educational attainment in the United States, Texas, Dallas County, and the City of Lancaster are presented in this section. The principal sources of historical and projected data for this study are the U.S. Census Bureau, the U.S. Bureau of Economic Analysis, Texas Department of Transportation, and NCTCOG. The U.S. Census Bureau and NCTCOG provided historical estimates on population counts for the area with the U.S. Bureau of Economic Analysis providing historical data on median income. The U.S. Census Bureau also was the source for all educational attainment information.

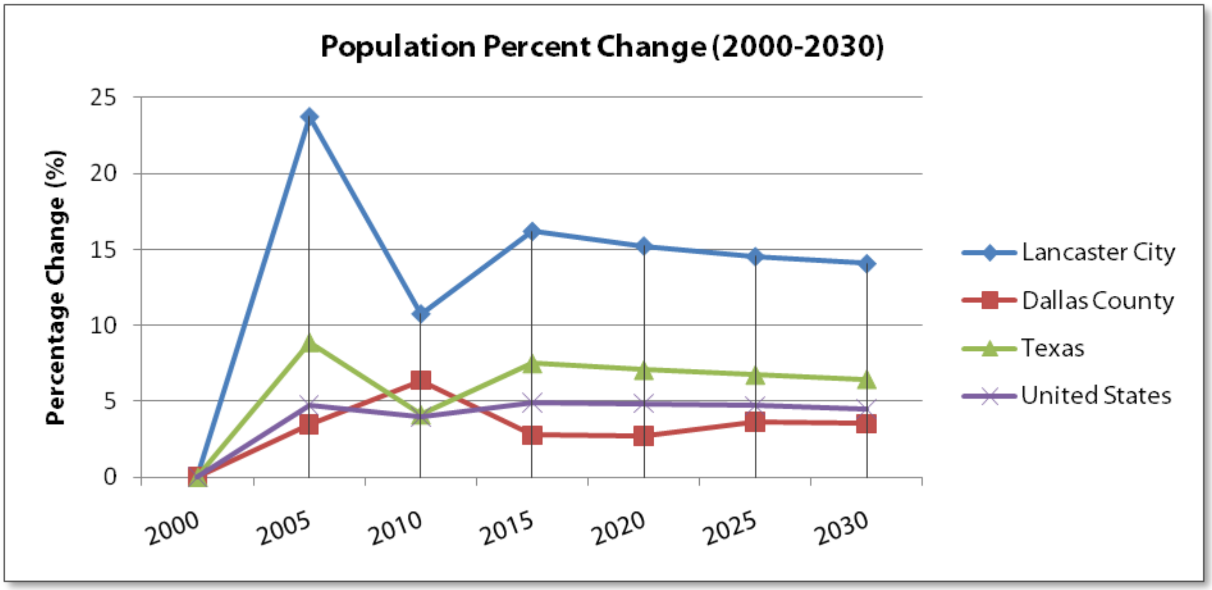
Population. The historic and projected population changes for the United States, Texas, Dallas County, and the City of Lancaster are shown in Table B1 and Figure B1. The historic data spans the years 2000-2008 and the projected data covers the years 2009-2030. The 38% population growth of Lancaster between 2000 and 2008 is over twice that of the State of Texas and nearly five times the national growth rate. Through 2030, Lancaster population growth is expected to continue to outpace the growth of Dallas County, the State of Texas and the nation, as a whole. Primarily, the western half of Lancaster from downtown to the Interstate is receiving the most residential growth. Lancaster-specific population trends are a key factor in the forecasting of future KLNC activity. The Lancaster population forecast is the best available proxy that can be used to isolate and approximate the specific growth within the Lancaster Regional Airport market area. It is important to note that Lancaster population growth is anticipated to outpace the growth of Dallas County, as a whole.

Table B1 **POPULATION DATA COMPARISON – HISTORIC AND PROJECTED GROWTH**

Year	Lancaster	Percent Change	Dallas County	Percent Change	Texas	Percent Change	United States	Percent Change
2000	26,011	---	2,225,997	---	20,946,049	---	282,171,936	---
2001	26,590	2.2%	2,264,705	1.7%	21,333,928	1.9%	285,039,803	1.0%
2002	26,951	1.4%	2,276,148	0.5%	21,713,397	1.8%	287,726,647	0.9%
2003	27,732	2.9%	2,280,417	0.2%	22,062,119	1.6%	290,210,914	0.9%
2004	30,202	8.9%	2,287,959	0.3%	22,424,884	1.6%	292,892,127	0.9%
2005	32,190	6.6%	2,303,568	0.7%	22,811,128	1.7%	295,560,549	0.9%
2006	33,702	4.7%	2,337,956	1.5%	23,367,534	2.4%	298,362,973	1.0%
2007	35,213	4.5%	2,366,511	1.2%	23,843,432	2.0%	301,290,332	1.0%
2008	35,800	1.7%	2,417,650	2.2%	24,326,974	2.0%	304,059,724	0.9%
Historic 2000-2008 Growth		**37.6%**		**8.6%**		**16.1%**		**7.8%**
2009	36,225	1.2%	2,452,319	1.4%	24,328,810	0.0%	306,282,191	0.7%
2010	37,329	3.0%	2,486,989	1.4%	24,330,646	0.0%	310,233,000	1.3%
2015	43,377	16.2%	2,555,989	2.8%	26,156,723	7.5%	325,540,000	4.9%
2020	49,983	15.2%	2,624,989	2.7%	28,005,740	7.1%	341,387,000	4.9%
2025	57,248	14.5%	2,721,090	3.7%	29,897,410	6.8%	357,452,000	4.7%
2030	65,301	14.1%	2,817,191	3.5%	31,830,575	6.5%	373,504,000	4.5%
Projected 2009-2030 Growth		**80.3%**		**14.9%**		**30.8%**		**21.9%**

Sources: U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), Texas State Data Center, and RW Armstrong Analysis.

Figure B1 **POPULATION PERCENTAGE CHANGE**



Sources: U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), Texas State Data Center, and RW Armstrong Analysis.

Median Income, Unemployment Rate, and Educational Attainment

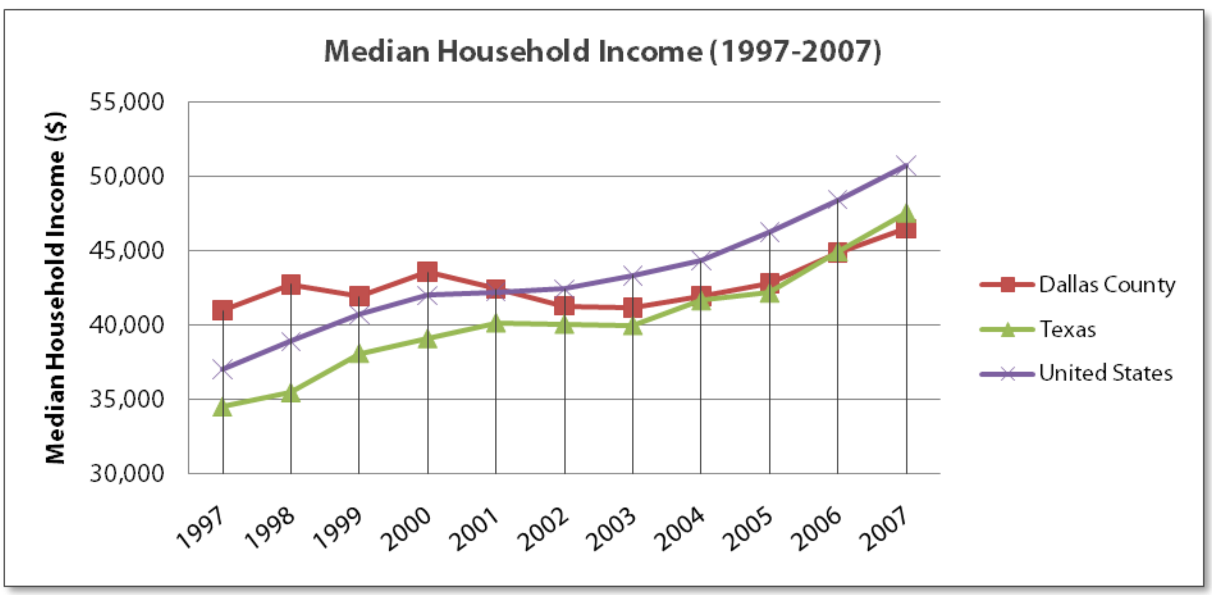
Table B2, *MEDIAN INCOME COMPARISON ($) – HISTORIC*, shows the median income for the United States, Texas, and Dallas County, with the percentage change from the years 1997-2007. The data shows that the median income for Dallas County grew at a lower rate than that of the State of Texas and U.S. The median income for the County in 2007 also was lower than both the State and nation. Figure B2, *MEDIAN INCOME TRENDS ($)*, is a graph that depicts the changes in median income for the United States, Texas, and Dallas County from the years 1997-2007.

Table B2 **MEDIAN INCOME COMPARISON ($) – HISTORIC**

Year	Dallas County	Percent Change	Texas	Percent Change	United States	Percent Change
1997	$40,960	---	$34,478	---	$37,005	---
1998	$42,736	4.34%	$35,449	2.82%	$38,885	5.08%
1999	$41,913	-1.93%	$38,092	7.46%	$40,696	4.66%
2000	$43,550	3.91%	$39,090	2.62%	$41,990	3.18%
2001	$42,421	-2.59%	$40,152	2.72%	$42,228	0.57%
2002	$41,271	-2.71%	$40,063	-0.22%	$42,409	0.43%
2003	$41,147	-0.30%	$39,967	-0.24%	$43,318	2.14%
2004	$41,947	1.94%	$41,645	4.20%	$44,334	2.35%
2005	$42,791	2.01%	$42,165	1.25%	$46,242	4.30%
2006	$44,894	4.91%	$44,943	6.59%	$48,451	4.78%
2007	$46,468	3.51%	$47,563	5.83%	$50,740	4.72%
Total % Change:		**13.4%**		**38.0%**		**37.1%**

Sources: U.S. Census Bureau, the U.S. Bureau of Economic Analysis, and RW Armstrong Analysis.
Note: Historical median income data was unavailable for Lancaster.

Figure B2 **MEDIAN INCOME TRENDS ($)**



Sources: U.S. Census Bureau, the U.S. Bureau of Economic Analysis, and RW Armstrong Analysis.
Note: Historical median income data was unavailable for Lancaster.

The unemployment rate is the percentage of the total labor force that is unemployed, but actively seeking employment and willing to work. This is a good indicator of negative economic forces in the area. The unemployment trend in an area is important when attempting to determine the rate at which there are individuals available to work in a given year, as well as a general sense as to the amount of jobs in an area. Table B3 and Figure B3 show the unemployment rates for Lancaster, Dallas County, Texas, and the United States from 1990-2008. The data shows that the unemployment rate for Lancaster has been higher than the other areas since 2000. This trend has continued with an unemployment rate of 6.9% in 2008, which is higher than the nation's average of 5.8%.

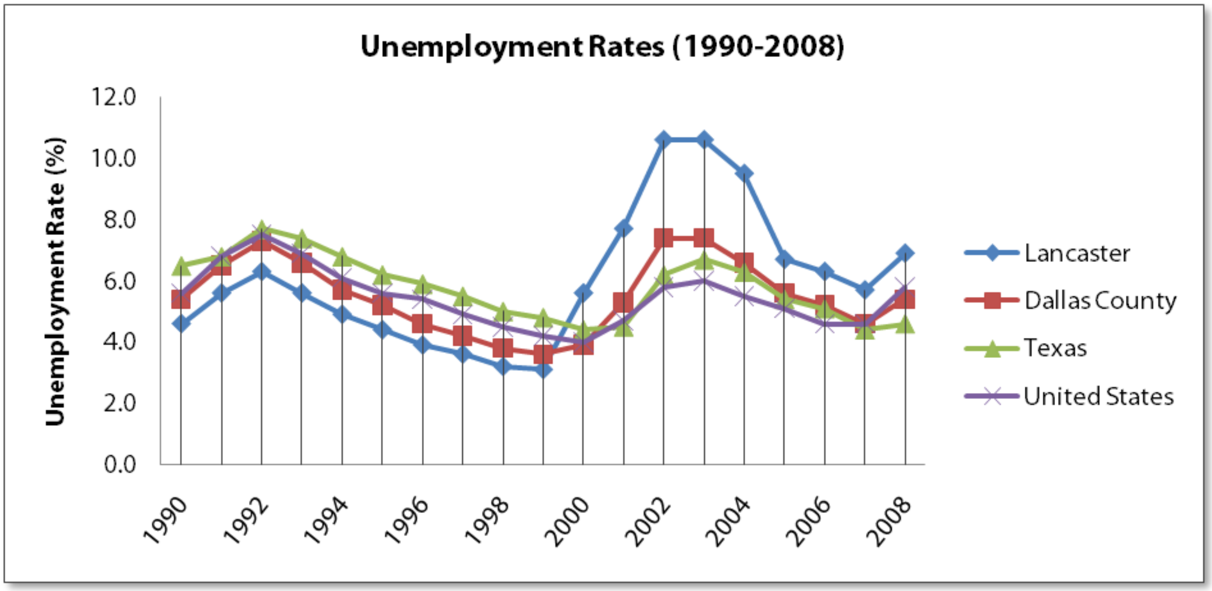
Table B3 **UNEMPLOYMENT RATES (%)**

Year	Lancaster	Dallas County	Texas	United States
1990	4.6%	5.4%	6.5%	5.6%
1995	4.4%	5.2%	6.2%	5.6%
2000	5.6%	3.9%	4.4%	4.0%
2005	6.7%	5.6%	5.4%	5.1%
2008	6.9%	5.4%	4.6%	5.8%

Sources: U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), and RW Armstrong Analysis.

Note: There is no information available in regard to the rationalization of Lancaster's higher growth rates in comparison to Dallas County, Texas, and the U.S.

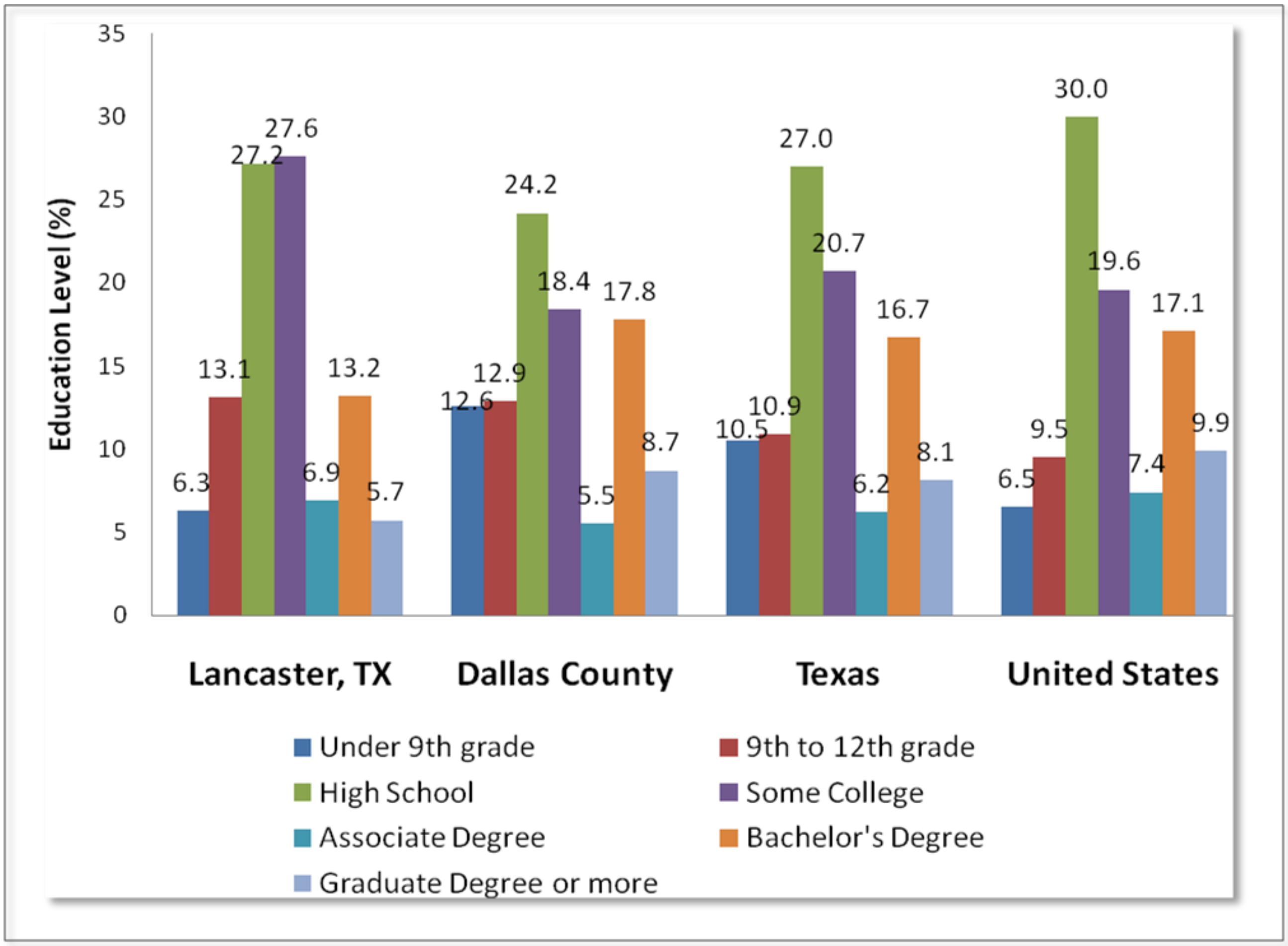
Figure B3 **UNEMPLOYMENT RATES (%)**



Sources: U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), and RW Armstrong Analysis.

The Educational Attainment of residents age 25 or more by highest educational attainment for the United States, Texas, Dallas County, and the City of Lancaster, by percentage of population for the year 2007, is shown in Figure B4, *2007 EDUCATIONAL ATTAINMENT – AGES 25 AND OVER (PERCENT OF POPULATION).* As the chart indicates, Lancaster lags the comparative population groups in college and graduate degree attainment. Educational attainment is an important characteristic of a community to measure because it is directly correlated to income, and, it allows for future estimations of economic activity.

Figure B4 **2007 EDUCATIONAL ATTAINMENT – AGES 25 AND OVER (PERCENT OF POPULATION)**



Sources: U.S. Census Bureau and RW Armstrong Analysis.

Dallas Logistics Hub

An important factor in the development of future aviation activity at Lancaster Regional Airport is the development of the Dallas Logistics Hub (DLH) and development plans of the Texas TriModal Group near the Airport. The Dallas Logistics Hub is planned as the largest new logistics park in North America, with 6,000 acres master-planned for 60 million square feet of distribution, manufacturing, office, and retail developments. The logistics park will be adjacent to Union Pacific's Southern Dallas Intermodal Terminal, a potential BNSF intermodal facility, four major highway connectors (I-20, I-45, I-35 and the proposed Loop 9 Southeast), and Lancaster Regional Airport[1].

[1] The Allen Group's Dallas Logistics Hub: http://www.dallashub.com/thehub.aspx?id=83

According to current plans, the Dallas Logistics Hub is expected to be finished within 25 years. This would make the year of completion 2034, which would have it completed after the planning period for Lancaster Regional Airport. Once construction and operations are underway, the economic and distribution activity expected at the DLH has the potential to positively impact the growth of operations at Lancaster Regional Airport. With that said, the Airport will be affected throughout the planning period due to the different phases of the DLH project.

In addition to the DLH, Texas TriModal, another land owner adjacent to the Airport, has similar plans to develop its property for distribution and light industrial uses. This future development will complement and potentially magnify the economic and airport activity created by the Dallas Logistics Hub.

Aviation Activity Forecasts

Forecasts are important for planning purposes when determining the future demand for an airport. The important variables at a general aviation airport that need to be analyzed are annual aircraft operations and based aircraft. The following sections will present historical data for the years 1995-2008 and projected data for the years 2009-2030.

Annual aircraft operations are the airborne movements of an aircraft in controlled or non-controlled airport terminal areas, and counts at en route fixes or other points where counts can be made. Two types of operations are local and itinerant. Local operations are performed by aircraft that operate in the local traffic pattern or within sight of the Airport. These operations are known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the Airport. These operations can also be known as executing simulated instrument approaches or low passes at the Airport. Itinerant operations are all aircraft operations other than local operations[2]. Annual aircraft operations are segregated into four separate categories: Air Carrier, Air Taxi and Commuter, General Aviation, and Military.

- **Air Carrier Operations** include scheduled service on aircraft with 20 or more seats operated by carriers certified under Federal Aviation Regulations (FAR) Part 119 (Certification: Air Carriers and Commercial Operators), whose operations are governed under FAR Part 121 (Operating Requirement: Domestic, Flag, and Supplemental Operations). Air Carrier categories also include "Commuter" operators who provide scheduled passenger service (five or more round trips per week on at least one route according to published flight schedules) while utilizing aircraft of 60 or fewer seats.
- **Air Taxi** refers to carriers that operate aircraft with 60 or fewer seats or a cargo payload capacity of less than 18,000 lb. and carries passengers on an on-demand basis only (charter service) and/or

[2] Federal Aviation Regulations, Sec. 170.3 – Definitions.

carries cargo or mail on either a scheduled or charter basis. Air taxi carriers are governed under FAR Part 135.

- **General Aviation** encompasses all other operations not including air carrier, air taxi and commuter, and military. These operations are conducted under FAR Part 91.
- **Military** include operations conducted by the nation's military forces.

For the purposes of the Lancaster Regional Airport forecasts, Air Carrier and Air Taxi operations are not forecasted since there is no historical record of these operation types. It is unlikely that air carrier service will be initiated at the Airport during the forecast period, and, Air Taxi service, should such activity occur during the forecast period, will fall under the General Aviation forecast numbers.

Note that based aircraft is perhaps the most important indicator of growth at a GA airport because it is the based aircraft owners that most directly affect the daily activity of an airport.

Existing Based Aircraft and Historical Operations

The Airport's based aircraft count and historic operations provided in the FAA's Terminal Area Forecast (TAF) provide the baseline data used in the forecasts. Differing forecast methodologies will be applied to established baseline numbers in order to arrive at anticipated based aircraft and operations. Table B4, *2009 CURRENT BASED AIRCRAFT,* depicts the current based aircraft at Lancaster Regional Airport, as reported by airport management.

Table B4 **2009 CURRENT BASED AIRCRAFT**

Aircraft Category	Number of Aircraft
Single Engine	116
Multi-Engine Piston	24
Multi-Engine Turbo-Prop	2
Jet[1]	12
Helicopter	11
Total	**165**

Source: Lancaster Regional Airport records.

[1]Based Jet aircraft include one corporate jet and 11 ex-military jets categorized as "Experimental" aircraft.

As previously mentioned, the aircraft operations data is provided by the FAA's Terminal Area Forecast. Lancaster Regional Airport does not have a control tower, which results in aircraft operations data not being completely accurate and reliable due to the lack of resources for counting operations. Historical airport operations data for the period of 1995 through 2008 are shown in Table B5, *HISTORICAL AIRPORT OPERATIONS*. Based aircraft counts prior to 2007 have been deemed to be inaccurate by current Airport management and, thus, not reliable for use in conducting historic trend analysis.

Table B5 **HISTORICAL AIRPORT OPERATIONS**

	Itinerant Operations			Local Operations				
Year	**GA**	**MIL**	**Total**	**GA**	**MIL**	**Total**	**Total Operations**	**Based Aircraft**
1995	16,180	50	16,230	24,270	0	24,270	40,500	110
1996	16,180	50	16,230	24,270	0	24,270	40,500	126
1997	16,180	50	16,230	24,270	0	24,270	40,500	126
1998	16,180	50	16,230	24,270	0	24,270	40,500	126
1999	16,180	50	16,230	24,270	0	24,270	40,500	126
2000	16,180	50	16,230	24,270	0	24,270	40,500	126
2001	16,180	50	16,230	24,270	0	24,270	40,500	126
2002	16,657	50	16,707	24,984	0	24,984	41,691	126
2003	16,941	50	16,991	25,410	0	25,410	42,401	128
2004	17,222	50	17,272	25,832	0	25,832	43,104	195
2005	17,507	50	17,557	26,258	0	26,258	43,815	195
2006	17,761	50	17,811	26,640	0	26,640	44,451	225
2007	18,020	50	18,070	27,027	0	27,027	45,097	227
2008[1]	18,282	50	18,332	27,420	0	27,420	45,752	232

Source: FAA *Terminal Area Forecast*, 1995-2008. [1] 2008 included in Fiscal Years 2008-2025 TAF projections. Not historical data.

Forecast Methodologies

There are a wide variety of forecasting techniques that have been developed to address aviation activity and overall demand. It is important to identify the three most common methodologies and note that not all may work depending on the particular data available and the accuracy of the data. The three most common methodologies are briefly described below:

- **Regression Analysis:** In a regression analysis forecast, the dependent variables of the item being forecasted (i.e.; based aircraft) are compared to independent demographic variables of population, employment, educational attainment, and/or personal income to determine the strongest link between the two. A correlation coefficient is calculated for each pairing of dependent to independent variables to quantify this link. This analysis has shown that population growth in an airport's market has the highest correlation to based aircraft growth. In other words, the population growth rate (independent variable) of a region (typically defined as the community served by the Airport) has the greatest direct impact on based aircraft growth. If population growth is indeed an indicator of potential aircraft growth in a given market, then national growth forecasts provided by the FAA need to be revised to reflect the population growth of the market (either above or below national averages). Through a direct comparison of national versus airport market area (i.e.; Lancaster) population projections, the FAA national aircraft fleet forecasts are adjusted to reflect differing national versus local growth trends.
- **Trend Analysis:** Trend analysis relies on projecting historic trends into the future. In trend analysis, a regression equation is used with time as the independent variable. It is one of the fundamental techniques used to analyze and forecast aviation activity. While it is frequently used as a back-up or expedient technique, it is highly valuable because it is simple to apply. Sometimes trend analysis can be used as a reasonable method of projecting variables that would be complicated (and costly) to project by other means[3].
- **Market Share Analysis:** A market share analysis is a relatively easy method to use, and can be applied to any measure for which a reliable higher-level (i.e., larger aggregate) forecast is available. Historical shares are calculated and used as a basis for projecting future shares. This approach is a "top-down" method of forecasting since forecasts of larger aggregates are used to derive forecasts for smaller areas (e.g., airports). A typical example where this may be appropriate is an airport's percentage share of national enplanements[4].

Existing Forecast

The 2007 FAA Terminal Area Forecast contains historical aviation activity data and the FAA's forecasts for more than 460 airports receiving FAA contract tower and radar service. This database also includes projections for more than 3,000 other airports in the National Plan of Integrated Airport Systems (NPIAS). The forecasts, covering the years 2008-2025, project activity of the four major users of the air

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[3] Trend Analysis, *FORECASTING AVIATION ACTIVITY BY AIRPORT*. Prepared for: Federal Aviation Administration Office of Aviation Policy and Plans Statistics and Forecast Branch (APO-110), Washington, DC, 2001.

[4] Market Share Analysis, *FORECASTING AVIATION ACTIVITY BY AIRPORT*. Prepared for: Federal Aviation Administration, Office of Aviation Policy and Plans Statistics and Forecast Branch (APO-110), Washington, DC, 2001.

traffic system: air carriers, air taxi and commuters, general aviation, and military. Note that an airport's FAA provided TAF does not always coincide with the actual based aircraft and operations at the Airport. The TAF can be considered an order-of-magnitude estimate of current and forecasted conditions at an airport. These estimates are derived by the FAA from national estimates of aviation activity, which are then assigned to individual airports based upon multiple market and forecast factors.

According to the FAA TAF 2007 as shown in Table B6, FAA TERMINAL AREA FORECASTS (2008-2025), there will be 46,417 total operations in 2009, with the operations increasing to 58,451 by 2025. That is a change of approximately 26%, which is similar to the growth projected for the nation5. Also shown in Table B6, is the FAA TAF's projection of based aircraft for the year 2009 at 235, with the increase to 314 in the year 2025. This is a change of approximately 34%, which is greater than the nation's based aircraft growth of approximately 17%[6] for the same years.

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[5] Federal Aviation Administration, *FAA AEROSPACE FORECAST*, Fiscal Years 2009-2025. U.S. Department of Transportation, Federal Aviation Administration, Aviation Policy and Plans.

[6] Federal Aviation Administration, *FAA AEROSPACE FORECAST*, Fiscal Years 2009-2025. U.S. Department of Transportation, Federal Aviation Administration, Aviation Policy and Plans.

Table B6 **FAA TERMINAL AREA FORECAST (2008–2025)**

	Itinerant Operations			Local Operations				
Year	**GA**	**MIL**	**Total**	**GA**	**MIL**	**Total**	**Total Operations**	**Based A/C**
2008	18,282	50	18,332	27,420	0	27,420	45,752	232
2009	18,548	50	18,598	27,819	0	27,819	46,417	235
2010	18,817	50	18,867	28,223	0	28,223	47,090	240
2011	19,091	50	19,141	28,632	0	28,632	47,773	245
2012	19,369	50	19,419	29,048	0	29,048	48,467	248
2013	19,650	50	19,700	29,470	0	29,470	49,170	253
2014	19,935	50	19,985	29,898	0	29,898	49,883	258
2015	20,224	50	20,274	30,332	0	30,332	50,606	262
2016	20,518	50	20,568	30,773	0	30,773	51,341	267
2017	20,816	50	20,866	31,220	0	31,220	52,086	272
2018	21,118	50	21,168	31,674	0	31,674	52,842	276
2019	21,425	50	21,475	32,135	0	32,135	53,610	281
2020	21,736	50	21,786	32,601	0	32,601	54,387	287
2021	22,052	50	22,102	33,075	0	33,075	55,177	293
2022	22,373	50	22,423	33,555	0	33,555	55,978	296
2023	22,698	50	22,748	34,042	0	34,042	56,790	302
2024	23,028	50	23,078	34,537	0	34,537	57,615	308
2025	23,362	50	23,412	35,039	0	35,039	58,451	314

Source: FAA *Terminal Area Forecast*, Fiscal Years 2008-2025.

Forecast Assumptions and Conditions

In order to develop a forecast of aviation demand that is reliable for planning purposes, there must be an understanding of the many variables that affect the aviation industry. Among the assumptions and factors that were considered in developing the forecast of aviation demand are the following:

- **The general aviation market, as determined by proximity of neighboring airports and the demographics of the surrounding communities, encompasses the City of Lancaster, Dallas County, and the State of Texas. These three areas have all been evaluated to take into account the overall economic environment of the region.**
- **Development of the Dallas Logistics Hub and Texas TriModal has the potential to affect the growth and diversity of both the population of Lancaster and the operations at the Airport throughout the forecast years.**

- **The demographic trends and socioeconomic indicators will continue to have the same relationship as the projected trends in future years.**

Airport Activity Forecasts

The forecast of annual based aircraft and airport operations are included in this section. The based aircraft forecast is for the years 2009-2030 and is separated by aircraft type. Those types include single engine (piston and turbo-prop), multi-engine, jet, and helicopter. The based aircraft and operations forecasts that are provided are considered unconstrained, meaning that the growth these forecasts assume do not take into consideration any airport or airspace capacity constraints that may negatively impact or hinder anticipated airport demand.

The airport operations forecast was developed under the guidelines set forth in the FAA Order 5090.3C *Field Formulation of the National Plan of Integrated Airport System*, due to the lack of current and historical operations data available for the Airport. In the absence of historical operations and based aircraft data, activity statistics can be developed by estimating annual operations per based aircraft. A general guideline is 250 operations per based aircraft (OPBA) for rural general aviation airports with little itinerant traffic, 350 OPBA for busier general aviation airports with more itinerant traffic, and 450 OPBA for busy reliever airports. In unusual circumstances, such as a busy reliever airport with a large number of itinerant operations, the number of operations per based aircraft may be as high as 750 operations per based aircraft. However, TxDOT recommends 300 OPBA (split by 200 local OPBA and 100 itinerant OPBA), which is utilized in this analysis due to the current and forecasted conditions at the Airport.

Airport operations forecasts, GA local, GA itinerant, and military categories have been developed. The forecast is also separated by aircraft type (single engine, multi-engine, jet, and helicopter). The based aircraft and airport operations forecasts were developed using both a regression analysis forecast based on population and a market share analysis based on the statewide based aircraft forecast developed by the FAA.

Regression Trend Analysis

The regression trend analysis provides the forecast for based aircraft based on the population trends for the City of Lancaster (see Table B1 for Lancaster Population forecast). Using this forecast methodology, Lancaster population growth trends (known entity) are applied to the national FAA based aircraft forecasts (known entity) and adjusted upward to account for Lancaster's projected above-average population growth. The adjusted forecast rates are then applied to baseline based aircraft and operations as a proxy for based aircraft and operations trends at Lancaster Regional Airport (unknown entity).

Table B7, *ANNUAL NATIONAL GROWTH RATES – U.S. POPULATION AND AIRCRAFT BY TYPE*, provides the annual national population growth rate and annual growth rate for aircraft by type, as per the FAA Aerospace Forecast. These numbers are projected nationally and do not account for local or regional variations in population growth rates. Note that for the purposes of this forecast, the single engine piston and experimental categories have been combined with a derived weighted average growth rate based upon their respective forecasted numbers within the national general aviation fleet. Experimental aircraft, a category generally made up of "homebuilt" aircraft, contribute the majority of the growth in this combined category. Single engine piston manufactured aircraft growth is anticipated to remain relatively flat throughout the forecast period.

Table B7 **ANNUAL NATIONAL GROWTH RATES – U.S. POPULATION AND AIRCRAFT BY TYPE**

Period	U.S. Population	Single Engine Piston	Multi-Engine Piston	Multi-Engine Turbo-Prop	Jet	Rotor
2008-2010	1.0%	-0.6%	-0.9%	0.7%	7.4%	5.2%
2011-2015	1.0%	-0.1%	-1.0%	1.6%	5.4%	3.7%
2016-2020	1.0%	0.2%	-1.1%	1.7%	4.1%	2.3%
2021-2030[1]	0.9%	0.5%	-1.2%	1.3%	3.2%	1.7%

Sources: U.S. Census Bureau, FAA *Aerospace Forecast* Fiscal Years 2009-2025. [1] The data for years 2026-2030 have been extrapolated.

Table B8, *ANNUAL LANCASTER GROWTH RATES – LANCASTER POPULATION AND AIRCRAFT BY TYPE*, details the Lancaster-specific population and corresponding aircraft growth rates for the forecast period. As illustrated in the table, Lancaster's population is expected to grow at a significantly faster rate than the national average. Since aviation growth rates are directly tied to population growth within a region, logic would dictate that above average population growth will lead to above average aviation growth (in this case, based aircraft). The Lancaster population growth factors are directly compared to the national population growth, and the ratio by which they exceed the national average is applied to the FAA aircraft forecast factors. It is through this methodology that Lancaster-specific growth rates for based aircraft are derived and applied to the based aircraft forecast.

Table B8 **ANNUAL LANCASTER GROWTH RATES – LANCASTER POPULATION AND AIRCRAFT BY TYPE**

Period	Lancaster Population	Single Engine Piston	Multi-Engine Piston	Multi-Engine Turbo-Prop	Jet	Rotor
2008-2010	2.1%	-0.6%	-0.9%	1.5%	15.7%	7.3%
2011-2015	3.1%	-0.1%	-1.0%	4.9%	16.4%	7.4%
2016-2020	2.9%	0.5%	-1.1%	5.0%	11.9%	4.5%
2021-2030[1]	2.7%	1.5%	-1.2%	3.9%	9.6%	3.5%

Sources: FAA *Aerospace Forecast* Fiscal Years 2009-2025, North Central Texas Council of Governments (NCTCOG), and RW Armstrong Analysis. [1] The data for years 2026-2030 have been extrapolated.

As illustrated in Table B9, *REGRESSION TREND ANALYSIS – BASED AIRCRAFT*, this method shows that the based aircraft for this forecast will grow from 165 to 221 during the planning period, which constitutes a growth of approximately 34%. Note that for the purposes of this forecast, jet aircraft are split into two distinct categories: Corporate Jet and Experimental Jet. Due to the unique makeup of Lancaster Regional Airport's baseline based jet mix (one corporate jet and 11 single engine, ex-military jets categorized, as "Experimental" by the FAA), it was determined that the aggressive forecast factors that drive business jet growth [i.e., explosive growth in the Very Light Jet (VLJ) market] would not apply to the growth of the based experimental jets. For the Experimental Jet category, it is assumed that number will remain constant throughout the forecast period, but not grow at any forecasted or predictable rate. This methodology accounts for the anticipated aggressive growth in the business jet market (an increase from one based corporate jet to 13 over the forecast period) without over-inflating the total jet count that could not be justified in the experimental jet market.

Also note that, in line with the FAA GA fleet forecast, the number of multi-engine piston aircraft based at the Airport is anticipated to decline over the forecast period (the only aircraft category to do so). This is simply a reflection of the aging of the multi-engine piston fleet, coupled with the limited number of manufacturers still producing this aircraft type as they focus on the development and production of VLJ and turbo-prop models.

Table B9 **REGRESSION TREND ANALYSIS – BASED AIRCRAFT**

Year	Single Engine Piston	Multi-Engine Piston	Multi-Engine Turbo-Prop	Corporate Jet	Experimental Jet	Rotor	Total
2008	116	24	2	1	11	11	165
2010	115	24	2	1	11	13	166
2015	114	22	3	3	11	18	171
2020	117	21	3	5	11	23	180
2025	126	20	4	8	11	29	198
2030	136	19	5	13	11	37	221

Sources: FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), and RW Armstrong Analysis.

To calculate the Airport's forecasted operations, a proxy of 300 operations per based aircraft (TxDOT recommended) is applied to the based aircraft forecast provided in Table B9. The results of the exercise are presented in Table B10, *REGRESSION ANALYSIS – AIRPORT OPERATIONS*, which predicts that airport operations under this forecast scenario will grow from 49,550 to 66,350 during the forecast period. This represents a growth of approximately 34% from 2008-2030. The itinerant operations/local operations represent 33/67% split of the operations, respectively.

Table B10 **REGRESSION ANALYSIS – AIRPORT OPERATIONS**

	Itinerant Operations			Local Operations				
Year	**GA**	**MIL**	**Total**	**GA**	**MIL**	**Total**	**Total Ops**	**Based A/C**
2008	16,500	50	16,550	33,000	0	33,000	49,550	165
2009	16,500	50	16,550	33,000	0	33,000	49,550	165
2010	16,600	50	16,650	33,200	0	33,200	49,850	166
2011	16,600	50	16,650	33,400	0	33,400	49,850	166
2012	16,700	50	16,750	33,600	0	33,600	50,150	167
2013	16,800	50	16,850	34,000	0	34,000	50,450	168
2014	17,000	50	17,050	34,200	0	34,200	51,050	170
2015	17,100	50	17,150	34,600	0	34,600	51,350	171
2016	17,300	50	17,350	34,800	0	34,800	51,950	173
2017	17,400	50	17,450	35,200	0	35,200	52,250	174
2018	17,600	50	17,650	35,600	0	35,600	52,850	176
2019	17,800	50	17,850	35,600	0	35,600	53,450	178
2020	18,000	50	18,050	36,000	0	36,000	54,050	180
2021	18,400	50	18,450	36,800	0	36,800	55,250	184
2022	18,700	50	18,750	37,400	0	37,400	56,150	187
2023	19,100	50	19,150	38,200	0	38,200	57,350	191
2024	19,400	50	19,450	38,800	0	38,800	58,250	194
2025	19,800	50	19,850	39,600	0	39,600	59,450	198
2026	20,200	50	20,250	40,400	0	40,400	60,650	202
2027	20,700	50	20,750	41,400	0	41,400	62,150	207
2028	21,100	50	21,150	42,200	0	42,200	63,350	211
2029	21,600	50	21,650	43,200	0	43,200	64,850	216
2030	22,100	50	22,150	44,200	0	44,200	66,350	221

Sources: FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), and RW Armstrong Analysis.

Note: The TxDOT 300 OPBA (200 local OPBA/100 itinerant OPBA) was used in this analysis.

Table B11, *REGRESSION ANALYSIS – FORECASTED OPERATIONS BY AIRCRAFT TYPE*, presents the projected fleet mix derived from the based aircraft forecast presented in Table B9.

Table B11 **REGRESSION ANALYSIS – FORECASTED OPERATIONS BY AIRCRAFT TYPE**

	2008	2010	2015	2020	2025	2030
Single Engine *Ex. Piston Cessna 172, Piper Arrow*	34,800	34,500	34,200	35,100	37,800	40,800
Multi-Engine Piston *Ex. Piper Seminole, Beech Baron*	7,200	7,200	6,600	6,300	6,000	5,700
Multi-Engine Turbo-Prop *Ex. King Air C90, King Air B200*	600	600	900	900	1,200	1,500
Jet *Ex. Lear 35, Citation II, Falcon 10*	3,600	3,600	4,200	4,800	5,700	7,200
Rotor *Ex. Bell 210, 427*	3,300	3,900	5,400	6,900	8,700	11,100
Total	**49,500**	**49,800**	**51,300**	**54,000**	**59,400**	**66,300**

Sources: Lancaster Regional Airport records, U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), FAA *Aerospace Forecast* Fiscal Years 2009-2025, and RW Armstrong Analysis.

Note: Military operations are not included.

Market Share Analysis

The market share analysis for Lancaster Regional Airport was developed utilizing the *FAA Aerospace Forecast Fiscal Years 2009-2025* General Aviation and Air Taxi Aircraft forecast as a baseline. Table B12, *FAA GA FLEET FORECAST AND LANCASTER REGIONAL AIRPORT MARKET SHARE BY AIRCRAFT TYPE*, shows this national forecast and also the based aircraft market share that the Airport has within the system. The FAA general aviation fleet (not inclusive of the "Sport Aircraft" and "Other" categories) under this forecast is anticipated to increase nearly 21% throughout the planning period.

Table B12 **FAA GA FLEET FORECAST AND LANCASTER REGIONAL AIRPORT MARKET SHARE BY AIRCRAFT TYPE**

Year	Single and Experimental	Multi-Engine Piston	Multi-Engine Turbo-Prop	Jet	Rotor
2008	170,690	19,130	9,600	11,400	10,215
2010	170,575	18,795	9,740	13,155	11,300
2015	172,655	17,910	10,540	17,100	13,520
2020	176,905	16,965	11,480	20,945	15,170
2025	183,170	16,005	12,245	25,165	16,795
2030[1]	189,657	15,099	13,061	30,235	18,594
LNC Market Share	**0.000680%**	**0.001255%**	**0.000208%**	**0.001053%**	**0.001077%**

Sources: FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, and RW Armstrong Analysis.
[1] The data for years 2026-2030 have been extrapolated.

Table B13, *MARKET SHARE – BASED AIRCRAFT*, depicts the market share forecast for based aircraft based on the Lancaster Regional Airport market share applied to the FAA national forecast, as detailed in Table B12. Under this forecast, the based aircraft for the Airport will grow from 165 to 203 during the planning period.

Table B13 **MARKET SHARE – BASED AIRCRAFT**

Year	Single and Experimental	Multi-Engine Piston	Multi-Engine Turbo-Prop	Jet	Rotor	Total
2008	116	24	2	12	11	165
2010	116	24	2	14	12	168
2015	118	22	2	18	15	175
2020	121	21	2	22	16	182
2025	124	20	3	26	18	192
2030	129	19	3	32	20	203

Sources: FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, and RW Armstrong Analysis.

Using the same methodology applied in the regression analysis forecast, Table B14, *MARKET SHARE – AIRPORT OPERATIONS*, depicts the forecast for airport operations derived from the market share based aircraft forecast. It shows that airport operations under this forecast will grow from 49,550 to 60,950 during the forecast period. This represents a growth of almost 23% from 2008-2030. The itinerant operations/local operations represent 33/67% split of the operations, respectively.

Table B14 **MARKET SHARE – AIRPORT OPERATIONS**

	Itinerant Operations			Local Operations				
Year	**GA**	**MIL**	**Total**	**GA**	**MIL**	**Total**	**Total Ops**	**Based A/C**
2008	16,500	50	16,550	33,000	0	33,000	49,550	165
2009	16,500	50	16,550	33,000	0	33,000	49,550	165
2010	16,800	50	16,850	33,600	0	33,600	50,450	168
2011	16,900	50	16,950	33,800	0	33,800	50,750	169
2012	17,000	50	17,050	34,000	0	34,000	51,050	170
2013	17,200	50	17,250	34,400	0	34,400	51,650	172
2014	17,300	50	17,350	34,600	0	34,600	51,950	173
2015	17,500	50	17,550	35,000	0	35,000	52,550	175
2016	17,600	50	17,650	35,200	0	35,200	52,850	176
2017	17,800	50	17,850	35,600	0	35,600	53,450	178
2018	17,900	50	17,950	35,800	0	35,800	53,750	179
2019	18,100	50	18,150	36,200	0	36,200	54,350	181
2020	18,200	50	18,250	36,400	0	36,400	54,650	182
2021	18,400	50	18,450	36,800	0	36,800	55,250	184
2022	18,600	50	18,650	37,200	0	37,200	55,850	186
2023	18,800	50	18,850	37,600	0	37,600	56,460	188
2024	19,000	50	19,050	38,000	0	38,000	57,050	190
2025	19,200	50	19,250	38,400	0	38,400	57,650	192
2026	19,400	50	19,450	38,800	0	38,800	58,250	194
2027	19,600	50	19,650	39,200	0	39,200	58,850	196
2028	19,800	50	19,850	39,600	0	39,600	59,450	198
2029	20,000	50	20,050	40,000	0	40,000	60,050	200
2030	20,300	50	20,350	40,600	0	40,600	60,950	203

Sources: FAA *Terminal Area Forecast* Fiscal Years 2008-2025, FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, and RW Armstrong Analysis.

Note: The TxDOT 300 OPBA (200 local OPBA/100 itinerant OPBA) was used in this analysis.

Table B15, *MARKET SHARE – FORECASTED FLEET MIX*, presents the projected fleet mix based on the operations forecast detailed in Table B14.

Table B15 **MARKET SHARE - FORECASTED FLEET MIX**

	2008	2010	2015	2020	2025	2030
Single Engine and Experimental *Piston Cessna 172, Piper Arrow*	34,800	34,800	35,400	36,300	37,200	38,700
Multi-Engine Piston *Piper Seminole, Beech Baron*	7,200	7,200	6,600	6,300	6,000	5,700
Multi-Engine Turbo-Prop *King Air C90, King Air B200*	600	600	600	600	900	900
Business Jets *Lear 35, Citation II, Falcon 10*	3,600	4,200	5,400	6,600	7,800	9,600
Rotor *Bell 210, 427*	3,300	3,600	4,500	4,800	5,400	6,000
Total	**49,500**	**50,400**	**52,500**	**54,600**	**57,300**	**60,900**

Sources: FAA *Terminal Area Forecast* Fiscal Years 2008-2025, FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, and RW Armstrong Analysis.

Note: Military operations are not included.

Preferred Forecast

The preferred forecast for this Master Plan is the *regression analysis based forecast*. It is believed that this forecast provides for greater accuracy and more realistic outcomes due to the fact that it is based not only on FAA-provided general aviation fleet growth, but also on the projected growth of Lancaster Regional Airport's surrounding community. By adjusting the FAA growth factors to specifically account for Lancaster's population profile (above average growth in relation to both state and national averages), a forecast that is tailored to the Airport's surrounding community is provided. While the market share forecast can provide valuable guidance, it lacks the specificity provided in the population-based regression forecast. Absent a historical trend forecast, for which data was not available, the *regression analysis based forecast* is deemed to be the most appropriate for this Master Plan.

Table B16, *PREFERRED BASED AIRCRAFT FORECAST*, Table B17, *PREFERRED AIRPORT OPERATIONS FORECAST*, and Table B18, *PREFERRED FLEET MIX FORECAST*, provide the preferred based aircraft, operations, and fleet mix forecasts. It is important to note that this forecast is independent of air cargo operations that may commence in conjunction with the planned development of the logistics facilities (Dallas Logistics Hub and Texas TriModal) adjacent to the Airport. These potential cargo operations are addressed in the Air Cargo section of this document, and their potential impact to future Airport development needs will be determined in consultation with the City of Lancaster.

Table B16 **PREFERRED BASED AIRCRAFT FORECAST**

Year	Single Engine Piston	Multi-Engine Piston	Multi-Engine Turbo-Prop	Corporate Jet	Experimental Jet	Rotor	Total
2008	116	24	2	1	11	11	165
2010	115	24	2	1	11	13	166
2015	114	22	3	3	11	18	171
2020	117	21	3	5	11	23	180
2025	126	20	4	8	11	29	198
2030	136	19	5	13	11	37	221

Sources: FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), and RW Armstrong Analysis.

Table B17 **PREFERRED AIRPORT OPERATIONS FORECAST**

	Itinerant Operations			Local Operations				
Year	**GA**	**MIL**	**Total**	**GA**	**MIL**	**Total**	**Total Ops**	**Based A/C**
2008	16,500	50	16,550	33,000	0	33,000	49,550	165
2009	16,500	50	16,550	33,000	0	33,000	49,550	165
2010	16,600	50	16,650	33,200	0	33,200	49,850	166
2011	16,600	50	16,650	33,400	0	33,400	49,850	166
2012	16,700	50	16,750	33,600	0	33,600	50,150	167
2013	16,800	50	16,850	34,000	0	34,000	50,450	168
2014	17,000	50	17,050	34,200	0	34,200	51,050	170
2015	17,100	50	17,150	34,600	0	34,600	51,350	171
2016	17,300	50	17,350	34,800	0	34,800	51,950	173
2017	17,400	50	17,450	35,200	0	35,200	52,250	174
2018	17,600	50	17,650	35,600	0	35,600	52,850	176
2019	17,800	50	17,850	35,600	0	35,600	53,450	178
2020	18,000	50	18,050	36,000	0	36,000	54,050	180
2021	18,400	50	18,450	36,800	0	36,800	55,250	184
2022	18,700	50	18,750	37,400	0	37,400	56,150	187
2023	19,100	50	19,150	38,200	0	38,200	57,350	191
2024	19,400	50	19,450	38,800	0	38,800	58,250	194
2025	19,800	50	19,850	39,600	0	39,600	59,450	198
2026	20,200	50	20,250	40,400	0	40,400	60,650	202
2027	20,700	50	20,750	41,400	0	41,400	62,150	207
2028	21,100	50	21,150	42,200	0	42,200	63,350	211
2029	21,600	50	21,650	43,200	0	43,200	64,850	216
2030	22,100	50	22,150	44,200	0	44,200	66,350	221

Sources: FAA *Aerospace Forecast* Fiscal Years 2009-2025, Lancaster Regional Airport records, U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), and RW Armstrong Analysis.

Note: The TxDOT 300 OPBA (200 local OPBA/100 itinerant OPBA) was used in this analysis.

Table B18 **PREFERRED FLEET MIX FORECAST**

Aircraft Type	2008	2010	2015	2020	2025	2030
Single Engine *Ex. Piston Cessna 172, Piper Arrow*	40,600	40,250	39,900	40,950	44,100	47,600
Multi-Engine Piston *Ex. Piper Seminole, Beech Baron*	8,400	8,400	7,700	7,350	7,000	6,650
Multi-Engine Turbo-Prop *Ex. King Air C90, King Air B200*	700	700	1,050	1,050	1,400	1,750
Jet *Ex. Lear 35, Citation II, Falcon 10*	4,200	4,200	4,900	5,600	6,650	8,400
Rotor *Ex. Bell 210, 427*	3,850	4,550	6,300	8,050	10,150	12,950
Total	57,750	58,100	59,850	63,000	69,300	77,350

Sources: Lancaster Regional Airport records, U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), FAA *Aerospace Forecast* Fiscal Years 2009-2025, and RW Armstrong Analysis.

Note: Military operations are not included.

For comparison purposes, the FAA TAF for Lancaster Regional Airport is provided again in Table B19, *FAA TERMINAL AREA FORECAST (2008-2030)*. As illustrated in the table, and in comparison to Airport reported based aircraft (165 GA aircraft), the TAF starts with an inflated based aircraft number for which future projections are derived. The TAF predicts a 35% increase in based aircraft through 2025 (and a 48% increase when data is extrapolated through 2030), while the preferred forecast indicates a more conservative 34% growth through 2030. In terms of operations, the TAF predicts a moderate 28% growth through 2025 (and a 37% increase when extrapolated through 2030), slightly below its projected 35% growth in based aircraft. Through 2030, the preferred forecast indicates a 34% growth in operations, directly in line with the based aircraft projections.

Table B19 **FAA TERMINAL AREA FORECAST (2008-2030)**

	Itinerant Operations			Local Operations				
Year	**GA**	**MIL**	**Total**	**GA**	**MIL**	**Total**	**Total Operations**	**Based A/C**
2008	18,282	50	18,332	27,420	0	27,420	45,752	232
2009	18,548	50	18,598	27,819	0	27,819	46,417	235
2010	18,817	50	18,867	28,223	0	28,223	47,090	240
2011	19,091	50	19,141	28,632	0	28,632	47,773	245
2012	19,369	50	19,419	29,048	0	29,048	48,467	248
2013	19,650	50	19,700	29,470	0	29,470	49,170	253
2014	19,935	50	19,985	29,898	0	29,898	49,883	258
2015	20,224	50	20,274	30,332	0	30,332	50,606	262
2016	20,518	50	20,568	30,773	0	30,773	51,341	267
2017	20,816	50	20,866	31,220	0	31,220	52,086	272
2018	21,118	50	21,168	31,674	0	31,674	52,842	276
2019	21,425	50	21,475	32,135	0	32,135	53,610	281
2020	21,736	50	21,786	32,601	0	32,601	54,387	287
2021	22,052	50	22,102	33,075	0	33,075	55,177	293
2022	22,373	50	22,423	33,555	0	33,555	55,978	296
2023	22,698	50	22,748	34,042	0	34,042	56,790	302
2024	23,028	50	23,078	34,537	0	34,537	57,615	308
2025	23,362	50	23,412	35,039	0	35,039	58,451	314
2026[1]	23,696	50	23,746	35,541	0	35,541	59,287	320
2027[1]	24,030	50	24,080	36,043	0	36,043	60,123	326
2028[1]	24,364	50	24,414	36,545	0	36,545	60,959	332
2029[1]	24,698	50	24,748	37,047	0	37,047	61,795	338
2030[1]	25,032	50	25,082	37,549	0	37,549	62,631	344

Source: FAA *Terminal Area Forecast* Fiscal Years 2008-2025. [1] The data for years 2026-2030 have been extrapolated.

C Air Cargo Analysis

INTRODUCTION. In May 2009, a review of near- and long-term outlooks for air cargo development at Lancaster Regional Airport was completed. The complete *Air Cargo Analysis* document is provided as an appendix. The following is a summary of the complete document.

Although the planning horizon for this consideration will likely exceed current economic viability expectations, ongoing industry developments will certainly shape the long-term because fewer prospects exist and an alternative cargo gateway strategy hinges on congestion at the primary gateways. It is also important to note that air cargo traffic actually fell about 20% at Texas' five biggest cargo airports between 2000 and 2008, erasing at least a decade's growth and extending the capacity lifespan of existing gateways by a similar span.

Section One: Air Cargo Business Models

Air cargo capacity is provided by carriers on freighter (all-cargo) and passenger (belly cargo) aircraft. So-called combination carriers operate both freighter and passenger flights. Capacity is often brokered by freight forwarders to end-user shippers (manufacturers and distributors).

Dominant in North America are **integrated carriers** FedEx and United Parcel Service (UPS), which operate both aircraft and trucks to provide more comprehensive services linking business, as well as residential delivery and pickup. The two accounted for over 40% of total cargo (55% of domestic cargo) at Dallas/Fort Worth International Airport (DFW) in December 2008 and FedEx is the sole scheduled cargo carrier at Fort Worth Alliance Airport (AFW). The two accounted for about 72% of domestic freight at DFW in calendar year 2008. This volume includes a nominal contribution from Addison-based contract carrier Martinaire Aviation.

No all-cargo airport in the U.S. has succeeded without being anchored by either FedEx or UPS because integrators alone possess the operating scale and internal resources (trucking and ground-handling among them) to sustain operations independent of other carriers. Both FedEx (AFW) and UPS (DFW) already have regional hubs in the Metroplex, leaving little cause for either to need significant local additional capacity.

UPS has located several regional hubs at secondary airports, but was satisfied that DFW could accommodate its long-term growth needs at the land-rich gateway. UPS and FedEx are also the U.S.'s two largest trucking companies and near-term expansion is likely to be limited to new trucking and air "spoke" operations.

Part of a $1.8 billion network expansion plan in North America, **FedEx** has added ten new distribution *trucking* hubs and expanded 19 others. FedEx's $300 million Southwestern hub at Alliance occupies 168 acres and the terminal about 600,000 square feet (SF). A general drop in demand and diversion from air to truck resulted in a 35% drop between 2007 and 2008. Even with the regional hub, FedEx maintained substantial operations at DFW to meet demands of local time-sensitive shippers, using Alliance for plane-to-plane transfers.

After acquiring assets of Airborne Express, former rival **DHL** recently announced it is exiting the U.S. domestic market to limit its focus to international shipments of U.S. origin/destination. In doing so, DHL has created another round of redundancies in on-airport cargo facilities, adding to vacancies already generated by the Airborne acquisition. By reducing its dedicated air capacity, DHL is also fortifying the dominance of traditional gateways where not only conventional freight forwarders, but also the forwarding divisions of integrated carriers, rely on lift provided by other carriers. Similarly, integrated forwarder **BAX Global** supplements capacity provided by Air Transport International with purchased capacity at DFW and other gateways.

Traditional all-cargo airlines offer airport-to-airport transport of heavy freight. "Wet lease" or ACMI (aircraft, crew, maintenance and insurance) providers operate cargo flights on a leased basis to other carriers and (less typically) to individual freight forwarders. All-cargo airlines may operate their own scheduled and chartered flights, selling space directly to freight forwarders and large industrial shippers. ACMI operators simply operate aircraft between points requested by their clients. Scheduled all-cargo airlines do the same for forwarders and large industrial shippers.

Except for major passenger hubs such as DFW, **passenger (belly) carriers** have ceded almost all domestic cargo market shares to integrated carriers. In December 2008, at DFW, American Airlines accounted for about 10% of total domestic freight, while all other passenger carriers accounted for only 1.3%. In contrast, American accounted for over 20% of DFW's total international cargo and, combined with British Airways and KLM, pure belly cargo carriers accounted for over 25%.

The ability to access that capacity, as well as additional frequencies and destinations often uniquely provided by passenger carriers, fortifies traditional passenger hubs as cargo gateways relied upon by international freight forwarders and large industrial shippers. Two passenger carriers, Lufthansa and Korean Air, operate both passenger and freighter flights at DFW. Adding five Asian carriers operating only freighters at DFW, but also passenger aircraft at other U.S. gateways to volumes of Lufthansa and Korean Air, combination carriers accounted for about 65% of DFW's international cargo in 2008.

Combined, pure belly and combination carriers accounted for almost 93% of DFW's international cargo. Such a concentration is troubling for Lancaster and any other would-be alternative because not only are passenger carriers somewhat captive to DFW, but combination carriers also extract tremendous efficiencies from collocating both their passenger and freighter operations. Moreover, pure belly, combination, and all-cargo carriers are tethered to major gateways by each other as complements and by major freight forwarders who use all of them. Furthermore, foreign flag carriers depend on American Airlines and others to interline cargo on domestic segments. Equity, alliances, and other relationships among carriers further limit carriers' flexibility from gateways.

Including the forwarder divisions of integrators, **freight forwarders** control the vast majority (about 76%) of international shipments. Forwarders' direct cargo income stems from the spread between what they pay airlines for capacity and what they charge their shipper-customers. To maximize that spread, forwarders must negotiate the lowest rate from carriers, but also must ensure that capacity will be available. To find the right balance of carrier competition (driving down rates) and available capacity for the greatest number of customers, air forwarders favor the largest gateways. Also critical are potential "recovery" options when shipments cannot be "flown as booked" due to mechanical issues or overbooking.

Section Two: Competition from Existing Sources of Airport Capacity

No alternative cargo airport development strategy is likely to succeed absent compelling evidence of need for an alternative. Rather than congestion resulting from rapid growth at the gateways, Alliance's cargo volumes ended 2008 more than 37% below 2000 annual volumes, while DFW was down a little more than 27% for the same period. Affected by national recession and its high-tech industry reeling from the dot.com fallout, Austin Bergstrom's air cargo fell almost 44%.

While total cargo fell 27%, **DFW** international cargo rose 113% between 2000 and 2008. International's share at DFW rose from 15% to 40% in the period. While regional hub carrier UPS has diverted volume from air to truck, DFW added several Asian freighter operators in recent years. DFW is one of the least likely U.S. gateways to suffer severe congestion in the near- to mid-term planning horizon. Airside, DFW is the only airport in the world capable of simultaneously accommodating a combination of seven takeoffs and landings. DFW hosts 24-hour operations with no slot constraints, no curfews and no restrictions. Moreover, DFW has continued adding cargo terminal capacity opening International Air Cargo Centre III and Logistics Centre in November 2005 to add 118,038 SF of warehouse space and three 747-400 parking positions. Recognizing the source of future air cargo growth, DFW has created an air service incentive program to offer landing fee rebates and marketing and launch support for new entrant cargo airlines.

Alliance Fort Worth (AFW) is home to the FedEx regional hub described in Section One, as well as an American Airlines maintenance base and Burlington Northern Santa Fe Railway (BNSF) intermodal yard. The FedEx hub single-handedly elevated AFW to being the 31st largest cargo airport (in annual tonnage) in North America, but its volume dropped more than 36% between 2000 and 2008. As with DFW, a decade's lost growth extends AFW's future capacity and diminishes the credibility of arguing that the Metroplex lacks capacity. Moreover, absent any scheduled commercial passenger operations, AFW has relatively uncongested airspace conditions, except for the FedEx operation. In spite of the ability to demonstrate cost-savings on the basis of airport operating costs, AFW has not attracted another all-cargo carrier apart from FedEx and its contract carriers. Instructively for Lancaster, claims that development around AFW might justify that carriers leaving DFW are weakened by the fact that time-sensitive international cargo is already trucked daily to/from DFW from Austin. Hence, trucking from one side of the Dallas/Ft. Worth Metroplex to the other is unlikely to be perceived as a compelling hardship.

Section Three: Case Studies of Alternative Cargo Gateways

That so few would-be alternative gateways have sustained success underscores the difficulty of attracting and then supporting air service. **Huntsville International Airport (HSV)** in Alabama is an alternative gateway with international flights dependent upon the commitment of Swiss-German forwarder Panalpina. Of about 79,000 tonnes of cargo in 2007 – only enough to rank #66 in North America – about 71,000 were attributable to the international operation. HSV is a full commercial airport with other aerospace operations and local industries attractive to the European forwarder and its contracted carrier-partners. Other **forwarder-led efforts** failed. After only a few months, Panalpina abandoned an attempted western version of its HSV operation at Victorville, California. Forwarder EGL Eagle attempted a scheduled-charter operation in Austin to serve Dell and other high-tech companies, but now routes those volumes over Houston and DFW. Swiss-German forwarder Danzas briefly "championed" scheduled-charter flights from Charlotte, North Carolina patterned after Panalpina's HSV operation, but deserted the effort after only a few flights.

In an example of **shipper-led development**, Nashville International Airport (BNA) garnered service from China Airlines in August 2001 specifically to serve Dell Computers, although area forwarders subsequently supplemented Dell's volumes with other regional consolidations. Interestingly, while Dell's current forwarder UPS Global Logistics has sustained the China Airlines service, UPS actually terminated its own air operation to pure trucking. Similarly, Indianapolis International Airport (IND) garnered international freighter flights from Luxembourg-based Cargolux to serve a trio of local pharmaceutical manufacturers willing to contractually commit to purchase capacity in exchange for the carrier's commitment of service.

The complete *Air Cargo Analysis* report in the Appendix also detailed cautionary examples of air cargo development. Columbus, Ohio's **Rickenbacker International Airport (LCK)** has been a successful economic engine for its region, but, in spite of a legacy FedEx operation, industrial tenants such as The Gap (part of 30 million SF of development in the surrounding industrial complexes) and a legacy Air Force Base, LCK has not yet broken even, but requires a subsidy from Columbus International Airport. Worse still, **MidAmerica Airport** (in Belleville, Illinois) has never landed a substantial scheduled carrier in spite of receiving $300 million in public funds – inspiring a 1998 segment called "Gateway to Nowhere" on the NBC Nightly News "Fleecing of America" series. To date, MidAmerica's cargo efforts have created only four full-time and 20 part-time jobs. Similarly, **North Carolina's Global TransPark** in Kinston, North Carolina peaked at 320 jobs (none of them in cargo) instead of the 55,000 promised in an early "feasibility study". Rather than the $2.8 billion annual economic impact projected, it drained more than $140 million in federal, state, and county funds without landing a single major air cargo tenant.

Not one example exists of a currently successful North American all-cargo airport not anchored by one of the integrated carriers, which uniquely have the resources necessary to support a stand-alone operation for an extended period of time. Integrated carriers bring their own aircraft, as well as the proprietary trucking resources, in-house forwarding divisions, and even ground-handling to support their own air operations. They also have the unique scale of operations in terms of internal volumes to potentially justify the extraordinary capital costs to make such a move. However, the Dallas/Ft. Worth Metroplex – uniquely – already hosts regional hubs for both remaining integrated carriers FedEx and UPS. Hence, the **carrier-driven** development approach (otherwise most obvious for Lancaster) is highly unlikely in the foreseeable planning horizon.

The most likely near- to mid-term prospects for development by either carrier at Lancaster Regional Airport would be either a ground operation or at best a very small feeder operation along the lines of the Caravan operation of Martinaire (described in Section One). The forwarder-led development by

Panalpina in Huntsville has not been replicated successfully in any other North American market. Shipper-led approaches that drew international cargo flights to Nashville and Indianapolis are only scarcely more viable. Lancaster has no local equivalent to Nashville's Dell computer manufacturing operation, or Indianapolis' pharmaceuticals manufacturers. Huntsville, Nashville, and Indianapolis are commercial airports largely sustained by non-cargo revenues, while Rickenbacker has never gained financial self-sufficiency relying on land development and local public subsidies.

Section Four: Lancaster Regional Airport Cargo Forecasts

Lancaster Regional Airport's cargo potential depends entirely on taking regional market share from DFW and/or AFW – whether diverting current operations or capturing anticipated new growth. Rather than growth, DFW and AFW have lost a combined 29% of their calendar year 2000 total air cargo volumes. International volumes – entirely at DFW – more than doubled during the same period, while domestic volumes were responsible for all of the losses.

In terms of methodology, **historical trend analysis** requires confidence that factors shaping recent experience continue to have the same influence in the future and best suits mature markets experiencing little instability over the last five to ten years. The period 2000-2008 has been anything but the stable, mature market recommended for this methodology.

Econometric modeling entails quantifying associations between the forecasted element – air cargo – and one or more variables, such as gross domestic product (GDP) or regional product, employment, population, income and/or fuel prices. However, due to extraordinary events during recent years, conventional correlates have detached from traditional relationships with cargo growth.

Given imperfections in historical trend analysis and econometric modeling, forecasters must shape their judgments through **interviews** of operators. This study involved interviews with airport management, economic developers, and carriers already serving the Metroplex. It must be recognized that Lancaster Regional Airport presently has no scheduled air service and that it competes with international gateway and regional cargo hub airports in the Metroplex. This circumstance elevates the role of judgment in forecasting. In addition, this means that Lancaster's potential air cargo development will be less influenced by individual commodities that may easily be trucked to either of the two gateway airports. Therefore, local production is not used as a primary driver; although, examples of potential industry that could change the industrial landscape have been offered in earlier sections. Rather, Lancaster's forecasts are largely calibrated by current cargo tonnages and operations of actual carriers at other area airports.

Given not one North American all-cargo airport has sustained success without being anchored by a substantial (usually a regional hub) operation by one of the integrated carriers and the unique presence of hubs for both FedEx and UPS already in the Metroplex area, **the consulting team projects the most likely forecast for Lancaster Regional Airport, in terms of scheduled cargo tonnage, is zero throughout the next 20 years**. Given the combined remaining capacity at DFW and AFW, justification to support a third metroplex area cargo airport is lacking. While, conventionally, the forecasted Base Case is also the most likely scenario; the "zero-cargo scenario" is this forecast's Low Case.

The Base Case forecast is shaped by the following assumptions:

- **A) Lancaster will only attract domestic cargo feeder service, while international service will continue to be accommodated at DFW and integrator traffic – apart from perhaps the Lancaster feeder flights – which will remain split between DFW and AFW.**
- **B) Initial operating volumes were established using 2008 cargo totals for a small aircraft all-cargo carrier currently operating at DFW. Unlikely to split such a small operation, 100% of that carrier's total annual volume has been moved to Lancaster in this model.**
- **C) The average annual growth rate projected by Boeing (2.6%) for intra-North America is used for Years 2-10. For Years 11-20, the consultant projects an annual growth rate (3.0%) that is higher in recognition of exceptional economic growth anticipated by area developers for the southern part of the Metroplex.**

Table C1 **BASE CASE AIR CARGO FORECASTS/ LANCASTER REGIONAL AIRPORT (METRIC TONNES)**

Year	Domestic Freight	Annual Growth %	Annual Growth in Tonnes
1	1,375	---	---
2	1,411	2.60%	36
3	1,447	2.60%	37
4	1,485	2.60%	38
5	1,524	2.60%	39
10	1,732	2.60%	44
15	2,008	3.00%	58
20	2,328	3.00%	68

Source: Webber Air Cargo, Inc.

The product of the preceding methodology would be a Year 1 total of 1,375 metric tonnes of freight, and, at Year 20, annual volumes would grow to 2,328 tonnes. Based on 286 operating days per year, two inbound and two outbound flights/day with conventional cargo feeder aircraft (Cessna 208A or B up to Fokker F-27, ATR-42 and ATR-72) would be more than adequate.

The High Case forecast is shaped by the following assumptions:

A) **For Years 1 through 10, Lancaster Regional Airport will attract only domestic cargo feeder service, as in the Base Case, but with slightly higher growth rates ultimately more aligned with domestic forecasts by Airbus rather than Boeing.**

B) **Beginning in Year 11, and again in Year 16, the forecasts have introduced additional freighter operators using annual tonnages roughly representative of actual carriers now operating at DFW.**

C) **Between Years 11 and 20, Domestic Cargo grows at the relatively lower growth rate typical of the mature North American market, but with a stimulus caused by access to air service for local shippers. Given market forces explored in this *Air Cargo Analysis*, even the High Case scenario precludes Lancaster Regional Airport developing any international service, maintaining that the forwarder base and other forces will keep such service at DFW.**

Table C2 **HIGH CASE AIR CARGO FORECASTS/ LANCASTER REGIONAL AIRPORT (METRIC TONNES)**

Year	Domestic Freight	Annual Growth % Domestic	Annual Growth Tonnes
1	1,375	---	---
2	1,415	2.90%	40
3	1,456	2.90%	41
4	1,498	2.90%	42
5	1,542	2.90%	43
10	1,778	2.90%	50
11*	9,123	3.30%	7,345
12	9,424	3.30%	301
13	9,735	3.30%	311
14	10,056	3.30%	321
15	10,388	3.30%	332
16*	18,017	3.30%	7,629
17	18,612	3.30%	595
18	19,226	3.30%	614
19	19,860	3.30%	634
20	20,516	3.30%	655

Source: Webber Air Cargo, Inc. * Years in which growth rates are distorted by projected introduction of a new carrier.

The product of the preceding methodology would be the same as the Base Case for Year 1, but would grow dramatically faster in the forecast's second decade, producing a Year 20 annual volume of 20,516 metric tonnes. However, it bears repeating that the consultant believes the High Case scenario is beyond the reach of Lancaster Regional Airport for the immediate 20-year planning horizon and that most likely Lancaster will develop no scheduled air cargo service or, at a maximum, only the Base Case's small feeder aircraft operation. Given sustained losses industry-wide in recent years, carriers are more likely to shrink capacity than to expand into a third cargo airport within the Metroplex.

Information gathered indicates that the absence of scheduled air cargo service at Lancaster Regional Airport will not hinder local economic development. The recognition that a significant air cargo operation is unlikely to occur at the Airport in the foreseeable future will also aid in establishing realistic development priorities for the Airport and its constituents. Both developers of nearby logistics parks suggested their emphases have been on intermodal (rail/truck) service providers and users, while air cargo service would be nothing more than a "bonus". Given the focus of FedEx and UPS to maximize productivity of their surface transportation systems in the U.S. domestic market, it still behooves Lancaster to market itself aggressively to the two integrators, but initially emphasize rail and truck capabilities with the Airport's utilization a long-term possibility.

D Demand Capacity Analysis and Facility Requirements

INTRODUCTION. The capacity of an airfield is primarily a function of the major aircraft operating surfaces that compose the facility and the configuration of those surfaces (runways and taxiways). However, it is also related to and considered in conjunction with wind coverage, airspace utilization, and the availability and type of navigational aids. Capacity refers to the number of aircraft operations that a facility can accommodate on either an hourly or yearly basis, which will be covered in the Demand Capacity Analysis section. On the other hand, facility requirements are used to determine the facilities needed to meet the forecast demand related to the existing and forecast aircraft fleet (in reference to the size and weight of aircraft) at Lancaster Regional Airport.

The evaluation provided below analyzes airfield capacity, along with providing information related to requirements for runway length, dimensional criteria (pavement widths, safety setbacks, object clearing standards, etc.), aircraft parking aprons, hangars, and vehicular access.

Airfield Capacity Methodology

The evaluation method used to determine the capability of the airside facilities to accommodate aviation operational demand is described in the following narrative. Evaluation of this capability is expressed in terms of potential excesses and deficiencies in capacity. The methodology used for the measurement of airfield capacity in this study is described in Federal Aviation Administration (FAA) Advisory Circular 150/5060-5, *Airport Capacity and Delay*. From this methodology, airfield capacity is defined in the following terms:

- **Hourly Capacity of Runways:** The maximum number of aircraft that can be accommodated under conditions of continuous demand during a one-hour period.
- **Annual Service Volume:** A reasonable estimate of an airport's annual capacity (i.e., level of annual aircraft operations that will result in an average annual aircraft delay of approximately one to four minutes).

The capacity of an airport's airside facilities is a function of several factors. These factors include the layout of the airfield, local environmental conditions, specific characteristics of local aviation demand,

and air traffic control requirements. The relationship of these factors and their cumulative impact on airfield capacity are examined in the following paragraphs.

Airfield Layout

The arrangement and interaction of airfield components (runways, taxiways, and ramp entrances) refers to the layout or "design" of the airfield. As previously described, Lancaster Regional Airport (KLNC) is served by one runway, Runway 13/31. The Airport has a system of parallel and connector taxiways that connect to the terminal apron and hangar areas located on the west side of the Airport.

Several taxiways provide access from the runway to the terminal area and aviation facilities. Taxiway "A" is a full parallel taxiway located 300 feet west of the runway (runway centerline to taxiway centerline), providing access to Runway 13/31. Taxiway "A" is 49 feet wide between Taxiways "B" and "C", 46 feet wide between Taxiways "C" and "E", and 41 feet wide between Taxiways "E" and "F". Taxiway "B" is a connector taxiway that connects the approach end of Runway 13 to the north end of the aircraft parking apron. Taxiway "B" is 100 feet wide from Taxiway "A" to the Runway 13 threshold, and from Taxiway "A" to the edge of the apron it is 40 feet wide. Taxiway "C" is a 40-foot wide connecter taxiway, providing access from the runway to the south end of the apron. Taxiway "E" is a 40-foot wide connector taxiway providing access to the south end of the runway via Taxiway "A", and is located between Taxiways "D" and "F". Taxiway "F" is located at the Runway 31 end, providing access to Taxiway "A". Taxiway "F" is 100 feet wide.

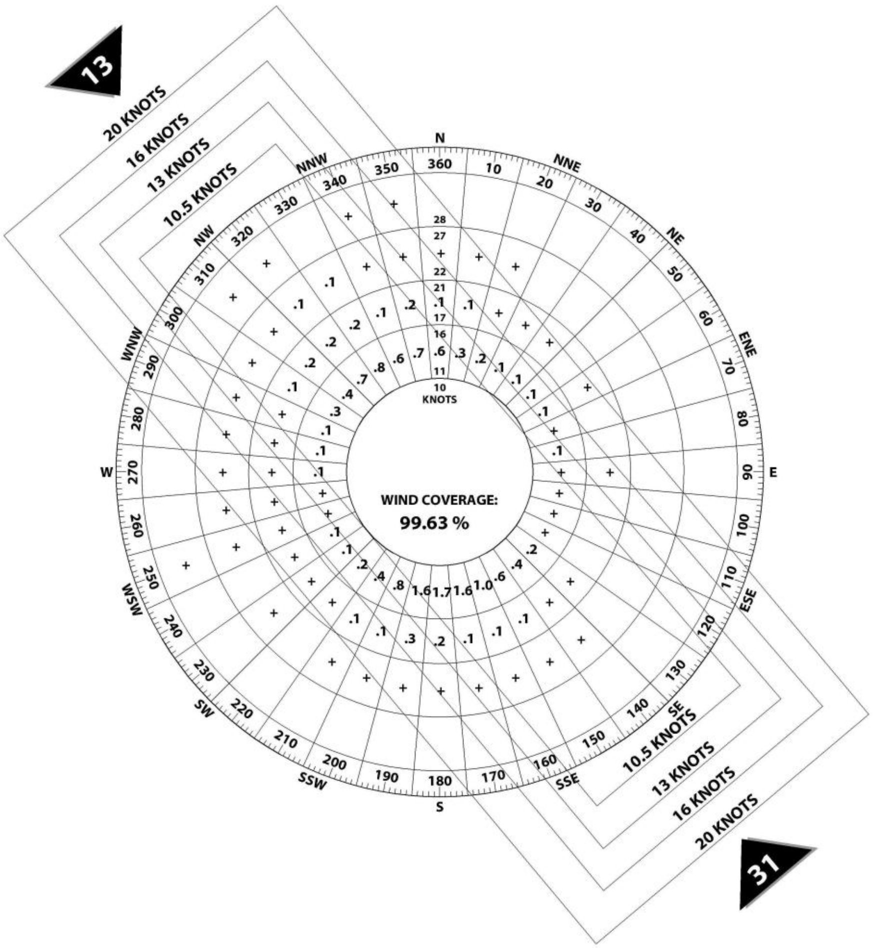
Environmental Conditions

Climatological conditions specific to the location of an airport not only influence the layout of the airfield, but also affect the use of the runway system. Surface wind conditions have a direct effect on the operation of an airport; runways not oriented to take the fullest advantage of prevailing winds will restrict the capacity of the Airport to varying degrees. When landing and taking off, aircraft are able to operate properly on a runway as long as the wind component perpendicular to the direction of travel (defined as a crosswind) is not excessive.

To determine wind velocity and direction at Lancaster Regional Airport, wind data to construct the all weather wind rose was obtained for the period 2004-2009 from observations taken at the Airport (from data gathered by the National Oceanic and Atmospheric Administration, National Climatic Data Center). The appropriate maximum crosswind component is dependent upon the Airport Reference Code (ARC) for the type of aircraft that use the Airport on a regular basis. As identified later in this chapter, the current ARC for Runway 13/31 is ARC C/D-II.

According to FAA AC 150/5300-13, *Airport Design*, for ARC-A-I and B-I airports, a crosswind component of 10.5 knots is considered maximum. For ARC A-II and B-II airports, a crosswind component of 13 knots is considered maximum. For ARC A-III, B-III, and C-I through D-III airports, a crosswind component of 16 knots is considered maximum. Finally, for ARC A-IV through D-VI airports, a crosswind component of 20 knots is considered maximum. In consideration of the Airport's ARC C/D-II classification, these standards specify that a maximum crosswind of 16 knots be considered in the analysis. For informational purposes, the 20-knot crosswind component is also included. In addition, it is known that the Airport will also continue to serve small single and twin-engine aircraft for which the 10.5-knot and 13-knot crosswind component is considered maximum; therefore, four crosswind components are important to be analyzed for this airport (the 10.5-knot, the 13-knot, the 16-knot, and the 20-knot). The following illustration, entitled *ALL WEATHER WIND ROSE*, illustrates the all weather wind coverage provided at Lancaster Regional Airport.

Figure D1 **ALL WEATHER WIND ROSE: 10.5-, 13-, 16-, AND 20-KNOT CROSSWIND COMPONENTS**



Source: National Oceanic and Atmospheric Administration, National Climatic Data Center. Station 72214 Lancaster, Texas. Period of Record 2004-2009.

Note: 41,224 total recorded observations during the period of record.

The following table, Table C1, entitled *ALL WEATHER WIND COVERAGE SUMMARY*, quantifies the wind coverage offered by the runway under all weather metrological conditions.

Table D1 **ALL WEATHER WIND COVERAGE SUMMARY**

	Wind Coverage Provided Under All Weather Conditions			
	10.5-Knot	13-Knot	16-Knot	20-Knot
Runway 13/31	95.83%	98.32%	99.65%	99.95%
Runway 13	83.37%	85.29%	86.38%	86.64%
Runway 31	71.75%	72.69%	73.36%	73.48%

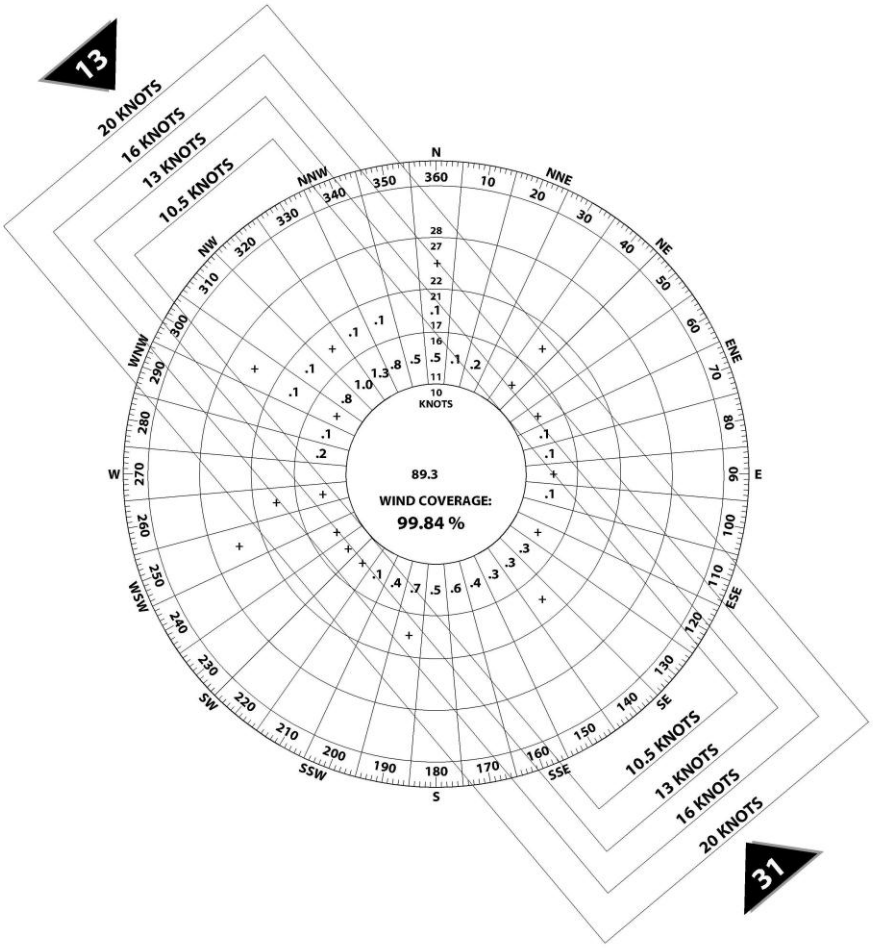
Source: National Oceanic and Atmospheric Administration, National Climatic Data Center. Station 72214. Lancaster, Texas. Period of Record 2004-2009, and tailwind component of five knots.

Notes: Wind analysis tabulation provided by BARNARD DUNKELBERG & COMPANY utilizing the FAA Airport Design Software supplied with FAA AC 150/5300-13. 41,224 total recorded observations during the period of record.

The desirable wind coverage for an airport is 95%. This means that the runways should be oriented so that the maximum crosswind component does not exceed more than 5% of the time. Runway 13/31 provides 95.83% wind coverage for the 10.5-knot crosswind component, 98.32% wind coverage for the 13-knot crosswind component, 99.65% wind coverage for the 16-knot crosswind component, and 99.95% for the 20-knot crosswind component. This analysis indicates that the existing runway configuration provides adequate wind coverage for the 10.5-knot, 13-knot, 16-knot, and the 20-knot crosswind components. No new runways will be recommended to provide additional wind coverage.

In an effort to analyze the effectiveness of the Airport's existing instrument approach capabilities, an Instrument Flight Rules (IFR) wind rose has been constructed and is presented in the following figure. Again, wind data from Lancaster Regional Airport have been used in the construction of the IFR wind rose.

Figure D2 **IFR[1] WIND ROSE: 10.5-, 13-, 16-, AND 20-KNOT CROSSWIND COMPONENTS**



Source: National Oceanic and Atmospheric Administration, National Climatic Data Center. Station 72214 Lancaster, Texas. Period of Record, 2004-2009.

Notes: 2,194 total recorded observations during the period of record.
[1] Ceiling of less than 1,000 feet, but equal to or greater than 200 feet and/or visibility less than three miles, but equal to or greater than 1/2 mile.

The all weather and IFR wind roses above represent documented wind speed and directions, converted to a percentage of total observations recorded at Lancaster Regional Airport during 2004-2009. The following table, Table D2, entitled *IFR WIND COVERAGE SUMMARY*, quantifies the wind coverage offered by Runway 13/31 under IFR meteorological conditions.

Table D2 **IFR WIND COVERAGE SUMMARY**

	Wind Coverage Provided Under IFR[1] Weather Conditions			
	10.5-Knot	**13-Knot**	**16-Knot**	**20-Knot**
Runway 13/31	98.16%	99.30%	99.84%	99.94%
Runway 13	81.49%	82.34%	82.75%	82.80%
Runway 31	78.55%	78.98%	79.28%	79.38%

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center. Station 72214 Lancaster, Texas. Period of Record, 2004-2009.

Notes: Wind analysis tabulation provided by Barnard Dunkelberg & Company utilizing the FAA Airport Design Software supplied with FAA AC 150/5300-13. 2,194 total recorded observations during the period of record.

[1] Ceiling of less than 1,000 feet, but equal to or greater than 200 feet and/or visibility less than three miles, but equal to or greater than 1/2 mile.

From this IFR wind coverage summary, it can be determined that, if a single runway is considered, the orientation of Runway 13 would offer the best wind coverage during all weather and instrument meteorological conditions (although under instrument meteorological conditions, the number is almost equal). Straight-in instrument approach capabilities are currently only provided for Runway 31. It is a goal of the City of Lancaster to improve the instrument approach capabilities at the Airport; therefore, the steps necessary to implement such improvements will be identified in the development program and financial program specific in this document.

Characteristics of Demand

Certain site-specific characteristics related to aviation use and aircraft fleet mix impact the capacity of the airfield. These characteristics include aircraft mix, runway use, percent arrivals, touch-and-go operations, exit taxiways, and air traffic control rules.

Aircraft Mix. The capacity of a runway is dependent upon the type and size of the aircraft that use the facility. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, categorizes aircraft into four classes based on maximum certificated takeoff weight. This differs from the Airport Reference Code defined previously, which classifies aircraft based on aircraft approach speed (A-E). For aircraft mix, aircraft Classes A and B consist of small single engine and twin-engine aircraft (both prop and jet), weighing 12,500 pounds or less, which are representative of the general aviation fleet. Class C and D aircraft are larger jet and propeller aircraft typical of the business jet fleet, along with those aircraft used by the airline industry and the military.

Lancaster Regional Airport has no operations by Class D aircraft (over 300,000 pounds), nor are any expected to occur in the future. Because no records are kept with regard to classification of aircraft by weight at Lancaster Regional Airport, it has been assumed that Class C aircraft operations at the Airport are primarily executive type prop and jet general aviation aircraft. Aircraft mix is defined as the relative percentage of operations conducted by each of these four classes of aircraft. The aircraft mix for Lancaster Regional Airport is depicted in the following table entitled *AIRCRAFT CLASS MIX FORECAST, 2009-2030.*

Table D3 **AIRCRAFT CLASS MIX FORECAST, 2009-2030**

	VFR Conditions			IFR Conditions		
Year	**Class A & B**	**Class C**	**Class D**	**Class A & B**	**Class C**	**Class D**
2009[1]	93%	7%	0%	88%	12%	0%
2010	93%	7%	0%	88%	12%	0%
2015	92%	8%	0%	87%	13%	0%
2020	91%	9%	0%	86%	14%	0%
2025	90%	10%	0%	85%	15%	0%
2030	89%	11%	0%	84%	16%	0%

Source: Barnard Dunkelberg & Company.

Notes:
Class A - Small Single Engine, < 12,500 pounds.
Class B - Small Twin-Engine, < 12,500 pounds.
Class C - 12,500-300,000 pounds.
Class D - > 300,000 pounds.
[1] Actual.

Runway Use. The use configuration of the runway is defined by the number, location, and orientation of the active runway(s) and relates to the distribution and frequency of aircraft operations to those facilities. Both the prevailing winds in the region and the existing runway facility at Lancaster Regional Airport combine to dictate the utilization of the existing runway system. According to airport observations, Runway 13 is the most utilized runway end, with an estimated 90% of runway operations being conducted in a southerly direction and operations to the north (Runway 31) being conducted about 10% of the time annually.

Percent Arrivals. Runway capacity is also significantly influenced by the percentage of all operations that are arrivals. Because aircraft on final approach are typically given absolute priority over departures, higher percentages of arrivals during peak periods of operations reduce the Annual Service Volume (ASV). The operations mix occurring on the runway system at Lancaster Regional Airport reflects a general balance of arrivals to departures. Therefore, it was assumed in the capacity calculations that arrivals equal departures during the peak period.

Touch-and-Go Operations. A touch-and-go operation refers to an aircraft maneuver in which the aircraft performs a normal landing touchdown followed by an immediate takeoff without stopping or taxiing clear of the runway. These operations are normally associated with training and are included in local operations figures. Touch-and-go (local) operations comprise approximately 25% of the local general aviation operations at the Airport (according to airport staff). The majority of aircraft operations (approximately 67%) are conducted by local aircraft. It is anticipated that local aircraft operations will continue to remain at least 67%, and itinerant aircraft operations will remain at least 33% of total operations throughout the 20-year planning period.

Exit Taxiways. The capacity of a runway is greatly influenced by the ability of an aircraft to exit the runway as quickly and safely as possible. Therefore, the quantity and design of the exit taxiways can directly influence aircraft runway occupancy time and the capacity of the runway system. The number of exit taxiways at Lancaster Regional Airport appears adequate for existing operations. However, from a capacity standpoint, some improvements might be made. The capacity analysis gives credit to only those runway exit taxiways located between 3,000 and 5,500 feet from the threshold of each runway. The demand and potential for future taxiway locations will be examined as the Airport Conceptual Development Plan is formulated.

Air Traffic Control Rules. The FAA specifies separation criteria and operational procedures for aircraft near an airport contingent upon aircraft size, availability of radar, and sequencing of operations (both advisory and/or regulatory) that may be in effect at the Airport. The impact of air traffic control on runway capacity is most influenced by aircraft separation requirements dictated by the mix of aircraft utilizing the Airport. Although the Airport is located inside the Dallas/Fort Worth Class B terminal area airspace, there are no significant impacts to operational capacity.

Airfield Capacity Analysis

As previously described, the determination of capacity for Lancaster Regional Airport uses the methodology described in the FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, along with the Airport Design Software computer program that accompanies AC 150/5300-13, *Airport Design*. Several assumptions are incorporated in these capacity calculations: arrivals equal departures, the percent of touch-and-go operations is between zero and 50% of total operations, there is a full-length parallel taxiway with ample exits and no taxiway crossing problems, there are no airspace limitations, the Airport has at least one runway equipped with an ILS, IFR weather conditions occur roughly 5% of the time, and, approximately 80% of the time, the Airport is operated with the runway use configuration that produces the greatest hourly capacity.

It is recognized that at least one of these "ideal" assumptions [the Airport does not have an instrument approach providing Category (CAT) I ILS minimums] is not totally appropriate for Lancaster Regional Airport. It remains important to understand the capacity of the runway system under most optimal conditions to help determine future facility needs. Applying information generated from the analysis described, the optimized capacity for the Airport's runway system can be formulated in terms of the following results:

- **Hourly Capacity of Runways** (VFR and IFR)
- **Annual Service Volume** (ASV)

Under ideal conditions, for an airport with a fleet mix similar to Lancaster Regional Airport, the ASV is estimated to be around 230,000 operations, with a VFR capacity of roughly 98 operations per hour, and an IFR capacity of approximately 59 operations per hour. As can be seen, this estimated ASV is less than the number of annual operations forecast for the end of the planning period (77,350). Thus, the Airport will continue to operate well below the level where unacceptable delays are likely to occur.

Ground Access Capacity

Ground demands for the existing facilities at Lancaster Regional Airport access the site from driveways along Ferris Road, a two-lane local road. Current demand for access and parking are being met by the existing facilities on the west side of the airfield.

To accommodate future growth at the Airport, a potential development area is identified on the east side of the airfield. The City of Lancaster's Master Plan shows a major four-lane arterial running along this eastern side of the Airport, which would provide ground access for future development. The eastern side of the Airport would also be the best choice for linking a spur to the Airport.

Facility Requirements

This section presents the analysis of requirements for airside and landside facilities necessary to meet aviation demand at Lancaster Regional Airport. For those components determined to be deficient, the type and size of facilities required to meet future demand are identified. Airside facilities examined include the runways, taxiways, runway protection zones, thresholds, and navigational aids. For the purposes of this analysis, landside facilities include such facilities as hangars, aircraft apron areas, and airport support facilities.

This analysis uses the growth scenario set forth in the forecast of demand for establishing future development needs at the Airport. This is not intended to dismiss the possibility that, due to the unique circumstances in the region, either accelerated growth or consistently higher or lower levels of activity may occur. Aviation activity levels should be monitored for consistency with the forecasts. In the event of changes, the schedule of development should be adjusted to correspond to the demand for facilities rather than be set to predetermined dates of development. By doing this, over-building or under-building can be avoided.

Airport Reference Code (ARC)/Design Aircraft Analysis

The types of aircraft presently utilizing an airport and those projected to utilize the facility in the future are important considerations for planning airport facilities. An airport should be designed in accordance with the Airport Reference Code (ARC) standards that are described in AC 150/5300-13, *Airport Design*. The ARC is a coding system used to relate and compare airport design criteria to the operational and physical characteristics of the aircraft intended to operate at the airport.

The ARC has two components that relate to the airport's "Design Aircraft" (often referred to as the critical aircraft). The first component, depicted by a letter (i.e., A, B, C, D, or E), is the aircraft approach category and relates to aircraft approach speed based upon operational characteristics. The second component, depicted by a Roman numeral (i.e., I, II, III, IV, or V), is the aircraft design group and relates to aircraft wingspan (physical characteristic).

Generally speaking, aircraft approach speed applies to runways and runway-related facilities, while aircraft wingspan is primarily related to separation criteria associated with taxiways and taxilanes. Examples of aircraft by ARC are illustrated in the following figure entitled *REPRESENTATIVE AIRCRAFT BY AIRPORT REFERENCE CODE (ARC) DESIGNATION.*

ARC A-I
Single-Engine Aircraft - 2 to 6 Seats
Beech Bonanza
deHaviland DHC-2 Beaver
Cessna-150

ARC B-I
Twin-Piston Aircraft - 4 to 10 Seats
Beech King Air B100
Piper 31-310 Navajo
Beech Baron 58

ARC B-I
Very Light Jet/Small Cabin 4-6 Seats
Eclipse 500
Citation Mustang
Adam Aircraft A700

ARC B-II
Twin-Turboprop/Business Jet/Small Cabin Aircraft
6 to 12 Seats - *Includes most commercial turboprop aircraft.*
Cessna Citation II/III/VII
Dassault Falcon 50
Dassault Falcon 900

ARC C/D-II
Commercial/Business Jet - 6 to 70 Seats
Bombardier CRJ-700
Bombardier CL-600 Challenger
Embraer ERJ-145

ARC C/D-III
Large Commercial/Business Jet - 14 to 160 Seats
Boeing 737-800
Boeing 727-200
Bombardier BD-700 Global Express
Boeing 757 (C-IV)
McDonnell Douglas (MD-83)

ARC C/D-IV
Large Commercial Jet - 243 to 255 Seats
Boeing 767
Boeing 757

Figure D3 **Representative Aircraft By Airport Reference Code (ARC) Designation**

Source: Aircraft Ground Service Guide, 2002 and Aircraft Manufacturer.
Note: Representative Aircraft Not to Scale.

The 2006 *Master Plan Update* determined the Beech Super King Air 200 (ARC B-II) as the existing "Design Aircraft" for the Airport, and identified the Gulfstream IV (ARC D-II) as the ultimate "Design Aircraft."

Runway 13/31 is currently designated to accommodate ARC C-II aircraft. Typical ARC C-II and D-II aircraft include the Canadair CL-600 (currently based at the Airport), Cessna Citation X, Gulfstream III, and the Gulfstream IV. The design requirements for ARC C-II and D-II are essentially the same; therefore, the existing Airport Reference Code for the Airport has been identified as ARC C/D-II.

As presented in the *Forecasts of Aviation Activity* chapter, multi-engine turbo-prop and business jet operations are anticipated to steadily increase throughout the 20-year planning period. With these considerations in mind, at a minimum, the ARC for Runway 13/31 should remain C/D-II; however, in consideration of other potential "future roles" for the Airport, several "future ARCs" are considered in the next chapter, *Development Concepts and Alternatives*. These include:

- **ARC C/D-II:** This type of airport supports regular use by aircraft as large as a Gulfstream IV. This is the Airport's existing ARC.
- **ARC C/D-III:** This type of airport can support regular use by aircraft as large as the new "very large" business jets (i.e., Gulfstream V, Canadair Global Express, Boeing Business Jet), along with aircraft used in typical regional cargo hub-feeder operations (e.g., ATR-72, DHC Dash 8, etc.).
- **ARC C/D-IV:** This type of airport can support regular use by aircraft used in a national cargo service cargo operation (e.g., Boeing 757, Boeing 767, etc.).

Facility information, standards, and requirements for these potential "future roles" and their associated ARCs, runway lengths, etc. are provided in the following pages.

Airside Facilities

Dimensional Criteria. The FAA Advisory Circular 150/5300-13, *Airport Design*, recommends standard widths, minimum clearances, and other dimensional criteria for runways, taxiways, safety areas, aprons, and other physical airport features. Dimensions are recommended with respect to the Aircraft Approach Category and Airplane Design Group (ADG) designations (as noted above, combine the approach category and the ADG = the ARC), and availability and type of approach instrumentation. Existing dimensions and the corresponding dimensional standard design criteria applicable to Lancaster Regional Airport are contained in the following tables. One table is provided for each potential "future role" identified above.

As identified in the following tables, the facilities at Lancaster Regional Airport meet or exceed all of the appropriate requirements for the current ARC (ARC C/D-II with instrument approach visibility minimums greater than ¾-mile) and should be maintained accordingly. Historically, all taxiways at the Airport have been constructed in accordance with ADG II standards with instrument approach visibility minimums greater than ¾-mile; however, it is recommended that any future taxiways be designed and constructed to accommodate instrument approach visibility minimums lower than ¾-mile. This will require that the distance between the runway centerline and the parallel taxiway centerline be increased from 300 feet to 400 feet. The runway/taxiway extension is planned to accommodate this standard.

For "future role" alternative comparison purposes, the criteria listed for ARC C/D-III and for ARC C/D-IV are provided in Tables D5 and D6. It can be noted that primary changes in the criteria for ARC C/D-III compared to ARC C/D-II are related to the taxiway pavement width, along with the width of the taxiway safety and object free areas. The taxiway width increases even more (to 75') with ADG C/D-IV criteria. The widths of the taxiway safety and object free areas also further increase in width. In addition, the width of the runway required for ADG C/D-IV increases to 150 feet.

Table D4 **ARC C-II/D-II RUNWAY DIMENSIONAL STANDARDS, RUNWAY 13/31 (in feet)**

Existing Item	Existing Dimension	ARC C-II/D-II with not lower than ¾-mile visibility minimums[1]	ARC C-II/D-II with lower than ¾-mile visibility minimums
Runway 13/31			
Runway Width	100	100	100
Runway Shoulder Width	---	10	10
Runway Centerline to Parallel Taxiway Centerline (Taxiway "A")	300[2]	300	400
Runway Centerline to Aircraft Parking	696	400	500
Runway Centerline to Holdline	250	250	250
Runway Safety Area Width	500	500[3]	500[3]
Runway Safety Area Length Beyond Runway End			
Runway 13	1,000	1,000	1,000
Runway 31	1,000	1,000	1,000
Runway Safety Area Length Prior to Landing Threshold			
Runway 13	600	600	600
Runway 31	600	600	600
Runway Object Free Area Width	800	800	800
Runway Object Free Area Length Beyond Runway End			
Runway 13	1,000	1,000	1,000
Runway 31	1,000	1,000	1,000
Runway Obstacle Free Zone Width	400	400	400
Runway Obstacle Free Zone Length Beyond Runway End (both runways)	200	200	200
Threshold Siting Surface Criteria			
Runway 13	Criteria Met[4]	Criteria Met[5]	Criteria Met[6]
Runway 31	Criteria Met[4]	Criteria Met[5]	Criteria Met[6]
Taxiway "A" Width	41-49	35	35
Taxiway Safety Area Width	79	79	79
Taxiway Object Free Area Width	131	131	131
Taxilane Object Free Area Width	115	115	115

Source: Federal Aviation Administration.AC 150/5300-13.

Notes: Existing dimensions delineated in **bold** text reflect potential non-standard criteria. N.D. = Not Determined.

(1) Existing runway approach visibility minimums = 1 Mile.

(2) The future taxiway centerline (south end) will be located 400 feet from the runway centerline in conjunction with the programmed 20099 runway/taxiway extension.

(3) A runway safety area width of 400 feet is permissible for ARC C-I and C-II. Reference AC 150/5300-13, Change 12.

(4) Applies existing type 3 criteria to Runway 13 and type 6 criteria to existing Runway 31 from Appendix 2, AC 150/5300-13, Change 15, Table A2-1, *Approach/Departure Requirements Table*.

(5) Applies type 3 to Runway 13 and type 8 criteria to the programmed/extended Runway 31 end.
(6) Applies to type 9 criteria to the Runway 13 and the programmed/extended Runway 31 end.

TableD5 **ARC C-III/D-III RUNWAY DIMENSIONAL STANDARDS, RUNWAY 13/31 (in feet)**

Existing Item	Existing Dimension	ARC C-III/D-III with not lower than ¾-mile visibility minimums[1]	ARC C-III/D-III with lower than ¾-mile visibility minimums
Runway 13/31			
Runway Width	100	100	100
Runway Shoulder Width	---	20	20
Runway Centerline to Parallel Taxiway Centerline (Taxiway "A")	**300**[2]	400	400
Runway Centerline to Aircraft Parking	696	500	500
Runway Centerline to Holdline	250	250	250
Runway Safety Area Width	500	500	500
Runway Safety Area Length Beyond Runway End			
Runway 13	1,000	1,000	1,000
Runway 31	1,000	1,000	1,000
Runway Safety Area Length Prior to Landing Threshold			
Runway 13	600	600	600
Runway 31	600	600	600
Runway Object Free Area Width	800	800	800
Runway Object Free Area Length Beyond Runway End			
Runway 13	1,000	1,000	1,000
Runway 31	1,000	1,000	1,000
Runway Obstacle Free Zone Width	400	400	400
Runway Obstacle Free Zone Length Beyond Runway End (both runways)	200	200	200
Threshold Siting Surface Criteria			
Runway 13	Criteria Met[3]	Criteria Met[4]	Criteria Met[5]
Runway 31	Criteria Met[3]	Criteria Met[4]	Criteria Met[5]
Taxiway "A" Width	**41-49**	50	50
Taxiway Safety Area Width	**79**	118	118
Taxiway Object Free Area Width	**131**	186	186
Taxilane Object Free Area Width	**115**	162	162

Source: Federal Aviation Administration Advisory Circular 150/5300-13.

Notes: Existing dimensions delineated in **bold** text reflect potential non-standard criteria. N.D. = Not Determined.

(1) Existing runway approach visibility minimums = 1 Mile.

(2) The future taxiway centerline (south end) will be located 400 feet from the runway centerline in conjunction with the programmed 2009 runway/taxiway extension.

(3) Applies existing type 3 criteria to Runway 13 and type 6 criteria to existing Runway 31 from Appendix 2, AC 150/5300-13, Change 15, Table A2-1, *Approach/Departure Requirements Table*.

(4) Applies type 3 to Runway 13 and type 8 criteria to the programmed/extended Runway 31 end.
(5) Applies to type 9 criteria to Runway 13 and the programmed/extended Runway 31 end.

Table D6 **ARC C-IV/D-IV RUNWAY DIMENSIONAL STANDARDS, RUNWAY 13/31 (in feet)**

Existing Item	Existing Dimension	ARC C-IV/D-IV with not lower than ¾-mile visibility minimums[1]	ARC C-IV/D-IV with lower than ¾-mile visibility minimums
Runway 13/31			
Runway Width	**100**	150	150
Runway Shoulder Width	---	25	25
Runway Centerline to Parallel Taxiway Centerline (Taxiway "A")	**300**[2]	400	400
Runway Centerline to Aircraft Parking	696	500	500
Runway Centerline to Holdline	**250**	250	255[3]
Runway Safety Area Width	500	500	500
Runway Safety Area Length Beyond Runway End			
Runway 13	1,000	1,000	1,000
Runway 31	1,000	1,000	1,000
Runway Safety Area Length Prior to Landing Threshold			
Runway 13	600	600	600
Runway 31	600	600	600
Runway Object Free Area Width	800	800	800
Runway Object Free Area Length Beyond Runway End			
Runway 13	1,000	1,000	1,000
Runway 31	1,000	1,000	1,000
Runway Obstacle Free Zone Width	400	400	400
Runway Obstacle Free Zone Length Beyond Runway End (both runways)	200	200	200
Threshold Siting Surface Criteria			
Runway 13	Criteria Met[4]	Criteria Met[5]	Criteria Met[6]
Runway 31	Criteria Met[4]	Criteria Met[5]	Criteria Met[6]
Taxiway "A" Width	**41-49**	75	75
Taxiway Safety Area Width	**79**	171	171
Taxiway Object Free Area Width	**131**	259	259
Taxilane Object Free Area Width	**115**	225	225

Source: Federal Aviation Administration Advisory Circular 150/5300-13.

Notes: Existing dimensions delineated in **bold** text reflect potential non-standard criteria. N.D. = Not Determined.

(1) Existing runway approach visibility minimums = 1 Mile.

(2) The future taxiway centerline (south end) will be located 400 feet from the runway centerline in conjunction with the scheduled 2009 runway/taxiway extension.

(3) The distance is increased one foot for each 100 feet above sea level (FAA Ace 150/5300-13, Change 14). Current airport elevation = 501 feet above mean sea level (AMSL).

(4) Applies type 3 criteria to Runway 13 and type 6 criteria to existing Runway 31 from Appendix 2, AC 150/5300-13, Change 15, Table A2-1, *Approach/Departure Requirements Table*.

(5) Applies type 3 to Runway 13 and type 8 criteria to the programmed/extended Runway 31 end.

(6) Applies to type 9 criteria to Runway 13 and the programmed/extended Runway 31 end.

Runway Line-of-Sight. According to existing runway line-of-sight standards, any two points located five feet above the runway centerline must be mutually visible for the entire length of the runway. If the runway has a full-length parallel taxiway, the visibility requirement is reduced to a distance of one-half the runway length. Lancaster Regional Airport complies with the runway line-of-sight standards for the entire length of the runway.

Runway Pavement Strength. The primary runway pavement at Lancaster Regional Airport can currently support aircraft with gross weights of 20,000 pounds single wheel, and 40,000 pounds dual-wheel main landing gear configurations. The pavement strength is adequate to accommodate the existing aircraft fleet mix and utilization patterns. However, if, as forecasted, the amount of heavy business jet use increases in the future, additional pavement strength may be required. In addition, all airfield pavements should be tested periodically to properly ascertain existing pavement strengths.

Runway Length. The determination of runway length requirements for Lancaster Regional Airport is based on several factors. These factors include:

- **Airport elevation;**
- **Mean maximum daily temperature of the hottest month;**
- **Runway gradient;**
- **Design aircraft type expected to use the Airport; and,**
- **Stage length of the longest nonstop trip destination.**

Generally, runway length requirements for design purposes at airports similar to Lancaster Regional Airport are premised upon the category of aircraft using the Airport. The categories are small aircraft under 12,500 pounds maximum takeoff weight and large aircraft under 60,000 pounds maximum certificated takeoff weight. The general aviation large aircraft fleet includes the majority of the business jet fleet.

Generalized runway length requirements are derived from the computer-based FAA Airport Design Software supplied in conjunction with AC 150/5300-13, *Airport Design.* Using this software, four values are entered into the computer, including the airport elevation of 501 feet Above Mean Sea Level (AMSL), the Mean Maximum Temperature of the hottest month of 96.0 degrees Fahrenheit, length of haul 500 miles, and the maximum difference in runway elevation at the centerline of 20.7 feet. This data generates the general recommendations for runway length requirements at Lancaster Regional Airport, which are provided in the following table entitled *RUNWAY LENGTH REQUIREMENTS*.

Table D7 **RUNWAY LENGTH REQUIREMENTS**

Runway Requirement	Dry Runway Takeoff Length (Feet)	Wet Runway Takeoff Length (Feet)
Existing Conditions		
Runway 13/31	5,000	5,000
Airplanes less than 12,500 lbs. with less than 10 seats		
75% of Small Aircraft Fleet	2,740	2,740
95% of Small Aircraft Fleet	3,280	3,280
100% of Small Aircraft Fleet	3,920	3,920
Airplanes less than 12,500 lbs. with 10 or more seats	4,460	4,460
Airplanes greater than 12,500 lbs. and less than 60,000 pounds		
75% of fleet at 60% useful load	5,030	5,500
75% of fleet at 90% useful load	7,420	7,420
100% of fleet at 60% useful load	6,080	6,080
100% of fleet at 90% useful load	9,530	9,530
Airplanes greater than 60,000 pounds		
500/1,000/1,500 NM stage lengths	5,190/6,160/7,050	5,360/6,160/7,050

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

Note: Lengths based on 501' AMSL airport elevation, 96° F Mean Maximum Temperature of the Hottest Month (July), length of haul 500 miles, and a maximum difference in runway centerline elevation of 21 feet.

As shown in the preceding table, each of the runway lengths given for large aircraft under 60,000 pounds maximum certificated takeoff weight provides a runway sufficient to satisfy the operational requirements of a certain percentage of the aircraft fleet at a certain percentage of the useful load. Useful load is defined as the difference between the maximum gross takeoff weight and the empty weight of the airplane, exclusive of fuel. The following aircraft are examples of those that comprise 75% of the general aviation aircraft fleet between 12,500 and 60,000 pounds: Learjets, Challengers, Citations, Falcons, Hawkers, and Westwinds.

A significant factor to consider when analyzing the generalized runway length requirements given in the above table is that the actual length necessary for a runway is a function of elevation, temperature, and aircraft stage length. As temperatures change on a daily basis, the runway length requirements change accordingly (i.e., the cooler the temperature, the shorter the runway necessary). Therefore, if a runway is designed to accommodate 75% of the fleet at 60% useful load, this does not mean that at certain times a larger or more heavily loaded aircraft cannot use the runway. However, the amount of time such operations can safely occur may be restricted.

The following table provides general FAA required runway takeoff lengths for potential aircraft that may operate at Lancaster Regional Airport during or beyond the planning period. It is important to note that, with the exception of the Gulfstream V and the Boeing 757, these lengths are based on standard day temperatures (59° F), and sea level elevation. For the Gulfstream V and the Boeing 757, data was available to more closely match Lancaster elevation and temperature conditions.

The previous table runway length requirements are based the Airport's 501 feet AMSL elevation and 96° F mean maximum annual temperature, resulting in runway lengths more specific to Lancaster Regional Airport.

Table D8 **GENERAL RUNWAY LENGTH REQUIREMENTS FOR POTENTIAL "CRITICAL" AIRCRAFT TYPES**

Aircraft	FAA Field Takeoff Length
Airplanes greater than 12,500 lbs. and less than 60,000 pounds	
Canadair CL-600[(1)]	5,400
ATR-42-500[(2)]	3,822
ATR-72[(2)]	4,020
Aircraft greater than 60,000 pounds	
Gulfstream V[(3)]	6,980
Bombardier Global Express	6,190
Boeing Business Jet	5,790
Boeing 757-200[(4)]	7,800

Source: 2009 Aviation Week & Space Technology *Aerospace Source Book*.

Notes: FAA takeoff field lengths are based upon standard day temperature (59° Fahrenheit) at sea level. Required runway lengths are increased with higher elevations and higher average maximum temperatures.

(1) Data obtained from Sandpiper Media, Inc., *Aircraft Ground Service Guide*. Field takeoff lengths are based on standard day temperature (59° F) at sea level.

(2) Based on Maximum Takeoff Weight (MTOW).

(3) Data obtained from Gulfstream V Flight Operations *Operational Information Supplement*, Revision 1, August 15, 2001. Conditions include 500 feet airport pressure altitude, wet runway conditions, 95° F operating ambient temperature, 20° takeoff flap, and 90,500 pounds maximum takeoff gross weight (MTOGW). Available field length should be increased 2% for each 5 knots of headwind (up to 40 knots). The empty weight for the Gulfstream V is less than 60,000 pounds.

(4) Data obtained from Boeing 757-200/300 *Airplane Characteristics for Airport Planning*, August 2002. Conditions based on standard day (59° F) + 25° F, no engine airbleed for air conditioning, zero wind, zero runway gradient, approximately 500' AMSL, and 255,000 lbs MTOGW. Federal Aviation Regulations (FAR) takeoff runway length is approximate.

As indicated previously, the runway is scheduled to be extended 1,500 feet to the south, for a total near-term future runway length of 6,500 feet. Based on the runway length data presented and observations/input received from existing aircraft operators, it has been determined that, with the future runway length of 6,500 feet, the runway will accommodate 75% of the fleet at 60% useful load and 100% of the aircraft fleet at 60% useful load for aircraft greater than 12,500 pounds and less than 60,000 pounds. This includes turbo-prop cargo aircraft such as the ATR-42, ATR-72, Fokker F-27, and the Canadair CL-600 (which is currently based at the Airport). Additionally, this runway length will also accommodate aircraft weighing greater than 60,000 pounds with stage lengths of 500 and 1,000 nautical miles (includes both dry and wet runway takeoff lengths). In other words, **the extended runway length (6,500 feet) will allow most projected aircraft types to operate on a regular basis without significant weight restrictions**. However, when and if the Airport is regularly utilized by some of the very large business jets or large jet powered cargo aircraft flying national and international routes, takeoff payloads could become restricted because of limited runway length.

The potential to lengthen the runway beyond 6,500 feet is explored in the development alternatives section in the next chapter.

Taxiways. Taxiways are constructed primarily to enable the movement of aircraft between the various functional areas on the Airport and the runway system. Some taxiways are necessary simply to provide access between aircraft parking aprons and runways; whereas, other taxiways become necessary to provide more efficient and safer use of the airfield. The separation distance between the runway and taxiway currently is 300 feet, but should be increased to 400 feet for ARC C/D-II standards (with lower-than ¾-mile visibility minimums). It is currently programmed for the extended portion of the runway and taxiway to have a 400 foot separation. A future parallel taxiway (separated by 400 feet) will also be needed to support east side development on the Airport. Additional analysis related to potential improvements will focus on the provision of efficient taxi access to future development areas, the benefit of additional exit taxiways to reduce runway occupancy times for arriving aircraft, and the provision of redundancy in accessing existing and future hangar development areas.

Runway Protection Zones (RPZs). The function of the RPZ is to enhance the protection of people and property on the ground beyond the runway ends. This is achieved through airport control of the RPZ areas, which, in turn, allows the Airport to specify land use within the area and to control the height of objects. The RPZ is trapezoidal in shape and centered about the extended runway centerline. It begins 200 feet beyond the end of the area usable for takeoff or landing. The RPZ dimensions are functions of the type of aircraft operating at an airport and the approach visibility minimums associated with each runway end. In consideration of the existing instrument approach minimums and the type of aircraft each runway is designed to accommodate, the following table, entitled *RUNWAY PROTECTION ZONE*

DIMENSIONS, lists existing RPZ dimensional requirements, along with the requirements for improved approach capabilities. In areas where the Airport sponsor does not control land within an RPZ, every effort should be made to acquire the land or acquire some type of land use control.

Table D9 **REQUIRED RUNWAY PROTECTION ZONE DIMENSIONS**

Item	Width at Runway End (feet)	Length (feet)	Width at Outer End (feet)	Airport Controls Entire RPZ
Existing RPZ Dimensional Requirements:				
Runway 13	500	1,700	1,010	No
Runway 31	500	1,700	1,010	No
Required RPZ Dimensions for Various Visibility Minimums:				
Visual and not lower than 1-mile, Small Aircraft Only	250	1,000	450	---
Visual and not lower than 1-mile, Approach Categories A & B	500	1,000	700	---
Visual and not lower than 1-mile, Approach Categories C & D	500	1,700	1,010	---
Not lower than ¾-mile, all aircraft	1,000	1,700	1,510	---
Lower than ¾-mile, all aircraft	1,000	2,500	1,750	---

Source: FAA Advisory Circular 150/5300-13, *Airport Design*.
--- Not applicable.

Threshold Siting Surfaces (TSS). Guidelines contained in FAA AC 150/5300-13 provide criteria for the proper siting of runway thresholds regarding obstacle clearance. Like the RPZ criteria, the threshold siting criteria are based on the type of aircraft and approach visibility minimums associated with each runway end. Threshold siting surfaces criteria is met for both existing runway ends, as well as the extended Runway 31 end. However, these requirements must be re-examined in conjunction with proposed runway improvements, including any changes to the approach visibility minimums associated with each runway end.

Electronic Landing Aids. Electronic landing aids, including instrument approach capabilities and associated equipment, airport lighting, and weather/airspace services, were detailed in the *Inventory* chapter of this document. The Airport has instrument approach capabilities to Runway 31, which includes a published RNAV (GPS) and NDB non-precision approach with visibility minimums not-lower-than one mile.

Within the near future, Global Positioning System (GPS) approaches are expected to be the FAA's standard approach technology. With GPS, the cost of establishing improved instrument approaches should be significantly reduced. Because of the expected continued use of sophisticated business and corporate aircraft at Lancaster Regional Airport, the ability to implement improved instrument approaches to both runways will be analyzed in the next chapter.

Visual Landing Aids (Lights). Presently, Runway 13/31 at Lancaster Regional Airport has a two-light precision approach path indictor (PAPI) lighting system serving both runway ends. Runway 31 also has Runway End Identifier Lights (REIL). Additionally, the runway is equipped with medium intensity runway lights (MIRL). To a great extent, the type of airport lighting will be dependent on the type of instrument approach capabilities. In consideration of any improved instrument approaches that are proposed, improved airport lighting is evaluated in later sections of this *Master Plan*.

Instrument Approach Evaluation

This evaluation was performed in order to identify any potential obstructions for future instrument approach procedures to the existing Runway 13 end and the programmed Runway 31 end (total runway length of 6,500 feet). This analysis also specifically evaluated any potential obstructions (i.e., terrain and known structures) for a future precision instrument approach with Category I visibility minimums to the existing Runway 13 end and the ultimate Runway 31 end (extended 1,500 feet to provide 8,000 feet in total runway length).

Instrument Approach Screening Criteria

Instrument approach screening criteria are contained in FAA Order 8260.54A, entitled *The United States Standard for Area Navigation (RNAV)*, for procedures offering Localizer Performance with Vertical Guidance (LPV) minimums, and FAA Advisory Circular (AC) 150/5300-13, *Airport Design*. Approach evaluations for each runway end use the following two criteria evaluations:

- **Glidepath Qualification Surface (GQS) Evaluation**
- **LPV Final Approach Segment and Straight-Out Missed Approach Segment Obstacle Assessment**

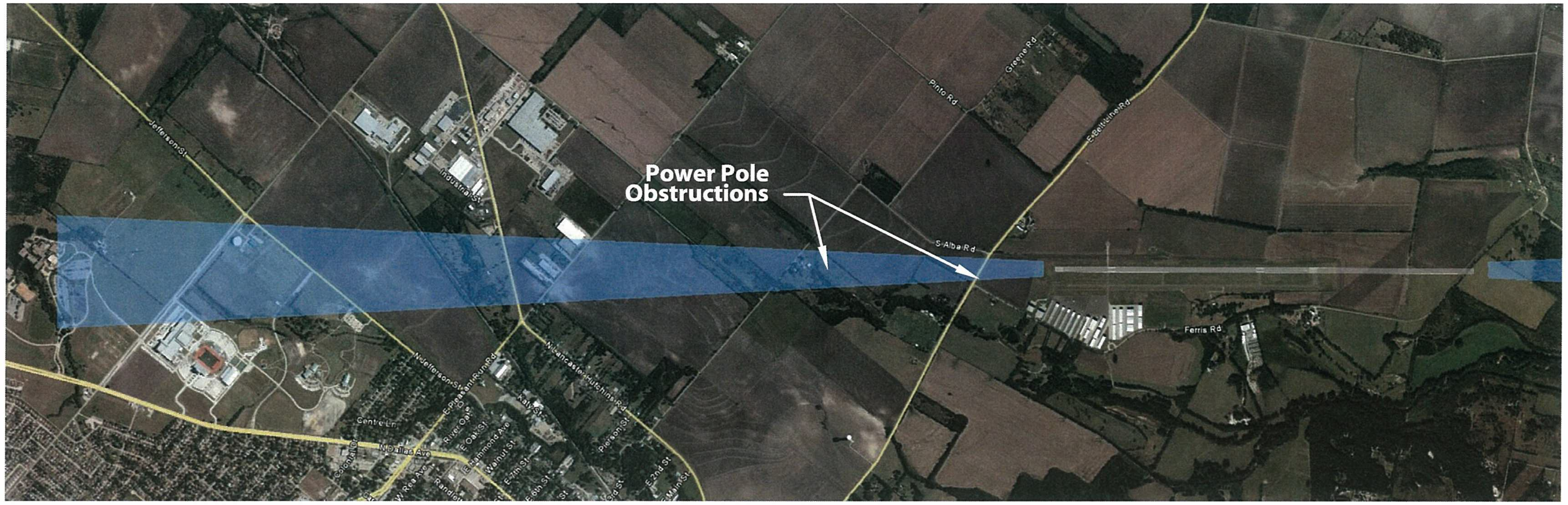
In order to create an accurate representation of the obstacle assessment surfaces, three-dimensional wireframes were created in AutoCAD, which allowed for exact XYZ coordinates and measurements of the specified FAA evaluation criteria. These wireframes were then imported to Google SketchUp and placed on geodetically-referenced aerial photography from Google Earth. The wireframes were then traced to create transparent surface models that could be overlaid on Google

Earth topography and imagery to show approximate terrain penetrations. It should also be noted that Google Earth topography is based on USGS Digital Elevation Models (DEMs), which have an elevation accuracy of +/- 10 to 30 meters.

Glidepath Qualification Surface (GQS) Evaluation

As specified in FAA Order 8260.54A, "the GQS extends from the runway threshold along the runway centerline extended to the decision altitude (DA) point. It limits the height of obstructions between the DA and runway threshold (RWT). When obstructions exceed the height of the GQS, an approach procedure with positive vertical guidance (ILS, MLS, TLS, LPV, Baro-VNAV, etc.) is not authorized." Therefore, the first level of instrument approach screening for this analysis applied the GQS criteria using a 3.0° glide path angle.

GQS Evaluation Results. In consideration of the existing and ultimate runway end elevations at Lancaster Regional Airport, the results of the GQS screening analysis are illustrated below in Figure D4, *RUNWAY 13/31 GLIDEPATH QUALIFICATION SURFACE*. As shown in Figure D4, two power poles penetrate the GQS within the Runway 13 approach (an approach from the north). Unless these power poles and associated utilities can be relocated, a future approach procedure with positive vertical guidance cannot be developed. Based on an ultimate runway length of 8,000 feet, there is one electronic transmission tower located within the ultimate Runway 31 approach (an approach from the south). It appears that this obstruction is clear of the GQS; however, prior to implementing any instrument approach procedures to Runway 31, an Airport Airspace Analysis survey will need to be conducted in order to verify the tower's clearance of the GQS.



Runway 13 GQS - 200' DA 3.0° Glidepath

N Not to scale

Source: Google Earth

Runway 31 GQS - 200' DA 3.0° Glidepath

Figure D4 **Runway 13/31 Glidepath Qualification Surface**

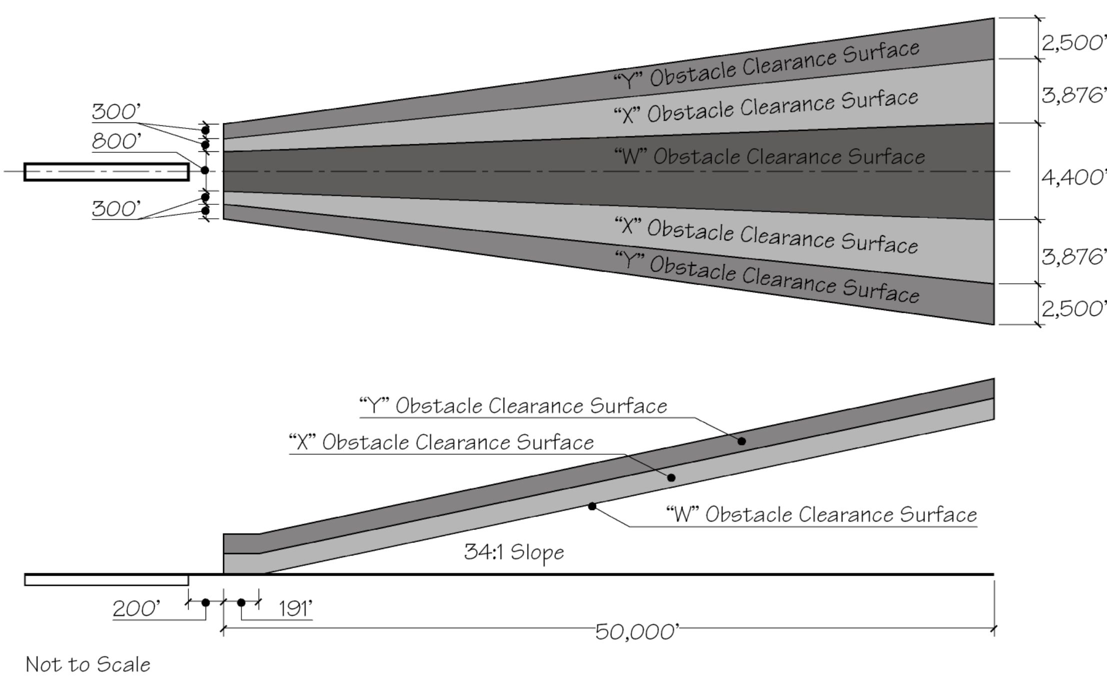
LPV Final and Straight-Out Missed Approach Segment Obstacle Assessment

The second level of screening for this instrument approach capability assessment includes the application of criteria for the LPV Final Approach Segment (FAS)/Obstruction Evaluation Area and Straight-Out Missed Approach Segment (MAS)/Obstruction Evaluation Area. The details of these criteria are also specified in FAA Order 8260.54A.

For the LPV Final Approach Segment, the primary area obstacle clearance surface (OCS) consists of the "W" and "X" surfaces, with the "Y" surface being an early missed approach transitional surface. The "W" surface slopes longitudinally at a slope ratio of 34:1 along the final approach track and is level perpendicular to the track. The "X" and "Y" surfaces slope upward from the edge of the "W" surface perpendicular to the final approach track at a slope ratio of 4:1 and 7:1, respectively. Obstacles located in the "X" and "Y" surfaces are adjusted in height to account for perpendicular surface rise and evaluated under the "W" surface.

The following figure illustrates the FAS OCS in plan and profile view as used in this evaluation.

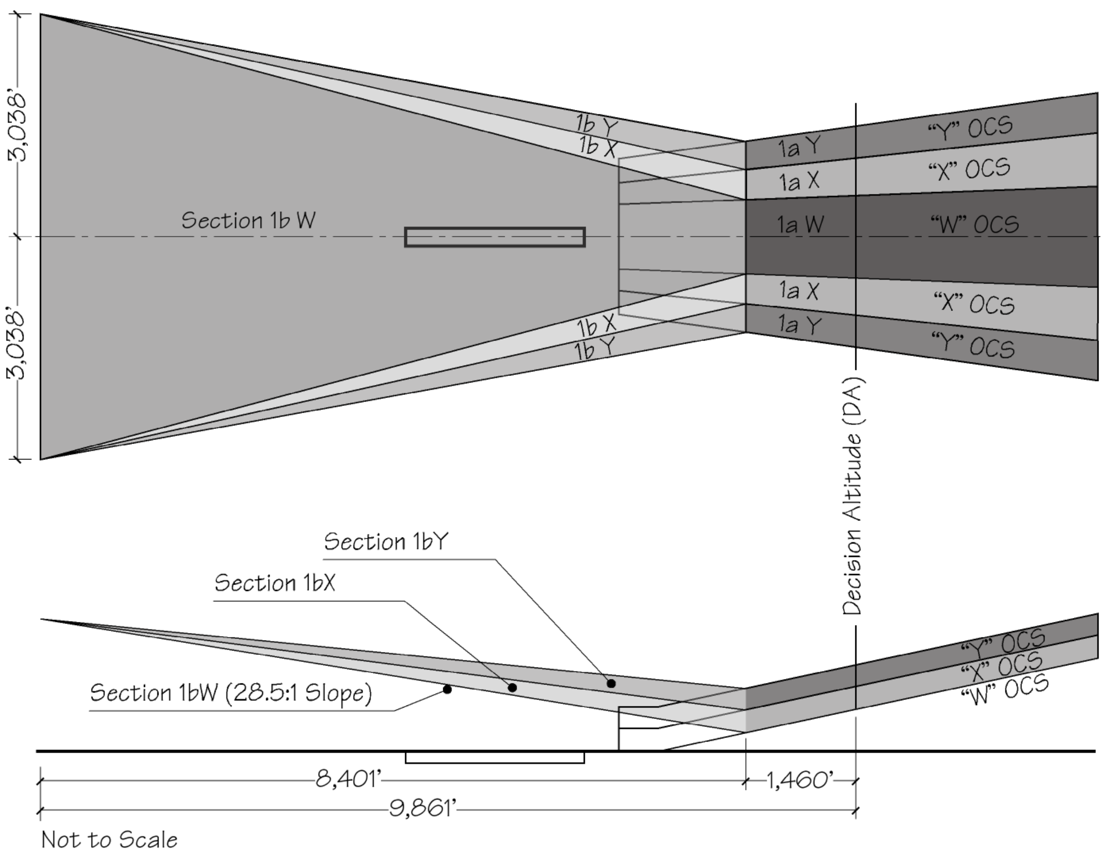
Figure D5 **LPV FINAL APPROACH SEGMENT OBSTACLE CLEARANCE SURFACES**



Source: Diagram prepared by Barnard Dunkelberg & Co. using information obtained from FAA Order 8260.54A, *The United States Standard for Area Navigation (RNAV).*

In consideration of the Straight-Out MAS, Section 1a is a 1,460-foot continuation of the Final Approach Segment beginning at the DA point. Section 1b begins at the end of Section 1a and extends for a distance of approximately 8,400 feet and rises at a slope ratio of 28.5:1. The following illustration, entitled *LPV SECTION 1 MISSED APPROACH SEGMENT OBSTACLE CLEARANCE SURFACES*, provides the specifics of the Section 1 MAS OCS.

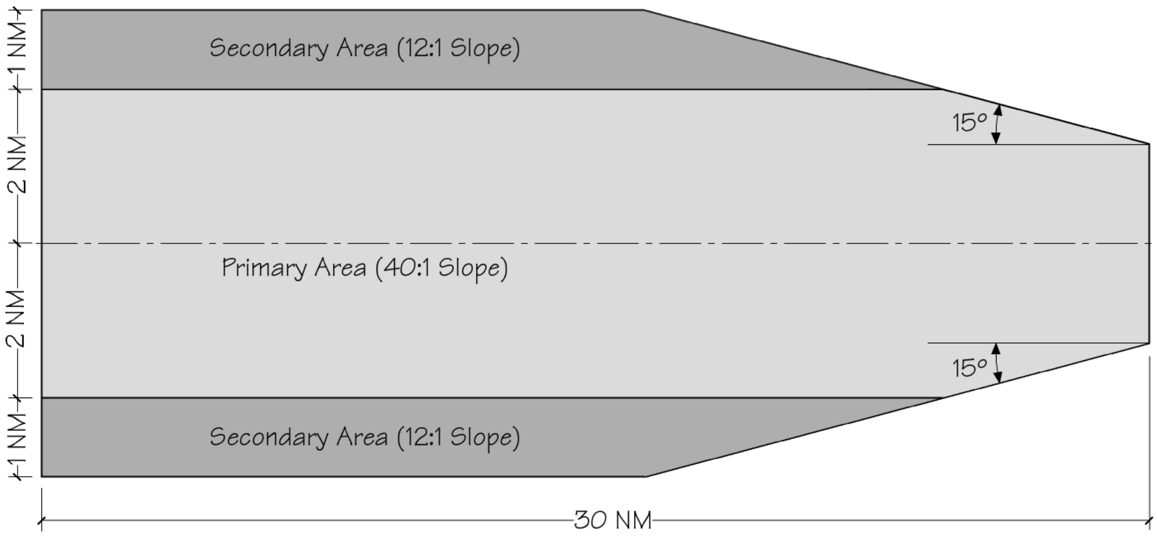
Figure D6 **LPV SECTION 1 MISSED APPROACH SEGMENT OBSTACLE CLEARANCE SURFACES**



Source: Diagram prepared by Barnard Dunkelberg & Co. using information obtained from FAA Order 8260.54A, *The United States Standard for Area Navigation (RNAV).*

Section 2 of the MAS begins at the end of 1b, utilizing a splay of 15°, and extends with a slope ratio of 40:1 until reaching a full width of six NMs within a length of up to 30 NMs. Figure D7, entitled *LPV SECTION 2 MISSED APPROACH SEGMENT OBSTACLE CLEARANCE SURFACES*, illustrates the details of the Section 2 Missed Approach Segment OCS.

Figure D7 **LPV SECTION 2 MISSED APPROACH SEGMENT OBSTACLE CLEARANCE SURFACES**



Source: Diagram prepared by Barnard Dunkelberg & Co. using information obtained from FAA Order 8260.54A, *The United States Standard for Area Navigation (RNAV)*.

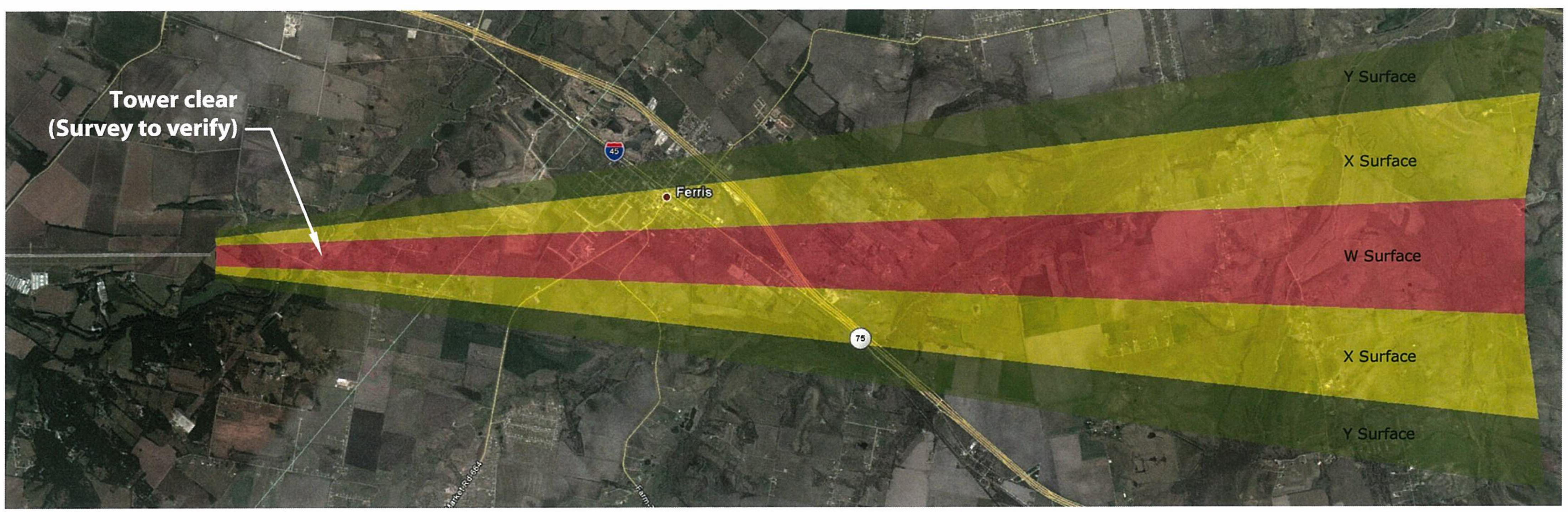
LPV FAS and Straight-Out MAS Results. The results of the LPV final approach and straight-out missed approach segments, with the application of the specified OCS screening criteria for Lancaster Regional Airport, are illustrated below. As shown in Figure D8, *RUNWAY 13/31 LPV FINAL APPROACH SEGMENT*, there are two power pole obstructions that penetrate the "W" surface of the Runway 13 north LPV final approach segment, which were previously identified as obstructions to the GQS. It should also be noted that these same poles do not penetrate Section 1 of the future straight-out MAS for Runway 13.

Based on the ultimate runway length of 8,000 feet, there is one electronic transmission tower located within the "W" surface of the Runway 31 LPV final approach segment; however, this tower does not penetrate the "W" surface. In addition, this tower would not penetrate Section 1 of the future straight-out MAS for Runway 31. Prior to implementing a vertically guided instrument approach procedure to Runway 31, or a non-vertically guided instrument approach procedure to Runway 13, an Airport Airspace Analysis survey will need to be conducted in order to verify the tower's clearance of all FAS and straight-out MASs.

Runway 13 Approach Obstacle Clearance Surfaces, WXY

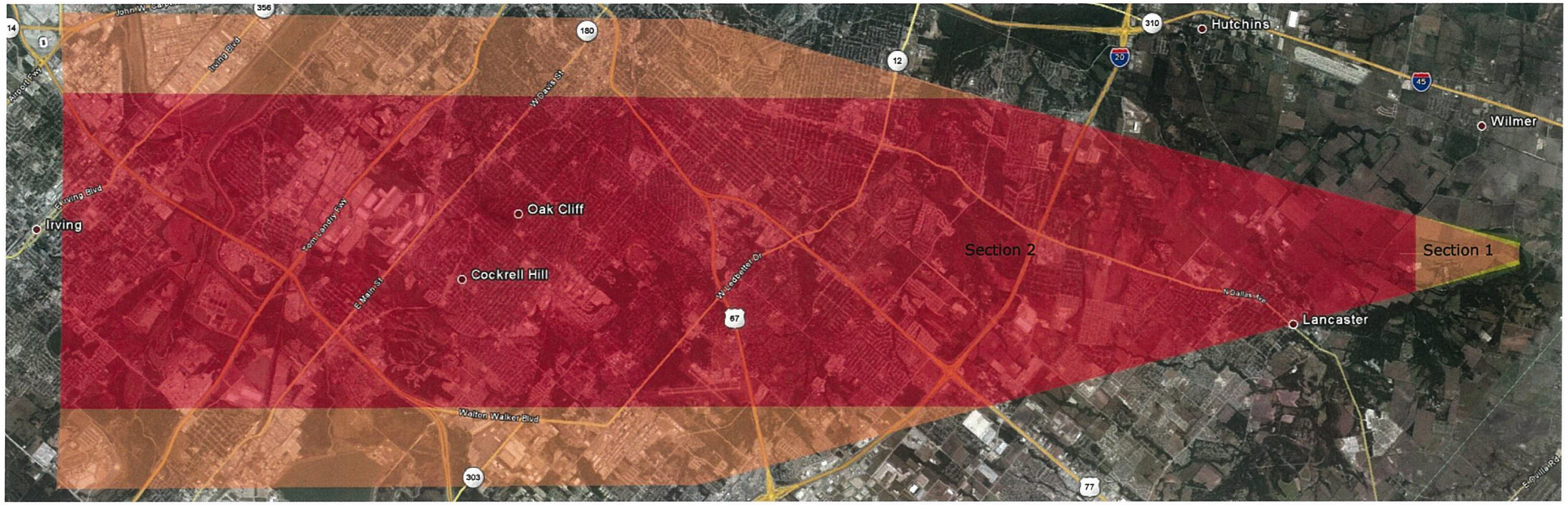
N Not to scale

Source: Google Earth



Runway 31 Approach Obstacle Clearance Surfaces, WXY

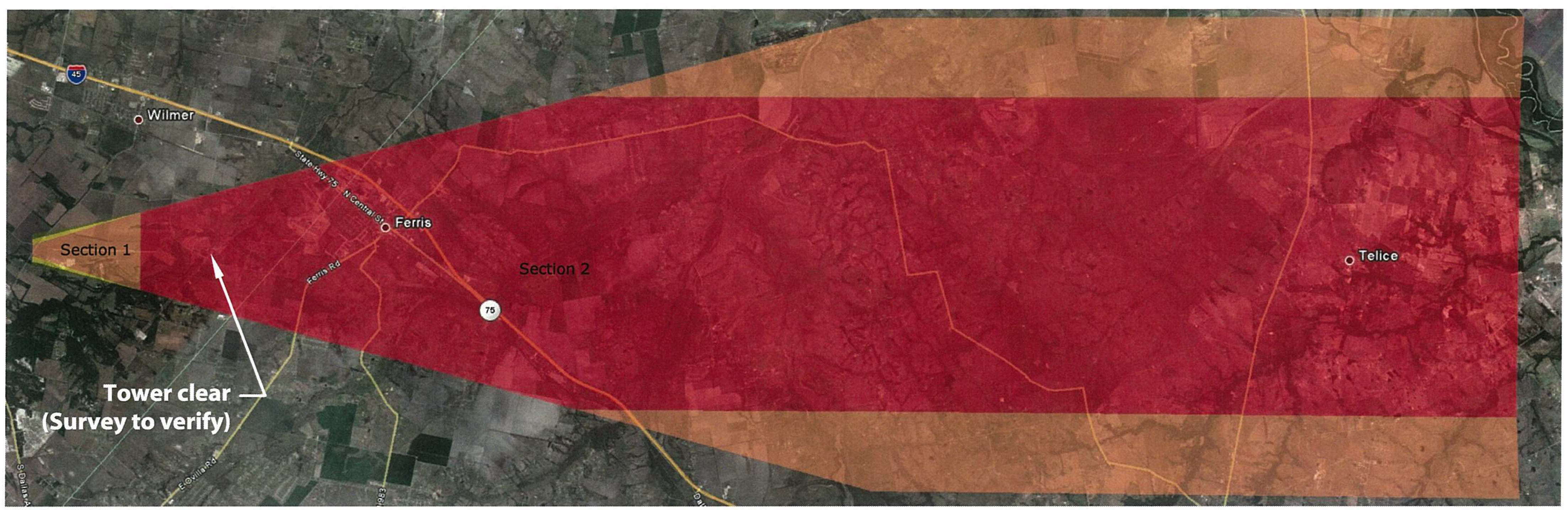
Figure D8 **Runway 13/31 LPV Final Approach Segment**



Runway 31 Missed Approach Segment Section 1 & 2

N Not to scale

Source: Google Earth



Runway 13 Missed Approach Segment Section 1 & 2

Figure D9 **Runway 13/31 LPV Straight-Out Missed Approach Segment**

Instrument Approach Evaluation Findings

Based on this preliminary Instrument Approach Evaluation and prior analyses completed in conjunction with the *Airspace* and *Inner Portion of the Approach Surface*s, there are no terrain obstructions associated with the specified Category I instrument approach minimums (200-foot ceiling and ½-mile visibility) to either runway end. However, as indicated above in the Instrument Approach Evaluation, there are two power poles located within the Runway 13 final approach area, which limit the approach capabilities to a non-precision/non-vertically guided instrument approach[1].

In consideration of the future programmed 6,500-foot runway length, previous analysis completed in conjunction with the *Airspace* and *Inner Portion of the Approach Surfaces*[2] identified one electronic transmission tower as an obstruction, located south of Runway 31, based on a Federal Aviation Regulations (FAR) Part 77 50:1 precision approach slope. Additionally, there are three electronic transmission towers located south of Runway 31 that would become obstructions within the Part 77 50:1 precision approach slope, in consideration of the ultimate 8,000-foot runway length. However, as identified in previous sections above, a future Runway 31 LPV approach appears to be feasible based upon the known obstruction data, while the development of a non-vertically guided approach offering higher minimums would be required to Runway 13.

The effect of these obstructions on instrument approach minimums, if any, would be confirmed following the completion of an Airport Airspace Analysis survey in accordance with criteria specified in FAA AC 15-/5300-18B, *GIS Standards*, which will be utilized in instrument approach procedures that are designed by the FAA. This information supports the decision to reserve room for an ultimate runway length of 8,000 feet, with a GPS/LPV instrument approach, offering Category I minimums to Runway 31, and a non-precision/non-vertically guided GPS instrument approach offering not less than ¾-mile visibility minimums to Runway 13.

[1] A Photoslope Obstruction Analysis was conducted as part of the *Demonstration Encroachment Analysis Surrounding Lancaster Regional Airport*, January 2008. The *Photoslope Obstruction Analysis* revealed that trees would be the controlling obstructions off both ends of the runway. Beyond the trees, the *Photoslope Obstruction Analysis* determined that power poles would likely be the controlling obstructions if the trees were removed. Any trees located on or in close proximity to airport property can be removed or trimmed to mitigate the obstruction.

[2] The *Airspace* and *Inner Portion of the Approach Surface* drawings were completed as part of the previous master planning effort for the Airport Layout Plan (ALP) set in 2005. The ALP was approved by TxDOT in 2006. Per the scope of services, an update of the *Airspace* and *Inner Portion of the Approach Surface* drawings was not required for this Master Plan; therefore, conditions and obstructions identified from the approved 2006 *Airspace* and *Inner Portion of the Approach Surface* drawings for Runway 13/31 are considered current.

Landside Facilities

Landside facilities are those facilities that are supported by the airside facilities, but are not actually part of the aircraft operating surfaces. These consist of such facilities as passenger terminal facilities, aprons, access roads, hangars, and support facilities. Following an analysis of these existing facilities, current deficiencies can be noted in terms of accommodating both existing and future needs.

Fixed Base Operator (FBO)/Terminal Building. The existing FBO/terminal building is adequate in size to effectively accommodate existing FBO business-related needs. However, in order to accommodate projected airport traffic activity, consideration will be given to new or expanded terminal building facilities.

General Aviation Aircraft Storage. General aviation aircraft that are based at Lancaster Regional Airport are stored on the west side of the Airport. Currently, there is a need for additional T-hangars, corporate, and FBO hangars in order to accommodate the fleet growth and increase in corporate traffic. It is assumed that the majority of all based aircraft will be stored in an enclosed hangar facility in the future. Over the course of the 20-year planning period, the demand for based aircraft storage areas at the Airport is forecast to increase moderately. The trend of increasing general aviation aircraft size also plays a role in defining future development needs.

Perhaps the most important influence contributing to the need for a comprehensive analysis of the future development needs for general aviation is the configuration of the existing facilities in consideration of space currently available for development. Strategies to increase the Airport's hangar development area are examined in later chapters of this document, recognizing that landside and airside access, along with utility infrastructure issues, will drive future development recommendations.

Tie-Down Storage Requirements/Based Aircraft. Aircraft tie-downs are provided for those aircraft owners that do not require, or do not desire to pay the cost for, hangar storage. Because of the great value of even small, unsophisticated general aviation aircraft, most aircraft owners prefer some type of indoor storage. There will continue to be some demand for based aircraft tie-down areas; however, it is anticipated that the Airport has enough area on existing aprons to accommodate future demand. (See table below.)

Tie-Down Storage Requirements/Itinerant Aircraft. In addition to the needs of the based aircraft tie-down areas addressed in the preceding section, transient aircraft also require apron parking areas at Lancaster Regional Airport. This storage is provided in the form of transient aircraft tie-down space. In calculating the area requirements for these tie-downs, an area of 400 square yards per aircraft is used.

As the plan for future general aviation development is formulated, adequate space will be provided for transient aircraft parking area, especially in those areas that cater to transient aircraft needs (i.e., FBO services).

Hangars. The general aviation facilities at the Airport are located on the western portion of airport property (directly west of Runway 13/31). The area contains both large and small hangar storage units (T-hangars, etc.). The fleet growth at the Airport is somewhat dependent upon hangar space availability. The development plan for future general aviation hangars will focus on identifying potential parcels, in consideration of the ability to provide roadway and taxiway access in a manner that is efficient and secure.

Table D10 **GENERAL AVIATION FACILITY STORAGE REQUIREMENTS, 2009-2030**

Facility	2009[1]	2010[1]	2015	2020	2025	2030
Itinerant/GA Apron (acres)	2.9	2.9	3.2	3.4	3.7	3.9
Based Aircraft GA Apron (acres)	0.2	0.2	0.2	0.4	0.4	0.5
Total Apron (acres)	3.1	3.1	3.4	3.8	4.1	4.4
T-Hangar Spaces (number/acre)	77/6.9	77/6.9	78/7.0	78/7.1	79/7.2	79/7.3
Corporate Hangar Spaces (number/acres)	86/ 17.1	86/ 17.1	93/ 18.7	99/ 19.9	112/ 22.5	130/ 26.1

Sources: Barnard Dunkelberg & Company and RW Armstrong. Projections based on FAA Advisory Circular 150/5300-13, *Airport Design*.

Note: Rounding differences may occur.

[1] Actual. The actual number of t-hangar and corporate hangar spaces provided by Airport staff has been used.

General Aviation Development Area. It is recognized that there will be continued demand for FBO and other general aviation development areas at the Airport, and, recommendations will be made with regard to where these facilities should be located in the future. It is also recognized that quantification of the demand for these facilities is not possible because the number, type, and size are dependent on user needs and financial feasibility.

Air Cargo. At this time, air cargo is a relatively small component of the activity at Lancaster Regional Airport. That which does occur is un-scheduled and is carried on general aviation aircraft. It is anticipated that air cargo activity will increase at the Airport during the planning period, but that it will remain a relatively insignificant component of total aircraft operations. That being said, a range of potential air cargo activity is analyzed in the development alternatives section to better understand the potential ramifications related to the need for future facilities.

Support Facility Requirements. In addition to the facilities described above, there are some airport support facilities that have quantifiable requirements and that are vital to the efficient and safe operation of the Airport. The primary consideration at Lancaster Regional Airport is fuel storage capacity.

Fuel Storage Facility. Aviation fuel is presently stored in three tanks located southwest of the terminal building, adjacent to the rotating beacon. Capacity of these facilities consists of two 10,000-gallon 100LL AVGAS underground storage tanks and a 10,000-gallon Jet-A underground storage tank. Every tank complies with all federal, state, and local regulations. The City of Lancaster currently owns all of the storage tanks and maintains and sells the fuel using two fuel trucks. One fuel dispensing truck has a capacity of 1,000 gallons for 100LL AVGAS and the other has a capacity of 2,600 gallons for Jet-A. The current fuel storage facility is not adequate to meet future demands. Additional future aboveground fuel storage locations providing access to Ferris Road will be examined.

Summary

The information provided in this chapter provides the basis for understanding what facility improvements at the Airport might be needed to efficiently and safely accommodate future demands. Following are the major improvement considerations that are indicated in the facility requirements section:

- **Programming for ultimate runway system (runway length, dimensional criteria, and number)**
- **Programming for instrument approach improvements**
- **Relocation of Taxiway "A" to a location that is 400 feet from the runway centerline**
- **Additional FBO hangar and ramp space**
- **Additional aviation business hangar and ramp space**
- **Expansion of tenant/vehicle parking areas**
- **Expansion of existing or construction of a new terminal building**
- **Expansion of landside development on the west side of the Airport (requires land acquisition)**
- **Potential for aviation-use development on the east side of the Airport**
- **Installation of self-serve fueling system**
- **Installation of aircraft wash bay**

It is important to note that the recommendations in this *Master Plan* are provided to best understand what facilities' improvements might be needed at the Airport, and where those facilities might be best placed. In other words, the *Master Plan* provides recommendations on how various parcels of the Airport might be best developed, in consideration of potential demand and community/environmental influences. One of the basic assumptions for a master plan, for a complex facility like an airport, is that if a future improvement is identified on the recommended development plan; it will only be built if there is actual demand, if the project is financially feasible, and if environmental impacts are insignificant.

In summary, the facility needs information provided in this chapter will be used to develop alternatives for the configuration of airport facilities in the future.

E Development Concepts and Alternatives Analysis

INTRODUCTION. The purpose of this chapter is to present and summarize the macro planning issues and recommendations associated with the future configuration of Lancaster Regional Airport, in terms of concepts and reasoning. This documentation provides a description of these "larger" issues (the majority of which relate to the layout of the airport pavement system and landside development areas); where possible, in consideration of previous input received from airport staff, the Study Committee, and the public, and, where needed, a description of alternatives that need further consideration is presented. In addition, preliminary information is presented on landside access considerations.

In concert with the historical and predicted future status of Lancaster Regional Airport, some basic assumptions have been established that are intended to direct the future development. The aviation activity forecasts and the various considerations on which the forecasts have been based upon support these assumptions.

Assumption One. The Airport will be developed and operated in a manner that is consistent with local ordinances and codes, federal and state statutes, federal grant assurances, and Federal Aviation Administration (FAA) regulations.

Assumption Two. This assumption recognizes the role of the Airport. The Airport will continue to serve as a facility that primarily accommodates general aviation activity, with a special focus on increased use by business jet aircraft. In addition, it is recognized that there is potential for cargo activity at the Airport, which will be taken into consideration as the Airport's development program is finalized. Scheduled passenger service activity does not occur at the Airport presently and is not anticipated in the future.

Assumption Three. This assumption relates to the size and type of aircraft that utilize the Airport and the resulting setback and safety criteria used as the basis for the layout of airport facilities. The largest aircraft using the Airport on a regular basis are business jets such as the Canadair CL-600 (currently based at the Airport), the Gulfstream IV, and the Cessna Citation X. Runway 13/31 is currently designated to accommodate ARC C/D-II aircraft (e.g., the Canadair CL-600). The design requirements for ARC C-II and D-II are essentially the same; therefore, the existing Airport Reference Code for the Airport has been identified as ARC C/D-II.

Assumption Four. The fourth assumption relates to the need for the Airport to accommodate aircraft operations with great reliability and safety. This indicates that the Airport's runway system should be developed with instrument approach guidance capabilities, adequate runway length, and adequate crosswind coverage to accommodate the forecast aircraft operations safely and efficiently under most weather conditions.

- **In consideration of the ARC C/D-II criteria used for Runway 13/31, its future extended length (6,500 feet) should be considered as the minimum length necessary to accommodate the forecast aircraft fleet. Depending on the community's view of the Airport's future, reservation of space for a longer runway may be important.**
- **Improved instrument approach capabilities to both ends of the existing runway should be considered (with the examination of the Metroplex airspace).**

Assumption Five. Available sites for the construction of additional landside facilities at Lancaster Regional Airport are minimal. The fifth assumption recognizes the importance of programming for the development of future aviation-use facilities on the east side of the runway.

Assumption Six. Economic development in the vicinity of Lancaster, including the ongoing activity related to the logistics hub initiatives is significant. The Airport's future role will include continued growth as a center for business-related aviation activity.

Assumption Seven. This assumption focuses on the relationship of the Airport to off-airport land uses and the compatible and complementary development of each. This is inherent in the design considerations and placement of facilities so as to complement, to the maximum extent possible, off-airport development, and to ensure the continued compatibility of the airport environs with the operation of the Airport.

Goals for Development

Accompanying these assumptions are several goals that have been established for purposes of directing the plan and establishing continuity in the future for airport development. These goals take into account several categorical considerations relating to the needs of the Airport, both in the short-term and the long-term, including safety, capital improvements, on-airport land use, land acquisition, land use compatibility, financial and economic conditions, and public interest/investment.

As reflected in the following goals, the Airport is recognized for the vital role it plays as a transportation facility, an industrial/commercial economic center, and for its role in supporting local and regional economic development.

- **Accommodate forecast aircraft operations in a safe and efficient manner by the provision of proper facilities and services. Plan and develop the Airport to be capable of accommodating the future needs and requirements of Lancaster and the Metroplex; thus, the Airport will continue to serve as a regional general aviation facility.**
- **The Master Plan will provide a program to facilitate the continued operation of the Airport as a well managed, efficiently operated facility.**
- **Recognize the true development potentials for the Airport and program for improvements accordingly.**
- **Recognize the activities that are unlikely to occur at the Airport in the foreseeable future and program for facilities accordingly.**
- **Review other airports with similar operational characteristics to those that might occur at Lancaster Regional Airport in the future. How do facilities compare?**
- **Identify the best uses for the landside development areas with particular emphasis on the east side of the runway.**
- **Enhance the self-sustaining capability of the Airport and ensure the financial feasibility of airport development.**

Airport Development Concepts and Alternatives

Introduction

Because all other airport functions relate to and revolve around the basic runway/taxiway layout, airside development alternatives must first be carefully examined and evaluated. Specific airside considerations for this airport include runway system layout, taxiway system layout, and instrument approach capabilities.

As indicated in the previous chapter, the development alternatives for the Airport are structured around potential "future roles". Each potential "future role" carries with it a set of development needs that impact the layout of future airside facilities. The "future roles" that are examined in the following text and graphic illustrations include:

- **General aviation airport with significant business use.**
- **General aviation airport with significant business use, including regular operations by very large business jets and accommodation of regional air cargo feeder activity.**
- **General aviation airport with significant business use, including very large business jets and accommodation of national cargo service.**
- **General aviation airport with significant business use and significant flight training activity.**

Although the examination of several of these alternatives is not specifically supported by demand that is predicted in the *Forecasts of Aviation Activity* chapter, the City of Lancaster has the responsibility to support its vision for the future of the Airport and to understand the physical development ramifications of each potential "future role". The alternatives analysis is intended to allow the City to make a well-informed decision related to long-term airport improvement recommendations.
The development alternatives were used as the basis for discussions with the Study Committee and the public on October 15, 2009. Following receipt of input on the alternatives from those meetings, along with input received for airport staff, City management, the FAA and the Texas Department of Transportation (TxDOT), a Conceptual Development Plan for the Airport will be formulated, including recommendations for landside improvements and an on-airport land use plan.

Airport Development Alternative One: *General Aviation Airport with Significant Business Use*

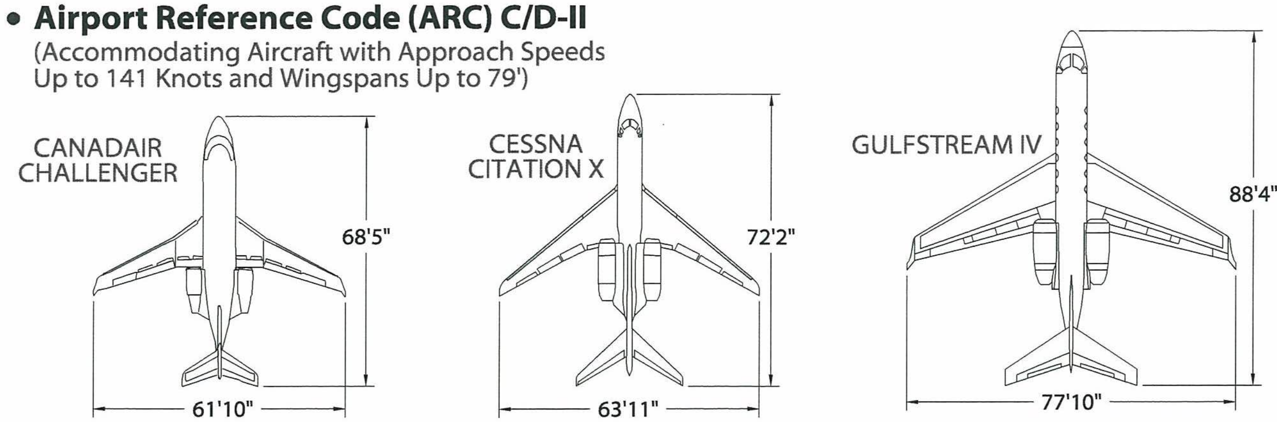
This alternative is based on the role that the Airport is currently fulfilling. As explained in the previous chapter, the runway length requirements of those aircraft currently using the Airport on a regular basis are met when the programmed runway extension (construction anticipated for completion in 2010) is completed (providing a runway of 6,500 feet in length).

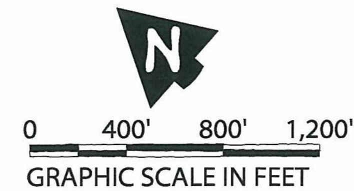
The key components of this alternative include retaining: a runway length of 6,500 feet; the current Airport Reference Code (ARC of C/D-II); a provision of a Category (CAT) I minimum approach to the south end of the runway; and, an improved non-precision approach with not lower than one-mile visibility minimums to the north end of the runway. This ARC includes business jet aircraft such as the Canadair Challenger, Cessna Citation X, and the Gulfstream IV. With all operational support amenities (low minimum approach capabilities, Airport Traffic Control Tower, etc.), this airport configuration has the capacity to support around 200,000 annual aircraft operations without excessive delay. Although no two airports are alike, this style of the general aviation airport in this alternative would be similar to Mesquite Metro Airport (the longest runway is 5,999' and approximately 123,000 annual operations).

The following items are recommended for Airport Development Alternative One:

- **Extend Runway 13/31 by 1,500 feet to the south [total runway length of 6,500 feet (currently programmed and construction is anticipated for completion in 2010)]. In consideration of required runway safety areas and runway object free areas, Runway 13/31 cannot be extended beyond 6,500 feet without relocation of Ferris Road or Belt Line Road.**
- **Extend Taxiway "A" 1,500 feet to the south (50 feet wide), located 400 feet west from the runway centerline (currently programmed in conjunction with the runway extension).**
- **Relocate existing Taxiway "A" (50 feet wide) to a location that is 400 feet west of the runway centerline.**
- **To support eastside development, construct a full parallel taxiway, 50 feet wide, 400 feet east of the runway centerline.**
- **Protect for a future precision instrument approach to Runway 31 (CAT I visibility minimums).**
- **Protect for a non-precision instrument approach to Runway 13 (one-mile visibility minimums).**
- **Retain the 20-foot structure height Building Restriction Line (BRL) on the west side of the runway and establish a 35-foot structure height BRL on the east side.**
- **Continue long-term planning for a potential aviation-use development area on the east side of airport property (the configuration of this parcel will likely be influenced by the proposed layout of landside facilities, ownership patterns, and environmental considerations).**

- **Airport Reference Code (ARC) C/D-II**
(Accommodating Aircraft with Approach Speeds Up to 141 Knots and Wingspans Up to 79')





EXAMPLE AIRPORTS

AIRPORT	R/W LENGTH	# OF R/W's	2007 A/C Operations
Sugar Land Regional (SGR) Sugar Land, TX	8,000'	1	86,538
Rogers Municipal-Carter Field (ROG) Rogers, AR	6,011'	1	22,236
Mesquite Metro (HQZ) Mesquite, TX	5,999'	1	124,348

Note: Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010. At the time of this report's publication, the construction for the runway extension was complete.

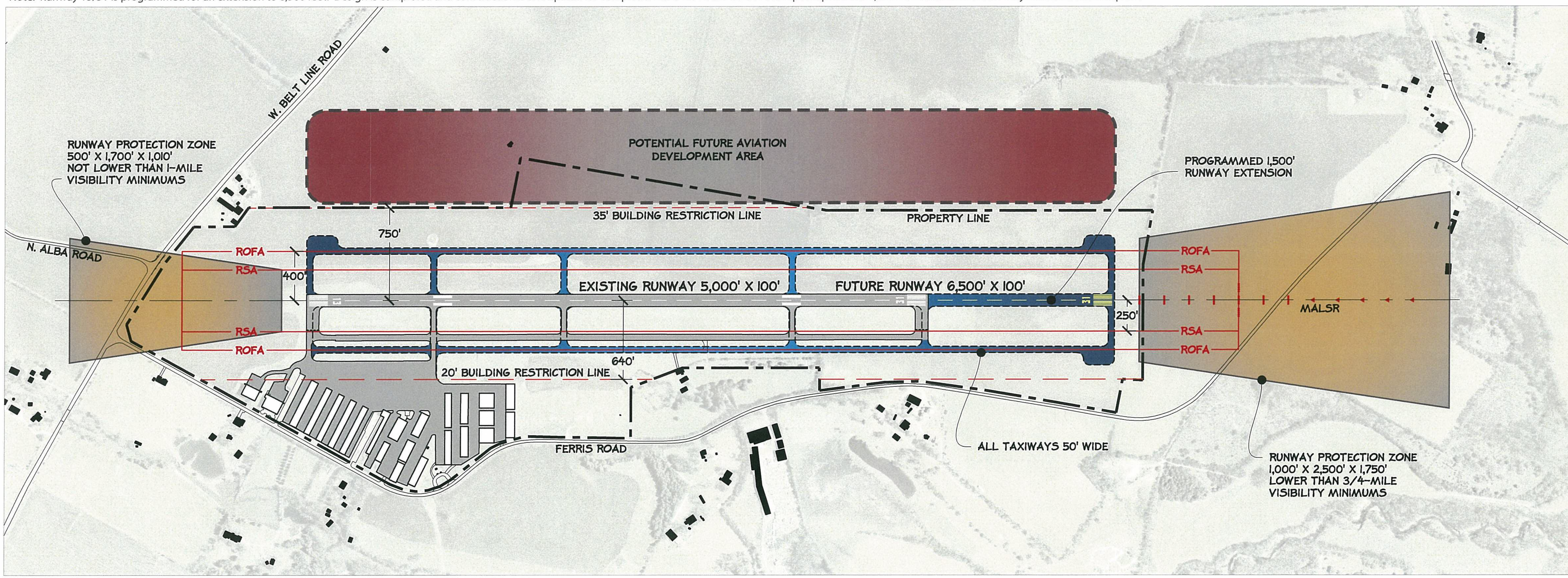


Figure E1 **Airport Development Alternative One**
General Aviation Airport with Significant Business Use
- Less than 200,000 Annual Aircraft Operations
- Protect for Future Precision Instrument Approach from South

Airport Development Alternative Two: *General Aviation Airport with Significant Business Use, Including Very Large Business Jets and Cargo Feeder Service*

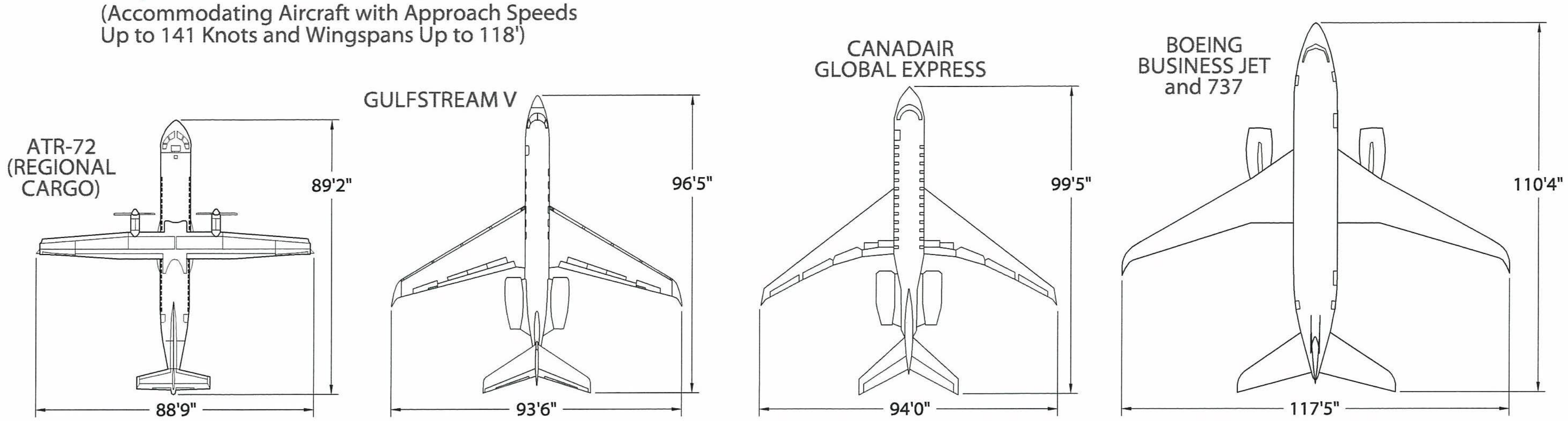
Similar to Alternative One, Airport Development Alternative Two also retains the extended runway length of 6,500 feet. However, this alternative adds the assumption that the Airport will ultimately support regular operation by the very large business jets such as the Gulfstream V, Canadair Global Express, and the Boeing Business Jet, along with the capability to support aircraft that are typically operated by regional cargo feeder airlines (e.g., the ATR 72).

The key components of Alternative Two include retaining a runway length of 6,500 feet (acceptable for most aircraft with trip stage lengths of less than 1,000 NM), revising the future Airport Reference Code to ARC C/D-III, and recommendations for improved instrument approach capabilities to both runway ends (CAT I minimums for southern approaches and ¾-mile visibility minimum for the approach from the north). With all operational support amenities (low minimum approach capabilities, Air Traffic Control Tower, etc.), this airport configuration has the capacity to support around 200,000 annual aircraft operations without excessive delay. Although no two airports are alike, this style of the general aviation airport in this alternative would be similar to Addison Airport (with a runway length of 7,202 feet and approximately 132,000 annual operations).

The following items are recommended for Airport Development Alternative Two:

- **Extend Runway 13/31 by 1,500 feet to the south [total runway length of 6,500 feet (currently programmed and construction anticipated for completion in 2010)]. In consideration of required runway safety areas and runway object free areas, the runway cannot be extended beyond 6,500 feet without the relocation of Ferris Road or Belt Line Road.**
- **Extend Taxiway "A" 1,500 feet to the south (50 feet wide), located 400 feet west from the runway centerline.**
- **Relocate existing Taxiway "A" (50 feet wide) to a location that is 400 feet west of the runway centerline.**
- **To support eastside development, construct a full parallel taxiway, 50 feet wide, 400 feet east of the runway centerline.**
- **Protect for a future precision instrument approach to Runway 31 (CAT I visibility minimums) and an improved non-precision instrument approach to Runway 13 (¾-mile visibility minimums).**
- **Retain the 20-foot structure height Building Restriction Line (BRL) on the west side of the runway and establish a 35-foot structure height BRL on the east side.**
- **Continue long-term planning for a potential aviation-use development area on the east side of airport property (the configuration of this parcel will likely be influenced by the proposed layout of landside facilities, ownership patterns, and environmental considerations).**

- **Airport Reference Code (ARC) C/D-III**
  (Accommodating Aircraft with Approach Speeds Up to 141 Knots and Wingspans Up to 118')



EXAMPLE AIRPORT

AIRPORT	LONGEST R/W LENGTH	# OF R/W's	2007 A/C Operations
Addison (ADS) Addison, TX	7,202'	1	131,833

N

0 400' 800' 1,200'

GRAPHIC SCALE IN FEET

Note: Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010. At the time of this report's publication, the construction for the runway extension was complete.

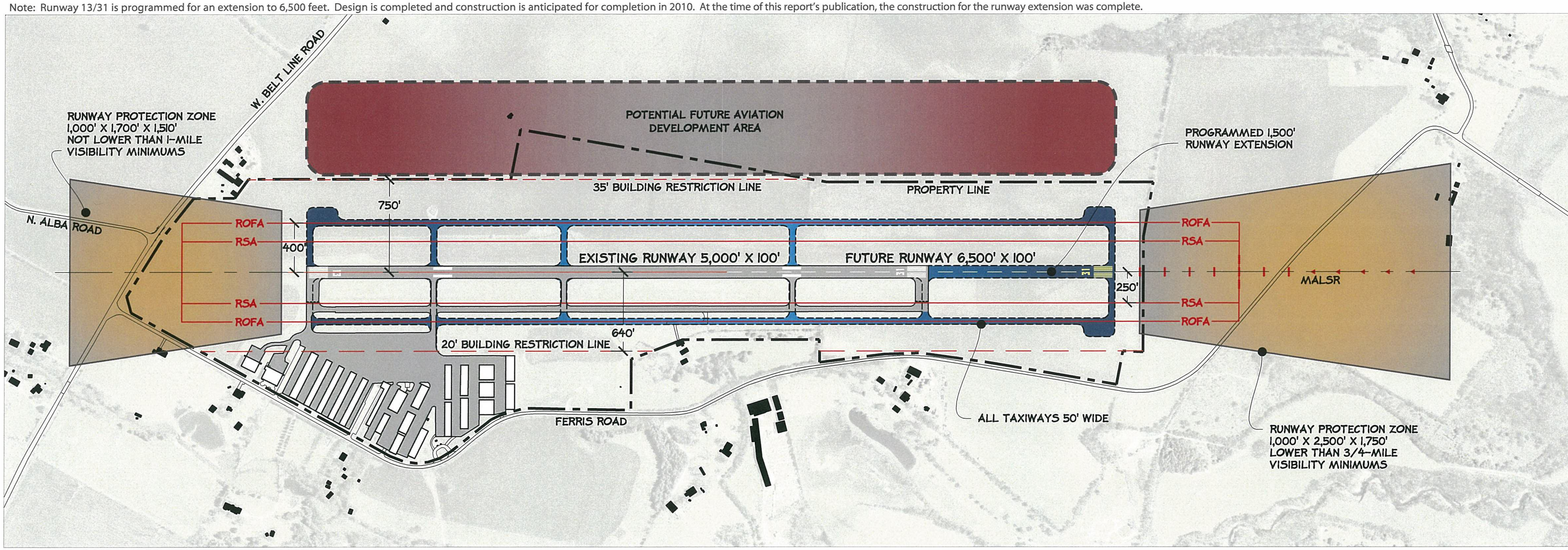


Figure E2 **Airport Development Alternative Two**
General Aviation Airport with Significant Business Use
Including Very Large Business Jets and Cargo Feeder Service

- Less than 200,000 Annual Aircraft Operations
- Protect for Future Precision Instrument Approach from South and Instrument Approach Improvement from the North

Airport Development Alternative Three: *General Aviation Airport with Significant Business Use Including Very Large Business Jets and National Cargo Service*

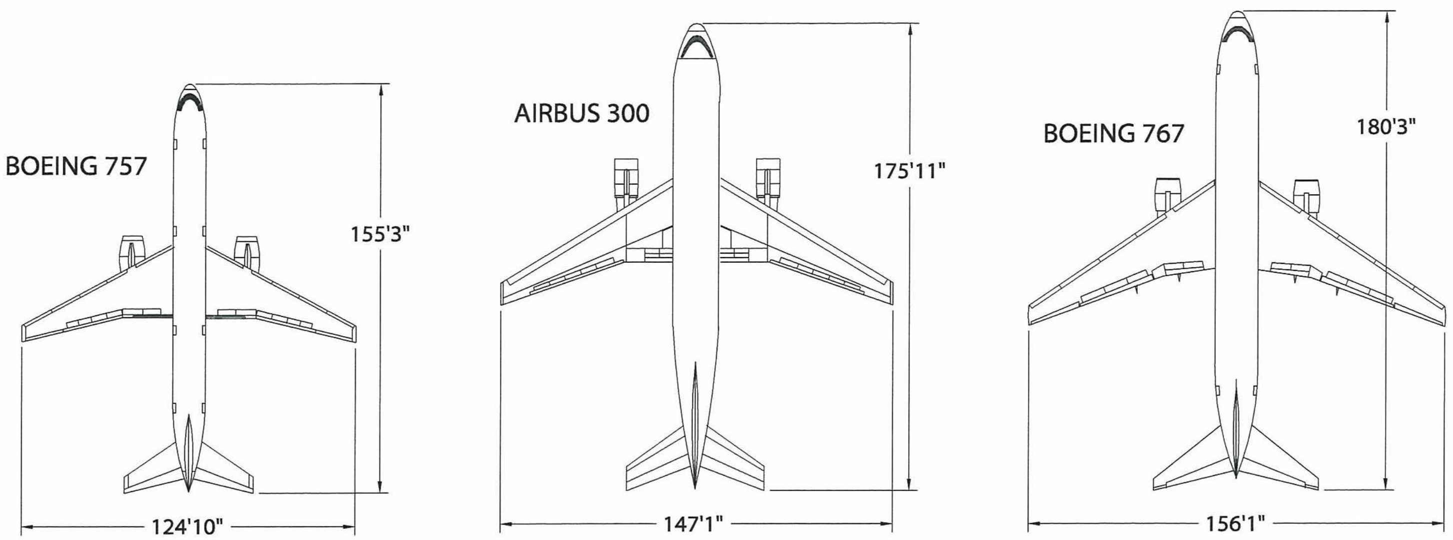
Airport Development Alternative Three is based on the Airport ultimately being a center for air cargo service with national service routes. With large aircraft (B-757, B-767, A-300, etc.) flying routes as long as 1,500 nautical miles, a longer runway would be justified. Runway 13/31 can be extended up to 8,000 feet if Ferris Road is relocated.

The key components of Alternative Three include extending Runway 13/31 to 8,000 feet, revising the future Airport Reference Code to ARC C/D-IV, and recommendations for improved instrument approach capabilities to both runway ends (CAT I minimums for both runway ends). With all operational support amenities (low minimum approach capabilities, Airport Traffic Control Tower, etc.), this airport configuration has the capacity to support around 200,000 annual aircraft operations without excessive delay. Although no two airports are alike, this style of the general aviation airport in this alternative would be similar to Fort Worth Alliance Airport (with a runway length of 9,600 feet and approximately 100,000 annual operations).

The following items are recommended for Airport Development Alternative Three:

- **Extend Runway 13/31 an additional 1,500 feet to the south, for a total runway length of 8,000 feet. (Currently programmed to be extended to 6,500 feet and construction anticipated for completion in 2010)**
- **Widen Runway 13/31 by 50 feet (to provide a total runway width of 150 feet).**
- **Extend Taxiway "A" an additional 1,500 feet to the south (75 feet wide), located 400 feet west from the runway centerline. (Currently programmed to be extended 1,500 feet in conjunction with the current/programmed runway extension)**
- **Widen existing Taxiway "A" to 75 feet.**
- **Relocate existing Taxiway "A" (75 feet wide) 400 feet west of the runway centerline.**
- **Construct full parallel taxiway, 75 feet wide, 400 feet east of the runway centerline.**
- **Protect for future precision instrument approach (CAT I visibility minimums) on both runway ends.**
- **Retain the 20-foot structure height Building Restriction Line (BRL) on the west side of the runway and establish a 35-foot structure height BRL on the east side.**
- **Continue long-term planning for a potential aviation-use development area on the east side of airport property (the configuration of this parcel will likely be influenced by the proposed layout of landside facilities, ownership patterns, and environmental considerations).**

- **Airport Reference Code (ARC) C/D-IV**
  (Accommodating Aircraft with Approach Speeds Up to 141 Knots and Wingspans Up to 171')



EXAMPLE AIRPORTS

AIRPORT	LONGEST R/W LENGTH	# OF R/W's	2007 A/C Operations
King County Int'l/Boeing Field (BFI) Seattle, WA	10,000'	2	304,135
Fort Worth Alliance (AFW) Fort Worth, TX	9,600'	2	100,031

N

0 500' 1,000' 1,500'
GRAPHIC SCALE IN FEET

Note: Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010. At the time of this report's publication, the construction for the runway extension was complete.

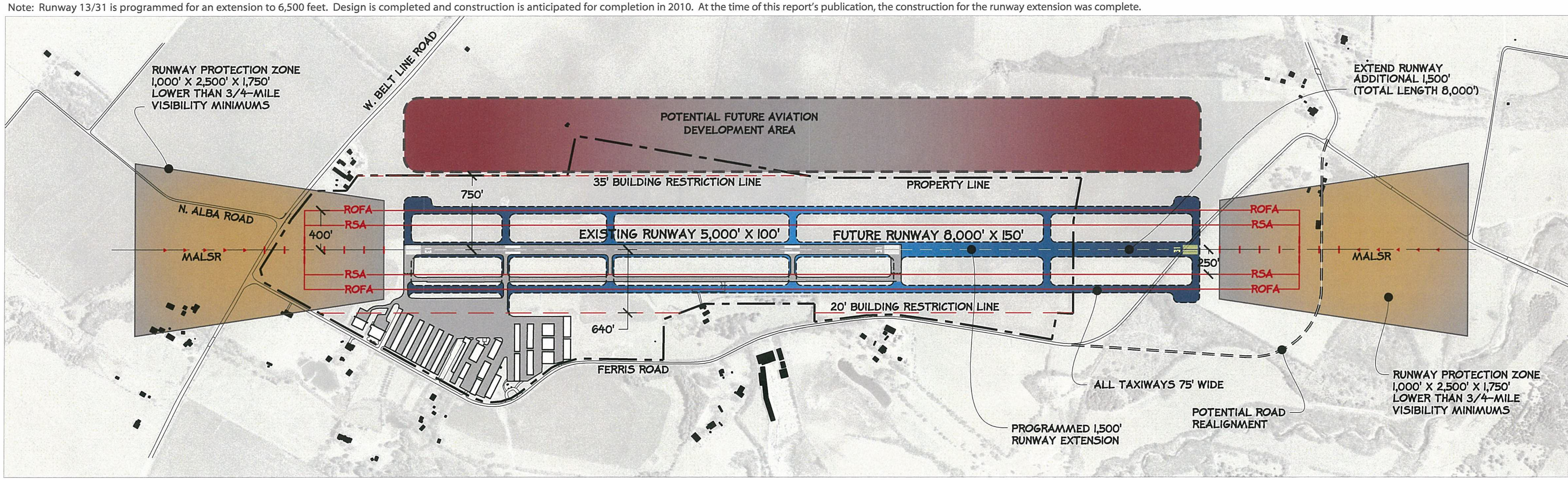


Figure E3 **Airport Development Alternative Three**
General Aviation Airport with Significant Business Use
Including Very Large Business Jets and National Cargo Service (B-757 & B-767)

- Less than 200,000 Annual Aircraft Operations
- Protect for Future Precision Instrument Approach from South

Airport Development Alternative Four: *General Aviation Airport with Significant Business Use and Significant Flight Training Activity*

Similar to Alternative One, Airport Development Alternative Four also retains the extended runway length of 6,500 feet for Runway 13/31. However, this alternative adds the assumption that the Airport will ultimately support a significant amount of flight training activity. Because of the number of aircraft operations generated at an airport that is a center for flight training activity, the capacity of a single runway could be exceeded (more than 200,000 annual operations). The only real way to increase operational capacity is to build a parallel runway.

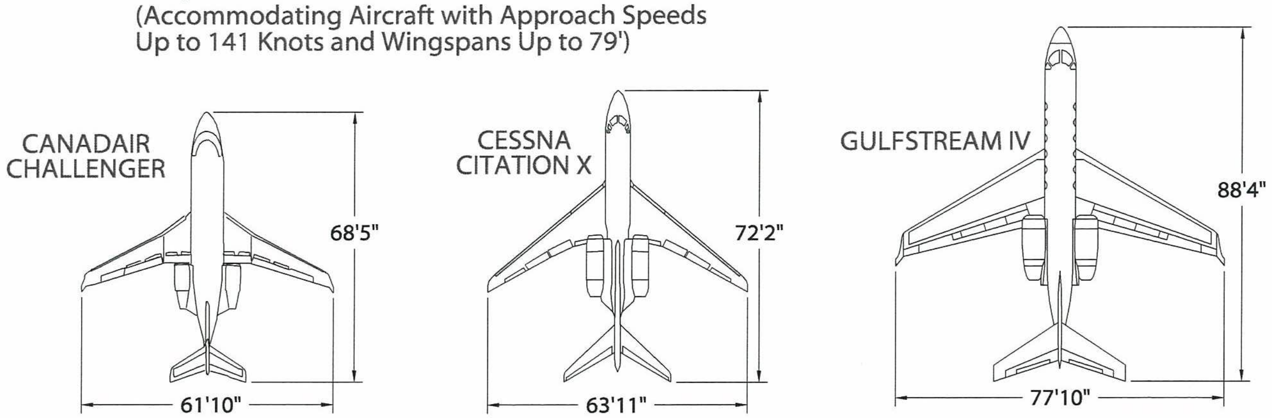
The key components of Alternative Four include retaining a runway length of 6,500 feet on the main runway and adding a parallel runway on the east side of the Airport. The ARC for the main runway will remain C/D-II, while the east side parallel runway will be built to ARC B-I small aircraft only standards (the requirement for a runway that serves aircraft that are less than 12,500 pounds). In addition, Alternative Four recommends that a CAT I minimum approach be provided for the south end, and a non-precision approach with not lower than one-mile visibility minimums to the north end of the main runway. The new east side runway will have visual approaches only. Although no two airports are alike, this style of the general aviation airport in this alternative would be similar to Arlington Municipal Airport (with a runway length of 6,080 feet and approximately 156,000 annual operations).

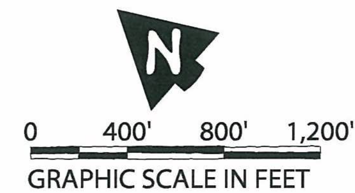
The following items are recommended for Airport Development Alternative Four:

- **Extend Runway 13R/31L 1,500 feet to the south, for a total runway length of 6,500 feet. (Currently programmed and construction anticipated for completion in 2010)**
- **Extend Taxiway "A" 1,500 feet to the south (50 feet wide), located 400 feet west from the Runway 13R/31L centerline.**
- **Relocate existing Taxiway "A" (50 feet wide) 400 feet west of the Runway 13R/31L centerline.**
- **Construct Runway 13L/31R, 4,000 feet long and 60 feet wide, 700 feet east of Runway 13R/31L.**
- **Construct a full parallel taxiway, 50 feet wide, 150 feet east of the Runway 13L/31R centerline.**
- **Protect for future precision instrument approach to Runway 31L (CAT I visibility minimums).**
- **Protect for a non-precision instrument approach to Runway 13R (one-mile visibility minimums).**

- **Retain the 20-foot structure height Building Restriction Line (BRL) on the west side of the runway and establish a 35-foot structure height BRL on the east side.**
- **Continue long-term planning for a potential aviation-use development area on the east side of airport property (the configuration of this parcel will likely be influenced by the proposed layout of landside facilities, ownership patterns, and environmental considerations).**

- **Airport Reference Code (ARC) C/D-II**
  (Accommodating Aircraft with Approach Speeds Up to 141 Knots and Wingspans Up to 79')





EXAMPLE AIRPORTS

AIRPORT	LONGEST R/W LENGTH	# OF R/W's	2007 A/C Operations
Richard Lloyd Jones Jr./Riverside (RVS) Tulsa, OK	5,102'	3	269,219
David Wayne Hooks Memorial (DWH) Spring, TX	7,009'	3	234,757
Arlington Municipal (GKY) Arlington, TX	6,080'	1	155,862

Note: Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010. At the time of this report's publication, the construction for the runway extension was complete.

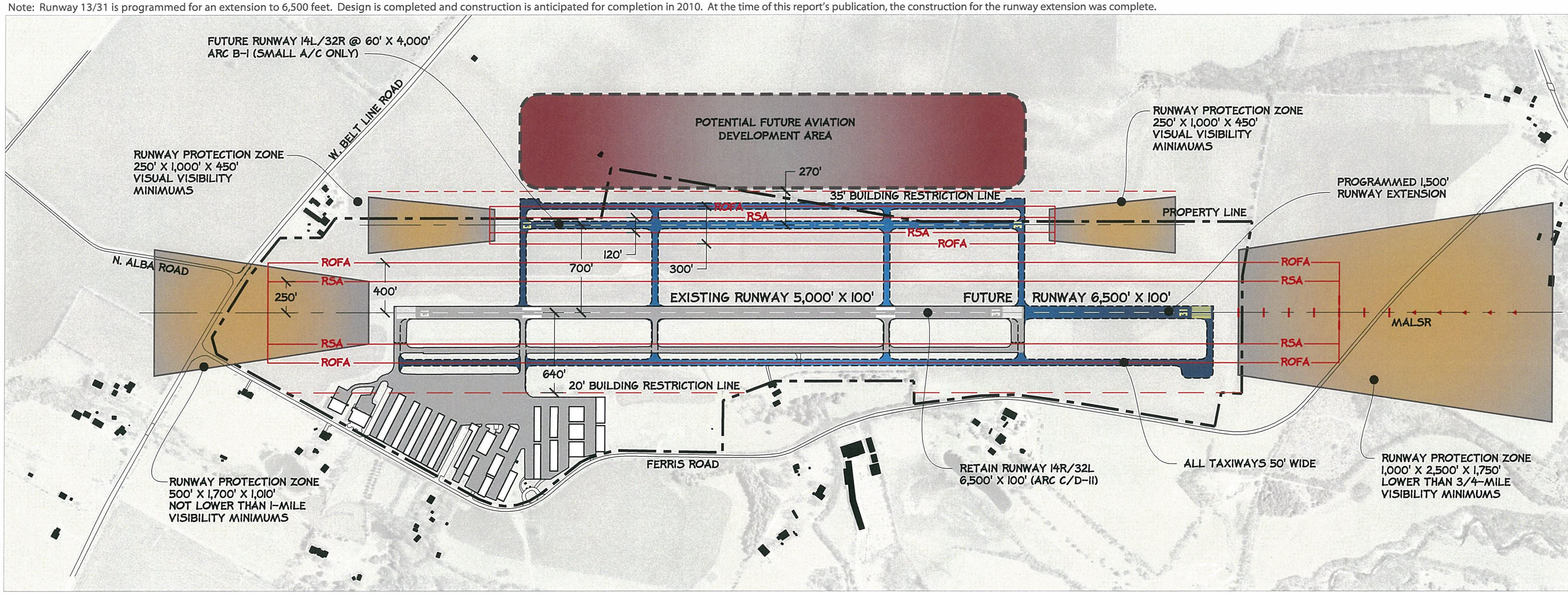


Figure E4 **Airport Development Alternative Four**
General Aviation Airport with Significant Business Use and Significant Flight Training Activity
- More than 200,000 Annual Aircraft Operations
- Protect for Future Precision Instrument Approach from South

Re-Align the Runway to North/South

In addition to the alternatives described graphically above, one other development option was explored and dismissed. Input received from the Study Committee and the Public indicated that, if the runway at Lancaster Regional Airport were to be re-aligned to a more north/south orientation, it would better line up with prevailing winds and, perhaps, have less operational conflicts with the complex Metroplex airspace northwest of Lancaster. An examination of this option revealed that with a 17/35 alignment, a runway length of approximately 6,100 feet could be achieved on a site east of the existing airport property (requires relocation of Ferris Road). Because this option basically does not take advantage of any of the existing airport property or facilities, and is also not supported by the Air Cargo Analysis, further consideration was dismissed. If the runway were to be this radically relocated, a selection study for a new airport site would be warranted.

Landside Development Aviation-Use Areas

The primary landside development issue that has been identified is the provision of area for additional general aviation storage facilities (hangars). These facilities can range from T-hangars that house aircraft in individual walled-in units that are contained in a larger structure, to large conventional hangars. T-hangars are capable of housing one or two general aviation aircraft; executive or corporate hangars are capable of housing one or more business jet aircraft; and, large "gang storage" hangars can house a number of aircraft under one roof without the separating partitions that characterize a T-hanger structure. The *Master Plan* provides a detailed concept layout of facilities to provide space for these various hangar types, while also striving to achieve flexibility so that the type of hangar built can be in response to actual demand.

Landside Development Concepts

Aviation forecasts (developed earlier in the *Master Plan*) indicate that areas should be reserved for the storage of approximately 56 additional general aviation based aircraft. Initially, future facilities should be developed in the existing general aviation development area, on the western portion of airport property. In addition, the area east of Runway 13/31 may potentially be available for future aviation-use development, including general aviation facilities. The future configuration of this area will likely be influenced by the location of future streets and highways, the types of aviation facilities ultimately delivered, ownership patterns, and environmental considerations.

West Side Development Concept. The existing general aviation development area is located on the west side of airport property. In order for this area to be maximized for future aviation-use facilities development, the acquisition of approximately 14 acres of land acquisition is recommended in the area south of the existing general aviation development area. Another factor that is critical in the future layout of the landside development area is to reserve room for the construction of a terminal building if needed in the future. This will likely be needed if improved general aviation facilities are to be provided for corporate users. In regard to the forecasted future aircraft operations in conjunction with the landside facilities necessary to meet aviation demand, as discussed in previous chapters, the landside development area is designed to accommodate ADG-III aircraft. Again, the goal is to provide an apron area that is large enough and flexible enough in its use to maximize its ability to accommodate corporate aircraft in the area adjacent to the terminal building. It should also be noted that a potential site of an Airport Traffic Control Tower (ATCT) has been identified on the west side of the Airport.

The following figure, entitled *WEST SIDE DEVELOPMENT CONCEPT*, provides a graphic description of a future conceptual layout of facilities in the development area on the west side of airport property.

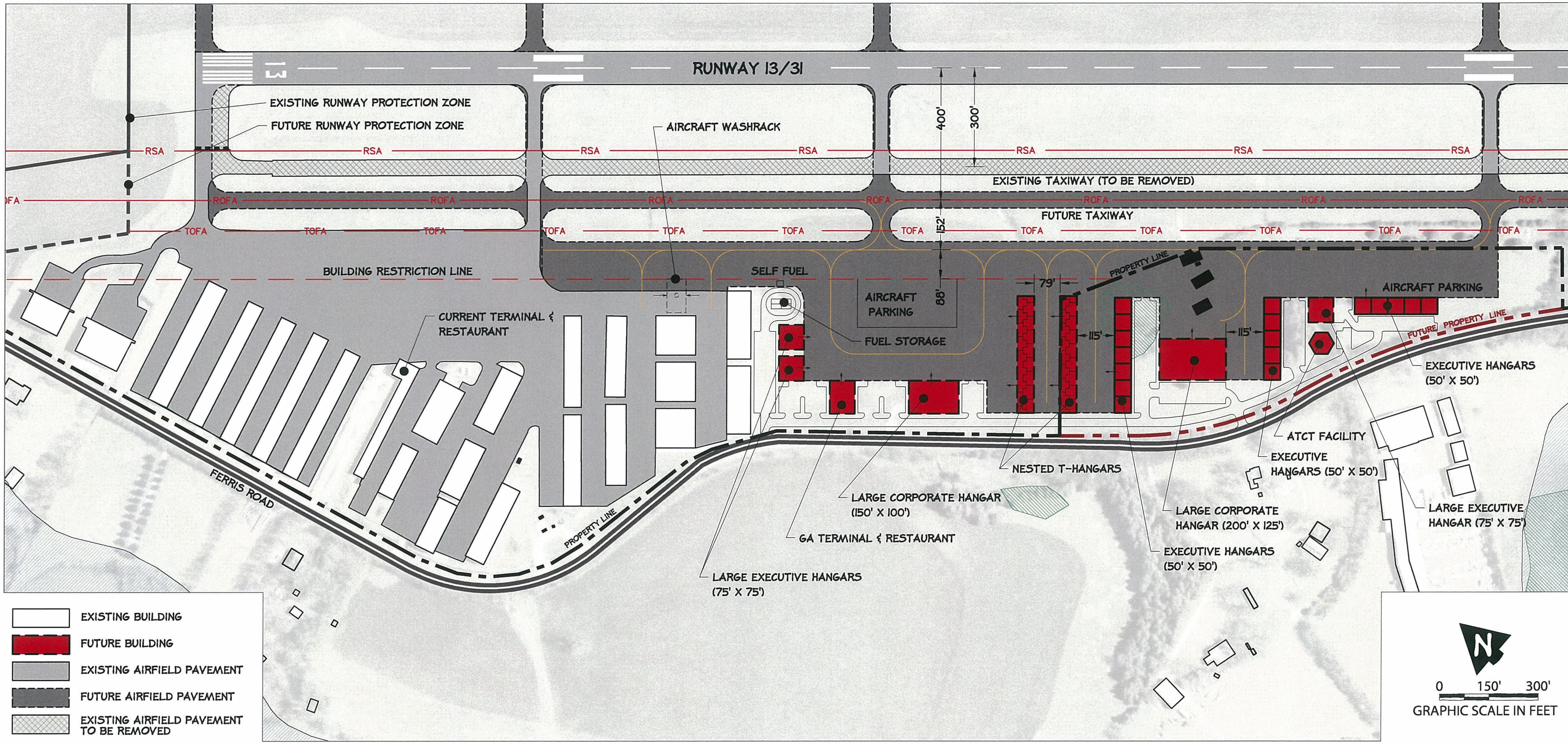


Figure E5 **Westside Development Concept**

East Side Development Concept. The strategy for the development of facilities on the east side of the Airport will evolve as demand for aviation-use facilities increases over the next few years. As indicated above, it is expected that, in the short-term, the demand for aviation-use facilities can be accommodated on the west side of the Airport. When demand is experienced for larger aviation-use facilities (i.e., facilities associated with aircraft maintenance and repair) or for mixed-use facilities (aviation-use facilities that have associated office, commercial, or industrial components), the east side of the Airport will be the preferred location.

Because of the uncertainty of the timing and scope of the demand for these "larger" aviation-use facilities, there is no recommendation for land acquisition on the east side of the Airport in this *Master Plan*. The *Master Plan* only identifies an area where aviation-related development would likely occur if there is demand, and to provide property stakeholders this information for full disclosure and their planning. This approach also allows for the City of Lancaster to recognize and acknowledge that there is a range of development strategies for the east side land. Perhaps the most traditional approach would be for the Airport to purchase the property (almost certainly with grant assistance from the FAA/TxDOT); however, without documented demand for east side aviation-related facilities development, it is impractical for City and Federal funds to be reserved for land purchase. That being said, however, if the correct set of circumstances presents itself and the City has the opportunity and need to acquire land on the east side of the Airport, it may choose to do so.

At the other end of the development strategy spectrum is a through-the-fence (TTF) arrangement. With TTF, the land on the east side of the Airport would not be purchased by the City/Airport. When there is demand for facilities that require access to the runway, they would be constructed on private land and the operator/developer would pay an access fee to allow use of the runway. Historically, the FAA has taken a dim view of TTF arrangements; however, over recent years they have become more acceptable for airport-compatible uses (i.e., not residential), dependent upon benefit and revenue to the Airport. As can be imagined, there are a significant number of requirements and/or restrictions enforced by the FAA that accompany a TTF arrangement. The primary documents that should be reviewed to understand these requirements and restrictions are:

- **The Airport Improvement Handbook (FAA Order 5100.38C)**
- **FAA Part 5 Grant Assurances**
- **Airport Compliance Manual (FAA Order 5190.6B)**
- **FAA Draft Compliance Guidance Letter 2009-1, Through-The-Fence and On-Airport Residential Access to Federally Obligated Airports**

Between these two ends on the development strategy spectrum (traditional and TTF), there are a myriad of creative options that can be explored, including the possibility for the development of an industrial/commercial airpark through a public/private partnership. The bottom line is that the potential for aviation-use development on the east side of the Airport is significant; however, it is not the appropriate time to detail how, when, or if that development should take place, as all options should be left open.

Conceptual Airport Development Plan

Following discussion of the concepts and alternatives provided above with the Master Plan Study Committee, along with input received from airport staff, City of Lancaster management, the FAA, and TxDOT, a Conceptual Development Plan for future airport facilities has been prepared. The Conceptual Development Plan has been utilized as the basis for the Environmental Overview, the development of detailed Airport Plans, and the development of a long-term Capital Improvement Program (CIP) for the Airport.

The Conceptual Development Plan is based upon the recommendations previously presented in Airport Development Alternative Two/General Aviation Airport with Significant Business Use. The Conceptual Development Plan includes the programmed runway extension of 1,500 feet to the south (total runway length of 6,500 feet), and is also programmed for a future ultimate runway length up to 8,000 feet. The Conceptual Development Plan revises the existing Airport Reference Code to a future ARC C/D-III, which includes very large business jets. The following list is a summary of critical improvement recommendations for the Airport, as shown on the following figure, *CONCEPTUAL DEVELOPMENT PLAN*:

- **Extend Runway 13/31 1,500 feet to the south for a total runway length of 6,500 feet (currently programmed and construction is anticipated for completion in 2010).**
- **Extend Taxiway "A" 1,500 feet to the south (50 feet wide), located 400 feet west from the runway centerline (currently programmed in conjunction with the 1,500-foot runway extension).**
- **Acquire land for future Runway Protection Zones (RPZ) on the south end of the runway, (approximately 95 acres).**
- **Implement a GPS or LPV precision instrument approach with ½-mile visibility minimums (CAT-I) to Runway 31.**
- **Install a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) to Runway 31.**
- **Relocate Taxiway "A" (50 feet wide), located 400 feet west of the runway centerline.**

- **Acquire land for future landside development on the west side of the Airport, located south of the existing hangar development area (approximately 14 acres).**
- **Develop an appropriate taxiway/taxilane/aircraft parking apron layout for the west side of the Airport.**
- **Acquire land or easement for the ultimate Runway 31 RPZ (approximately 57 acres).**
- **Relocate Ferris Road to the south of the Airport.**
- **Extend Runway 31 by 1,500 feet to the south, for an ultimate length of 8,000 feet.**
- **Extend Taxiway "A" 1,500 feet to the south, 50 feet wide, located 400 feet west of the runway (in conjunction with the runway extension).**
- **Implement a GPS or LPV precision instrument approach with ½-mile visibility minimums (CAT-I) to Runway 31.**
- **Relocate and install MALSR to Runway 31.**
- **Construct a full-length parallel taxiway, 50 feet wide, 400 feet east of the runway centerline.**
- **Continue long-term planning for a potential aviation-use development area on the east side of airport property.**
- **Acquire land or easements for the future Runway 13 RPZ (approximately 23 acres).**
- **Implement a non-precision instrument approach with not lower than ¾-mile visibility minimums to Runway 13.**
- **Relocate the GA terminal building and restaurant south of the existing hangar development area on the west side of the Airport.**
- **Develop an appropriate site reservation for a future Airport Traffic Control Tower (ATCT) facility.**

Note: Runway 13/31 is programmed for an extension to 6,500 feet. Design is completed and construction is anticipated for completion in 2010.
At the time of this report's publication, the construction for the runway extension was complete.

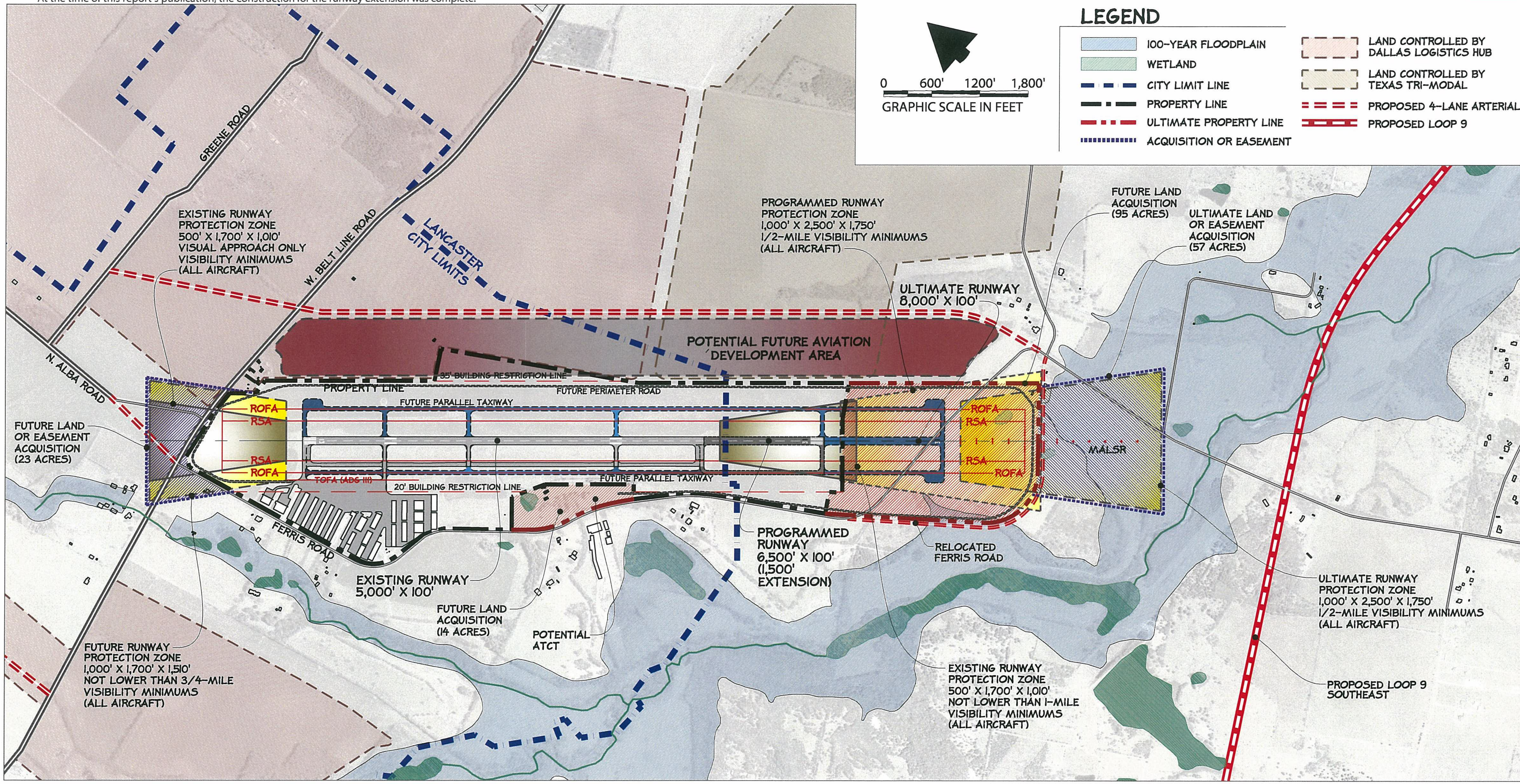


Figure E6 **Conceptual Development Plan**
Airport Reference Code C/D III (Includes Very Large Business Jets)
General Aviation Airport with Significant Business Use
Programmed for Ultimate Runway Length of 8,000 Feet

Sources: City of Lancaster Master Thoroughfare Plan; Dallas Logisitics Hub Site Plan; Texas Tri-Modal Master Plan; FEMA, Dallas County 100-Year Floodplain.

Multi-Modal Transportation Alternatives

Summary

The City of Lancaster's 2006 *Master Thoroughfare Plan* shows a proposed four-lane major arterial roadway that would run east along the potential aviation development area located east of airport property. This arterial would provide prime access to the surrounding roadway network, which includes the following:

- **Belt Line Road**
- **Proposed Loop 9 Southeast**
- **Interstate 45**
- **Interstate 35E**
- **Interstate 20**

From a mobility perspective, Airport Development Alternatives One through Four, presented above, each include the prospective need to access this planned four-lane arterial adjacent to the potential aviation development area east of the Airport. This development area will be more conducive to commercial development as it is much more accessible by trucks with opportunities to link to nearby rail. The potential of bringing rail access to the site was explored; however, it was deemed impractical from a cost and mobility perspective.

Configuration of the planned four-lane major arterial roadway with proposed access points to the potential aviation development area east of airport property is illustrated on Figure E7, *MULTI-MODAL PLAN: ROAD OPTION 'A'*. As shown on Figure E7, existing and future airport facilities on the west side of airport property will continue to be accessed via Ferris Road. One weakness with the configuration of Road Option 'A' is the number of access driveways connecting to the east side potential aviation development area that are proposed along the new arterial roadway.

Access points are often in direct conflict with an arterial's function to provide mobility. One potential solution is illustrated on Figure E8, *MULTI-MODAL PLAN: ROAD OPTION 'B'*. This configuration provides a single access point to the proposed arterial roadway. As shown, the proposed arterial is re-aligned and shifted further to the east in order to provide a larger buffer for possible non-aviation development in between the potential aviation development area and the proposed major arterial roadway. The access roadway from the major arterial services the potential aviation development area with an internal local road for light industrial use that terminates/re-circulates at the north and south ends of the road. As illustrated on Figure E8 and on the *Conceptual Development Plan*, existing and proposed airport facilities on the west side of the Airport will continue to be serviced by Ferris Road.

The transportation plan that best suits the mobility needs of Lancaster Regional Airport and the surrounding community is Road Option 'B', as depicted in Figure E8, *MULTI-MODAL PLAN: ROAD OPTION 'B'*. It provides access to the east side potential aviation development area, with limited access to the proposed major four-lane arterial, which will likely reduce congestion along the new roadway. Road Option 'B' also has the flexibility to accommodate a wide variety of vehicles (trucks, emergency, and automobiles). Recommendations will be incorporated following coordination and input received from the City of Lancaster.

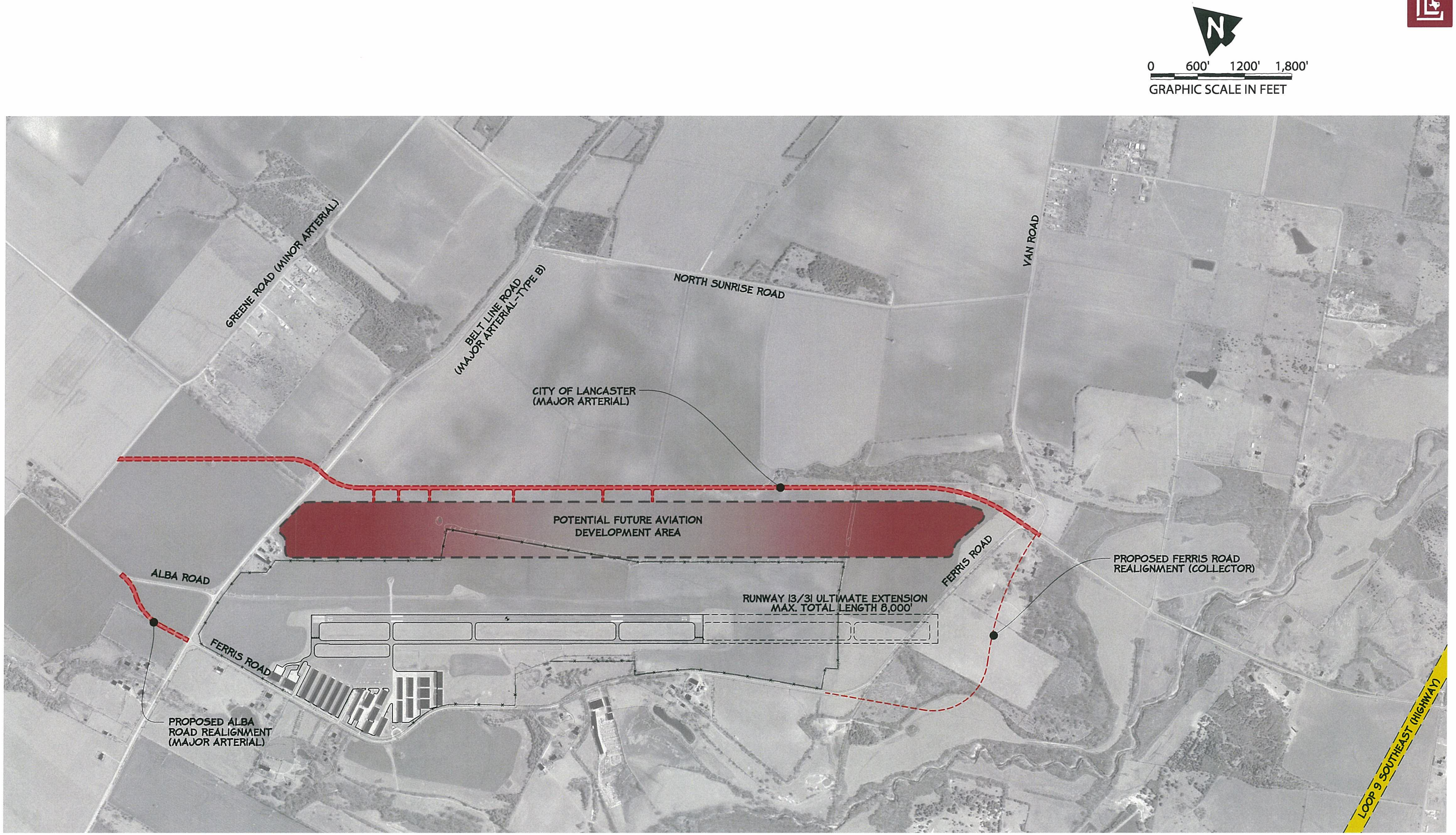


Figure E7 **Multi-Modal Plan: Road Option 'A'**

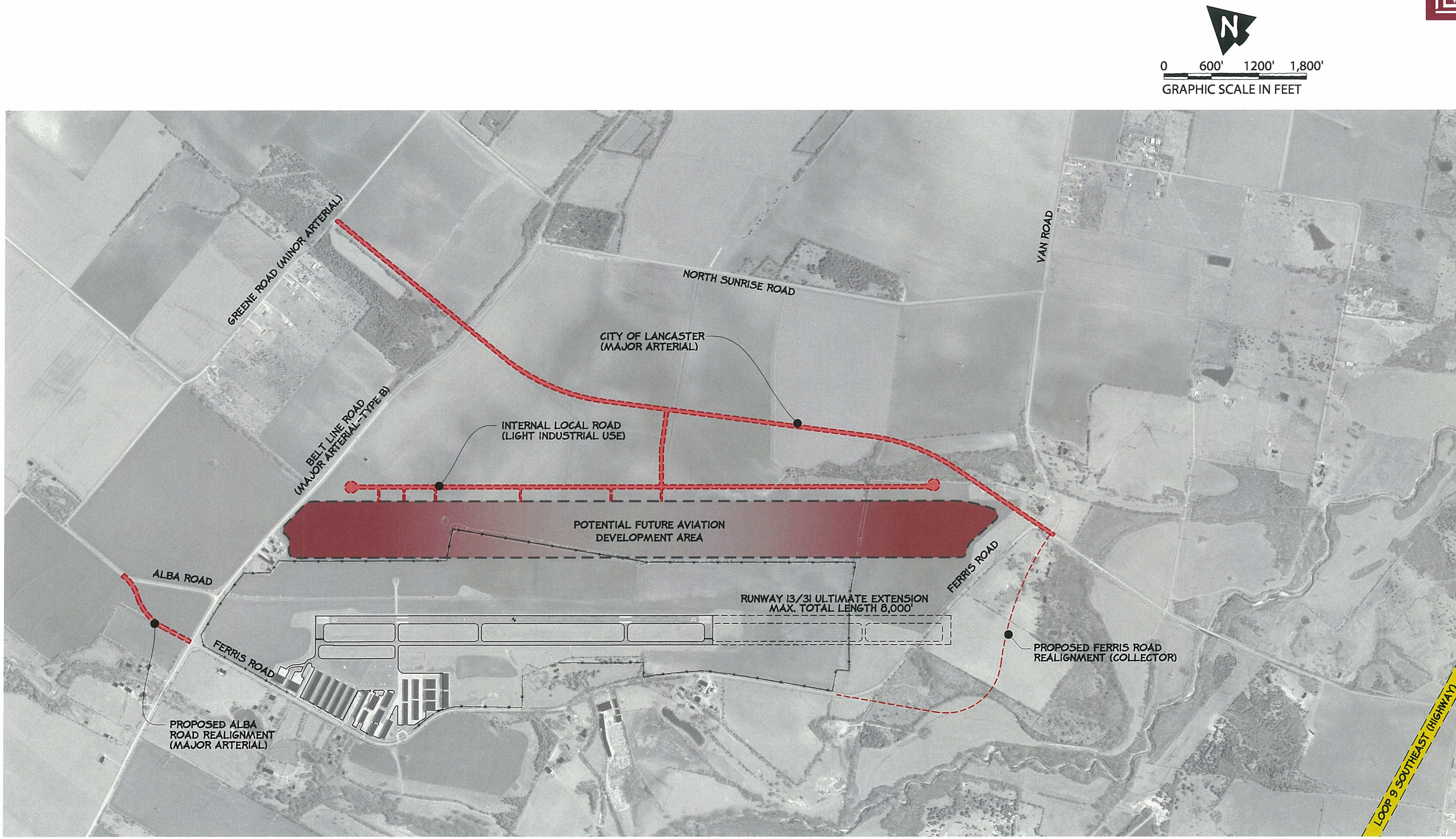


Figure E8 **Multi-Modal Plan: Road Option 'B'**

F Environmental Overview

INTRODUCTION. The Environmental Overview provides an initial indication of the environmental factors involved with the implementation of the Conceptual Development Plan's improvement recommendations as described in Chapter E, *Development Concepts and Alternatives Analysis*. The environmental overview was conducted in accordance with the Federal Aviation Administration's (FAA's) *Environmental Desk Reference for Airport Actions*, and FAA Order 5050.4B, National Environmental Policy Act (NEPA), *Implementing Instructions for Airport Actions*. The analysis presented in this chapter is not intended to fulfill NEPA requirements associated with a project-level review, as it is assumed that projects the FAA deems suitable for decision within the near-term (0-5 years) will require environmental documentation to be prepared prior to approval and implementation.

The purpose of this environmental overview is to summarize and identify the environmental effects, (including environmental conditions presented in Chapter A, *Inventory)* that may require further evaluation during the preparation of future NEPA analysis. Previous environmental documentation, including the 2009 Categorical Exclusion[1] for the Runway 31 extension, was reviewed to identify potential impacts related to the recommended alternative presented in the Conceptual Development Plan.

The environmental categories examined in this chapter include:

- **Noise**
- **Compatible Land Use**
- **Environmental Justice**
- **Air and Water Quality**
- **Historic, Architectural, Archeological, and Cultural Resources**
- **Threatened and Endangered Species**
- **Hazardous Wildlife Attractants**
- **Wetlands**
- **Floodplains**
- **Wild and Scenic Rivers**
- **Coastal Resources**
- **Farmland**
- **Section 4(f) Property**
- **Hazardous Substances and Wastes**
- **Construction Impacts**

[1] A Categorical Exclusion (CATEX) is the lowest level of environmental analysis required to meet NEPA standards, and is only completed when the project is on the FAA's list for categorically excluded projects and/or is not predicted to have any significant environmental impacts or extraordinary circumstances. A CATEX was produced for the Runway 31 extension that is currently programmed, and was approved by the FAA and the Texas Department of Transportation (TxDOT) in 2009.

Alternatives involving the future configuration of the Airport have been reviewed in previous chapters. As proposed in the Airport Layout Plan (ALP), the *Master Plan* recommends the following primary changes[2]:

- **Relocate Taxiway "A" (50 feet wide), 400 feet west of the runway centerline**
- **Relocate/construct new GA terminal building south of the existing hangar development area on the west side of the Airport**
- **Construct an Airport Traffic Control Tower (ATCT) facility on the west side of the Airport**
- **Construct a perimeter road along airport property**
- **Relocate Ferris Road to the south of the Airport**
- **Extend Runway 31 by 1,500 feet to the south, for an ultimate length of 8,000 feet**
- **Extend Taxiway "A" 1,500 feet to the south, 50 feet wide, located 400 feet west of the runway (in conjunction with the ultimate runway extension)**
- **Construct a full-length parallel taxiway, 50 feet wide, 400 feet east of the runway centerline**
- **Develop/construct an appropriate taxiway/taxilane/aircraft parking apron layout for the development area on the west side of airport property**

Historic and Existing Airport Conditions

Location and Climate

Lancaster Regional Airport is located in north-central Texas within the Dallas/Fort Worth Metroplex. The Airport Reference Point (ARP) is located at Latitude 32° 34' 45.08" N, Longitude 096° 43' 58.40" W. The Airport has an elevation of 501 feet above mean sea level (AMSL) and consists of approximately 306 acres. The climate of the area is characterized as mild with an average rainfall of approximately 33 inches, and annual snowfall averages approximately three inches. The average maximum temperature of the hottest month is 96° Fahrenheit (July/August), and the average minimum temperature of the coldest month is 34° Fahrenheit (January).

Surface Transportation Access

Surface transportation is accomplished via Ferris Road from the west. Ferris Road is connected to the north by Belt Line Road, which runs east and west, and provides access to Interstate 45 to the east and South Dallas Avenue to the west. Additionally, Belt Line Road continues west past South Dallas

[2] Runway 13/31 is currently programmed for a 1,500 foot extension to the south. Construction began in December 2009.

Avenue and connects with Interstate 35E/U.S. Highway 77. Ferris Road continues south of the Airport and connects to East Ovilla Road, which also runs east and west, providing access to Interstate 45 and South Dallas Avenue.

Existing Land Use

Currently, the majority of existing land use surrounding the Airport is classified as undeveloped. Small portions of Residential land uses are located to the northwest, west, and southwest of the Airport. Additionally, a small section of Industrial land use is located west/southwest of the Airport. Existing land use within the airport boundary is classified for airport use.

Area Demographics

In 2008, Lancaster had a population of 35,800, and Dallas County had a population of 2,417,650[3]. Median income in Dallas County grew from $43,550 in 2000 to $46,468 in 2008, a growth rate of approximately 6.7%[4]. In 2008, the unemployment rate was 6.9% for Lancaster and 5.4% for Dallas County[5]. Approximately 27.2% of the Lancaster population above the age of 25 had at least a high school education, and approximately 13.2% had at least a Bachelor's Degree in 2007. Comparatively, approximately 24.2% of the 2007 population above the age of 25 in Dallas County had at least a high school education, and approximately 17.8% had at least a Bachelor's Degree[4].

Airport Activity

Historic. In 2000, the FAA Terminal Area Forecast (TAF) reported approximately 40,500 total aircraft operations at Lancaster Regional Airport. Of that total, approximately 16,180 were conducted by itinerant general aviation (GA) aircraft, 50 were itinerant military, and 24,270 were local GA aircraft. By 2007, the TAF reported approximately 18,020 itinerant GA aircraft operations, 50 itinerant military operations, and approximately 27,027 local GA aircraft operations for a total of 45,097 operations.

Existing. As presented in Chapter B, *Forecasts of Aviation Activity*, the total estimated operations for 2008 at Lancaster Regional Airport were 57,750. Approximately 40,600 operations were conducted by single engine aircraft, approximately 8,400 were conducted by multi-engine piston aircraft, 700 by multi-engine turbo-prop aircraft, 4,200 by jet aircraft, and approximately 3,850 operations were conducted by rotor aircraft.

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[3] U.S. Census Bureau, North Central Texas Council of Governments (NCTCOG), Texas State Data Center, and RW Armstrong analysis.
[4] U.S. Census Bureau, the U.S. Bureau of Economic Analysis, and RW Armstrong analysis.
[5] U.S. Census Bureau, NCTCOG, and RW Armstrong analysis.

Environmental Conditions Analysis

Noise

Noise is generally defined as unwanted sound and, as such, the determination of acceptable levels is subjective. The day-night sound level (DNL) methodology is used to determine both the noise levels resulting from existing conditions and the potential noise levels that could be expected to occur with full development of proposed projects. The basic unit in the computation of DNL is the Sound Exposure Level (SEL). An SEL is computed by adding the "A" weighted decibel level [dB(A)] level for each second of a noise event above a certain threshold ("A" weighted refers to the sound scale pertaining to the human ear). For example, a noise monitor located in a quiet residential area [40 dB(A)] receives the sound impulses of an approaching aircraft and records the highest dB(A) reading for each second of the event as the aircraft approaches and departs the site. Each of these one-second readings is then added logarithmically to compute the SEL.

The computation of DNL involves the addition, weighting, and averaging of each SEL to achieve the DNL level in a particular location. The SEL of any single noise event occurring between the hours of 10:00 p.m. and 7:00 a.m. is automatically weighted by adding 10 dB(A) to the SEL to account for the assumed additional irritation perceived during that time period. All SELs are then averaged over a given time period (day, week, year) to achieve a level characteristic of the total noise environment. Very simply, a DNL level for a specified area over a given time is approximately equal to the average dB(A) level that has the same sound level as the intermittent noise events. Thus, a DNL 65 level describes an area as having a constant noise level of 65 dB(A), which is the approximate average of single noise events even though the area would experience noise events much higher than 65 dB(A) and periods of quiet.

The main advantage of DNL is that it provides a common measure for a variety of differing noise environments. The same DNL level can describe both an area with very few high level noise events and an area with many low level events. DNL is thus constructed because it has been found that the total noise energy in an area predicts community response.

DNL levels usually are depicted as grid cells or contours. Grid cells are squares of land of a specific size that are entirely characterized by a noise level. Contours are interpolations of noise levels based on the centroid of a grid cell and drawn to connect all points of similar level. Contours appear similar to topographical contours and form concentric "footprints" about a noise source. These footprints of DNL contours drawn about an airport are used to predict community response to the noise from aircraft using that airport.

Computer Modeling. The DNL noise contours were generated using the Integrated Noise Model (INM) Version 7.0b, specifically developed by the FAA for modeling the noise environment at airports. The program is provided with standard aircraft noise and performance data that can be tailored to the characteristics of individual airports. The INM program requires the input of the physical and operational characteristics of the airport. Physical characteristics include runway end coordinates, displaced thresholds, airport altitude, and temperature. Operational characteristics include aircraft mix, flight tracks, and runway utilization. Optional data that can be incorporated in the model include approach and departure profiles, approach and departure procedures, and aircraft noise curves.

Using the existing and forecast aircraft operations presented earlier, two sets of noise contours have been generated, an existing (2008) set and a future (2030) set. The aircraft operations were sufficient to produce the 65, 70, and 75 DNL noise contours. Illustrations and descriptions follow of the potential impacts to the surrounding land uses for each set of noise contours.

2008 Noise Impacts. The existing noise contours and the anticipated effect on the surrounding land uses are presented in the following figure entitled *EXISTING (2008) NOISE CONTOURS WITH EXISTING LAND USE*. The 75 DNL noise contour contains approximately 72 acres, the 70 DNL noise contour encompasses roughly 140 acres, and the 65 DNL noise contour contains about 291 acres. As can be seen, the existing 75 DNL noise contour remains within airport property, and a small portion of the 70 DNL noise contour extends south off airport property. The 65 DNL noise contour slightly extends off airport property to the east, and south/southeast of the Runway 31 threshold. As can be seen, there are no existing noise-sensitive land uses contained within any of the existing noise contours.

2030 Noise Impacts. By 2030, the total annual operations are forecast to increase by 34% to 77,350. The future aircraft categories that are expected to be operating at the Airport include single engine, multi-engine piston and turbo-prop, business jet, and helicopters. The future 2030 noise contours and the anticipated effect on the surrounding land uses are illustrated in the figure entitled *FUTURE (2030) NOISE CONTOURS WITH EXISTING LAND USE*. In comparison, the 2030 noise contours are slightly smaller than the 2008 contours. This decrease in size is due to the assumption that older, louder aircraft (particularly in the business jet category) will be phased out within the next 20 years, and more operations will be conducted by newer, quieter aircraft. The future 75 DNL noise contour contains approximately 18 acres, the 70 DNL noise contour encompasses about 64 acres, and the 65 DNL noise contour includes approximately 181 acres. The future 65, 70, and 75 DNL noise contours all remain within the airport boundary. No noise-sensitive land uses are contained within any of the future noise contours.

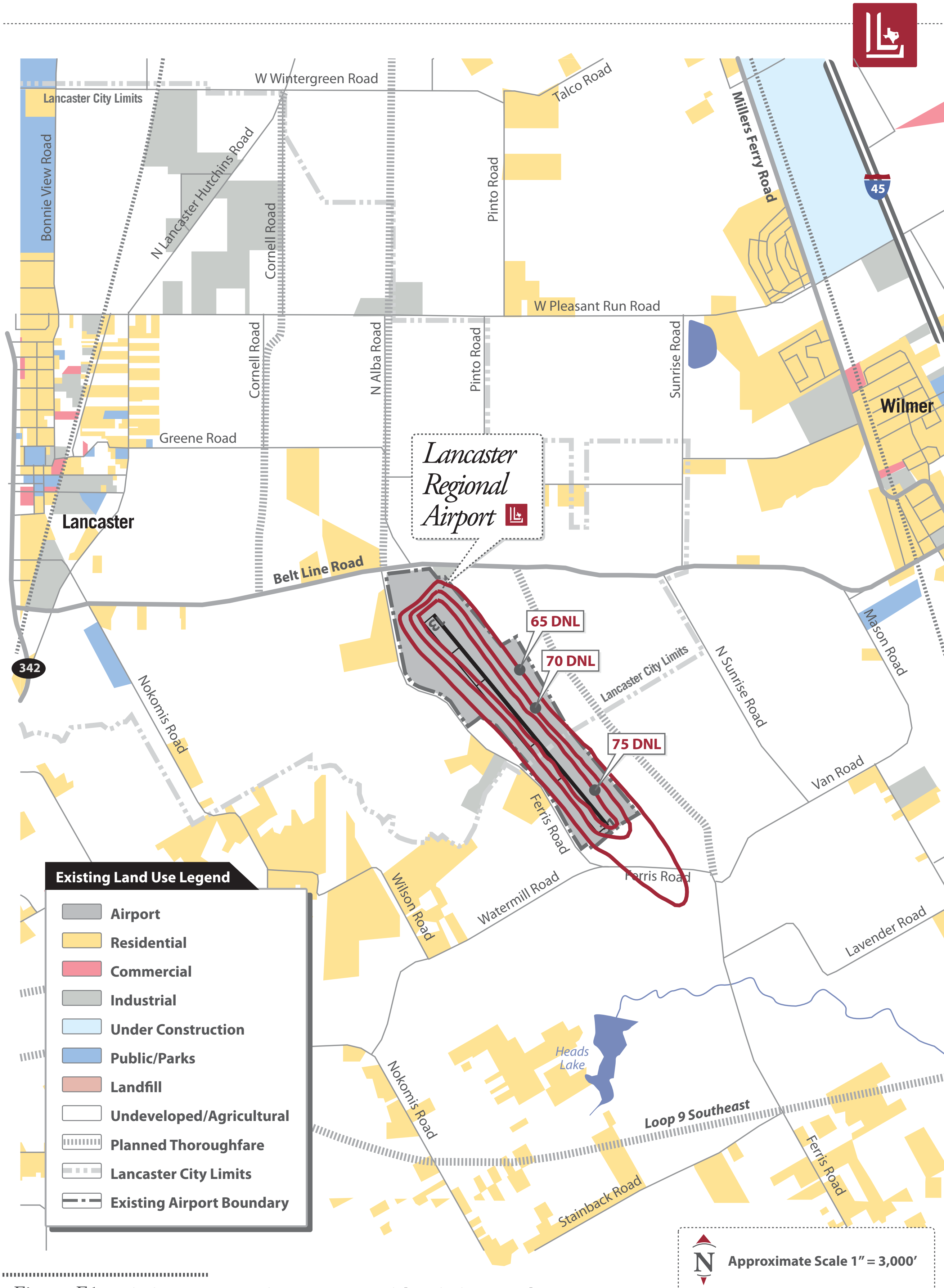


Figure F1 **Existing (2008) Noise Contours with Existing Land Use**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus. City of Lancaster GIS Planning Data, North Texas Council of Governments (NCTCOG).

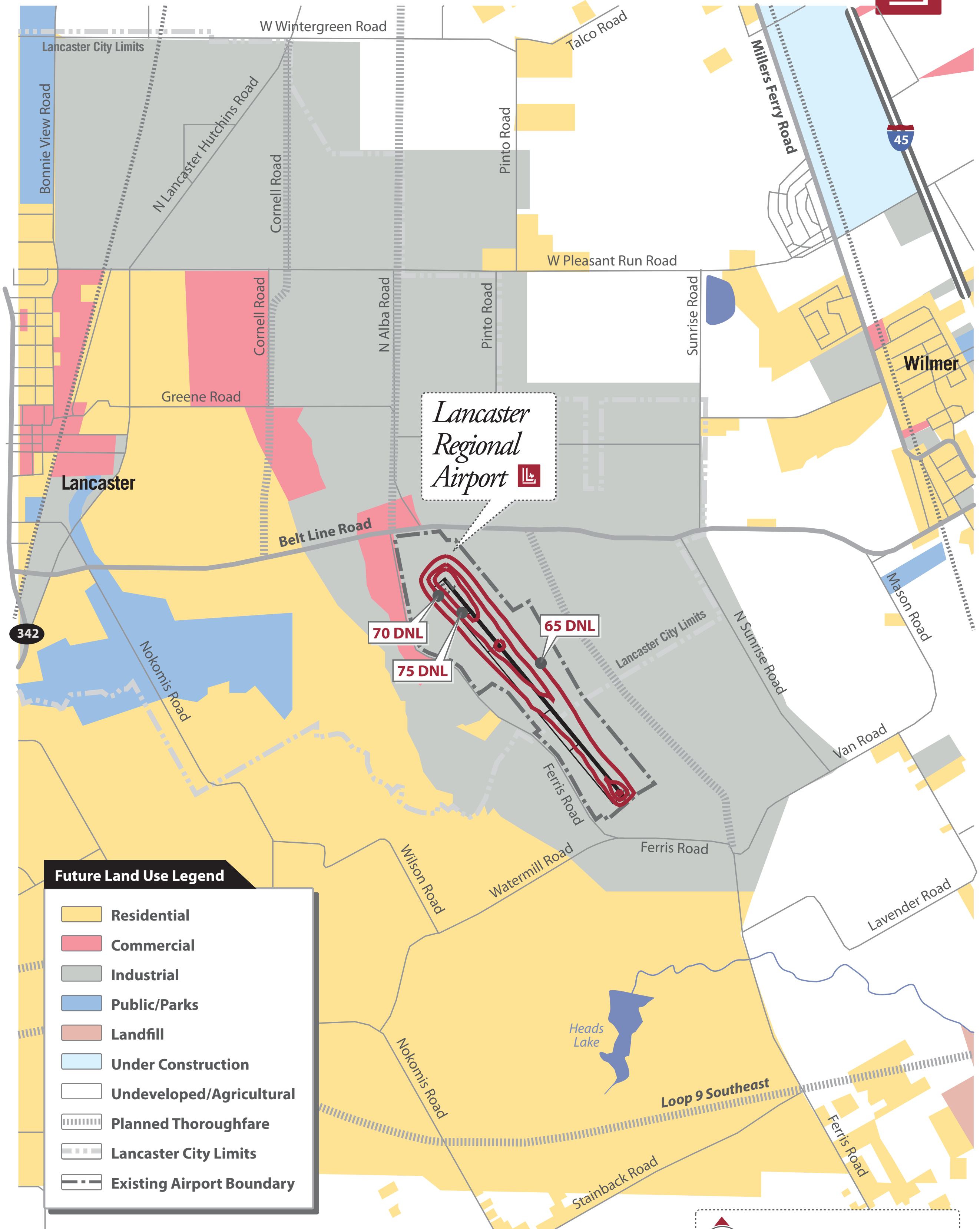


Figure F2 **Future (2030) Noise Contours with Future Land Use**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus. City of Lancaster GIS Planning Data, North Texas Council of Governments (NCTCOG).

Compatible Land Use

Future Conditions. Establishing land use compatibility within airport environs is the responsibility of local authorities, but should be based on a recognized standard. Federal Aviation Regulations (FAR) Part 150, *Land Use Compatibility Guidelines*, are the acknowledged standard by the Federal Government regarding aircraft noise at airports. The following illustration, entitled *LAND USE COMPATIBILITY MATRIX*, indicates those land uses that are compatible within certain DNL noise contours. It identifies land uses as being compatible, incompatible, or compatible if sound attenuated.

The guidelines can act as a guide to the City for establishing sensible land use planning and control practices, and as a tool for comparing relative land use impacts resulting from the proposed airport development. It must be remembered that the DNL noise contours do not delineate areas that are either free from excessive noise or areas that will be subjected to excessive noise. In other words, it cannot be expected that a person living on one side of a DNL noise contour will have a markedly different reaction than a person living nearby, but on the other side. What can be expected is that the general aggregate community response to noise within the DNL 65 noise contour, for example, will be less than the public response from the DNL 75 noise contour.

The area between the 65 DNL noise contour and below is an area within which most land uses are compatible, but closer to the 65 DNL is also an area where single event noise complaints are often received. The area between the 65 and 70 DNL noise contours is an area of significant noise exposure where many types of land uses are normally unacceptable and where land use compatibility controls are recommended. Finally, the area inside the 70 and 75 DNL noise contour identifies land uses that are subjected to a significant level of noise, and, the sensitivity of various uses to noise is increased.

Compatible Land Use Recommendations. Noise impacts are significant components in establishing sensible land use planning practices within the environs of the Airport. Although the Airport is currently surrounded primarily by compatible land uses, there is some potential for future land use incompatibilities and conflicts. These conflicts could arise in development areas located north of the approach end of Runway 13 and south of Runway 31. As shown above, on Figure F2 *FUTURE (2030) NOISE CONTOURS WITH FUTURE LAND USE*, these development areas are mostly recommended for commercial or industrial land use in the Future Land Use Plan for the City. In an effort to encourage effective compatible land use planning for areas surrounding the Airport, and in recognition of future aircraft over-flights, the following recommendations should be considered:

- **Acquisition or easement of approximately 23 acres of land within the Runway 13 Runway Protection Zone (RPZ).**
- **Acquisition or easement of approximately 57 acres of land within the ultimate Runway 31RPZ.**

LAND USE	BELOW 65	YEARLY DAY-NIGHT NOISE LEVEL (DNL) IN DECIBELS 65-70	70-75	75-80	80-85	OVER 85
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail-building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to NOTES.

The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

TABLE KEY

SLUCM	Standard Land Use Coding Manual.
Y(Yes)	Land Use and related structures compatible without restrictions.
N(No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30 or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

NOTES

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided that special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Figure F3 **Land Use Compatibility Matrix**

Source: FAR Part 150 Guidelines.

These acquisitions (or easements) will provide the City of Lancaster with development control of the land, thus restricting the development of non-compatible land uses. Additionally, coordination between the City of Lancaster Planning Division and the Airport is recommended in order to ensure that these areas remain as commercial or industrial land use and that residential development is restricted. By maintaining these areas in commercial or industrial land use, the Airport will not be limited by incompatible land uses (i.e., residential and other noise sensitive land uses) in the future.

While these compatible land use recommendations go beyond the FAR Part 150 guidelines, single event noise levels from the occasional flyover in these areas can be significant. Because general aviation aircraft do not fly as precise a flight track as air carrier aircraft (resulting in a wide variation of actual aircraft over-flight locations), there are many noise complaints registered at general aviation airports beyond the 65 DNL noise contours. These single event over-flights can cause more irritation than the cumulative noise levels associated with aircraft operations. As can be seen with existing and future land uses surrounding the Airport, the City of Lancaster is already synchronized with FAR Part 150 land use compatibility recommendations.

Environmental Justice

None of the proposed improvement projects would greatly increase the size or shape of the noise contours; therefore, the proposed projects are not predicted to disproportionately affect any racial or economic group of people living within the vicinity of the Airport.

Air and Water Quality

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: carbon monoxide (CO), ozone (O_3), particulate matter (PM_{10}), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and lead (Pb). According to the EPA, the area is currently in compliance with all National Ambient Air Quality Standards (NAAQS). The closest non-attainment area is Dallas, Texas, which is approximately 15 miles from the Airport. Generally, the FAA uses the number of passengers and number of aviation operations as an indicator of potential air quality concerns. These numbers help decide whether the project requires further air quality analysis.

Federal Aviation Administration Order 5050.4A states, "No air quality analysis is needed if the airport is a commercial service airport and has less than 1.3 million passengers and less than 180,000 general aviation operations forecasts annually." The forecast operations by the end of the 20-year planning period are expected to remain well below the 180,000 operations threshold required to do an air quality analysis. Short-term air quality impacts may be expected from temporary construction activities such as heavy equipment pollutant emissions, fugitive dust resulting from cut and fill activities, and the operation of portable concrete batch plants. Compliance with all applicable local, state, and federal air quality regulations and permitting requirements will be the responsibility of all contractors.

Contractors doing work at the Airport will be required to follow guidelines outlined in the Federal Aviation Administration's Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports*, which is the FAA's guidance to airport sponsors concerning protection of the environment during construction. The final plans and specifications for any project will incorporate the provisions of AC 150/5370-10A to ensure minimal impact due to erosion, air pollution, sanitary waste, and the use of chemicals. Additionally, a National Pollutant Discharge Elimination System (NPDES) permit, administered by the Texas Commission on Environmental Quality (TCEQ), will be required for construction projects.

Historical, Architectural, Archaeological, and Cultural Resources

Section 106 of the National Historic Preservation Act requires federal agencies, or their designated representatives, to take into account the effects of their undertakings on historic properties, which include archaeological sites, buildings, structures, objects, or districts. Several sites in Lancaster are listed on the National Register of Historic Places (NRHP), but none of these sites are close to airport property.

Prior to any future airport projects, the Texas Historical Commission will need to be contacted. Additionally, should any construction activity expose buried archaeological material, work would stop in that area and both the FAA and the Texas Historical Commission would be contacted.

Threatened and Endangered Species

The *Endangered Species Act*, as Amended, requires each federal agency to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species. According to the Texas Parks & Wildlife Department, there are 16 federally and state threatened and endangered species located within Dallas County. Table F1, *DALLAS COUNTY FEDERALLY LISTED & STATE LISTED WILDLIFE SPECIES*, lists the state or federally listed species (under the *Endangered Species Act*) within Dallas County. Before any projects could be undertaken, the Airport would need to determine if these threatened and endangered species are located on airport property, within the proposed project area. If the species are found to be present, and depending on potential impact, an Environmental Assessment or Environmental Impact Statement may have to be prepared prior to project implementation.

Table F1 **DALLAS COUNTY FEDERALLY LISTED & STATE LISTED WILDLIFE SPECIES**

Common Name	Scientific Name	State Status	Federal Status
American Peregrine Falcon	*Falco peregrines anatum*	E	DL
Arctic Peregrine Falcon	*Falco peregrines tundrius*	T	DL
Bald Eagle	*Haliaeetus leucocephalus*	T	DL
Black-capped Vireo	*Vireo atricapilla*	E	LE
Golden-cheeked Warbler	*Dendroica chrysoparia*	E	LE
Interior Least Tern	*Sterna antillarum athalassos*	E	LE
Peregrine Falcon	*Falco peregrines*	E, T	DL
Piping Plover	*Charadrius melodus*	T	LT
White-faced Ibis	*Plegadis chihi*	T	---
Whooping Crane	*Grus Americana*	E	LE
Wood Stork	*Mycteria Americana*	T	---
Alligator snapping turtle	*Macrochelys temminckii*	T	---
Texas horned lizard	*Phrynosoma cornutum*	T	---
Timber/Canebrake rattlesnake	*Crotalus horridus*	T	---

Source: Texas Parks & Wildlife Department.
Note: Species listed as "Rare" are not included.
E = Endangered
T = Threatened
DL = Federally Delisted
LE = Federally Listed Endangered
LT = Federally Listed Threatened
--- No Status

Hazardous Wildlife Attractants

Retention and settling ponds, recreational use ponds, wastewater and storm water treatment facilities, ponds resulting from mining activities and drinking water intake and treatment, and landfill facilities can frequently attract large numbers of potentially hazardous wildlife, such as birds. The City of Ferris' landfill, Skyline Landfill (operated by Waste Management of North Texas), is located approximately two and ½ miles southeast of the Airport, as illustrated below in Figure F4, *ENVIRONMENTAL CONDITIONS MAP*.

According to FAA Advisory Circular 150/5200-33-B, *Hazardous Wildlife Attractants On or Near Airports*, the FAA recommends that minimum separation criteria be established between the air operations area (AOA) and certain land uses that can potentially attract hazardous wildlife. Any solid waste disposal facility (i.e., sanitary landfill) or water management facility (i.e., wastewater treatment facility, storm water management facility, etc.) located within 5,000 feet of all runways planned to be used by piston-powered aircraft or within 10,000 feet of all runways planned to be used by turbine aircraft, is considered by the FAA to be an incompatible land use because of the potential for conflicts between bird habitat and low-flying aircraft.

The 2006 *Airport Master Plan Update* indicated that Waste Management/Skyline Landfill had submitted monthly bird activity reports to the FAA since 1995. In 2004, the FAA concluded the bird activity at the landfill was reasonably "well controlled" and was "compatible" with Lancaster Regional Airport's aircraft operations. Additionally, based on this rationale, the FAA at the time did not object to any potential airport expansion, such as a runway extension. However, the Skyline Landfill has experienced significant growth in the last few years, and a growing concern is the possible lack of covering waste, which is potential for an increase in bird activity. It may be important in the future to continue monitoring the growth of Skyline Landfill and mitigate as necessary in consultation with the FAA and the City of Ferris.

Wetlands

Wetlands are basically defined as areas inundated by surface or groundwater with a frequency sufficient to support vegetation or aquatic life requiring saturated or seasonally saturated soil conditions for growth and reproduction. Tenmile Creek runs west and south of the Airport, and Keller Branch Creek runs west and north of the Airport. Both streams have several associated wetlands. According to the U.S. Fish and Wildlife Service National Wetlands Inventory Maps, there is one wetland located on airport property. A Palustrine open-water/permanently flooded/diked/impounded (POWHh) wetland is located on the west/southwest side of airport property (also known as the Smith Stock Pond). This wetland will probably fall under the jurisdiction of the U.S. Army Corps of Engineers because of its connectivity to the surrounding creeks. Existing wetlands on or near airport property are illustrated below in Figure F4, *ENVIRONMENTAL CONDITIONS MAP*.

Water quality issues may need to be examined, particularly because of the connectivity of the wetlands to larger water sources. If any proposed projects would impact these wetlands, the Airport will coordinate with the U.S. Army Corps of Engineers and some further environmental analysis may be necessary. Should there be any mitigation measures identified, contractors would be required to follow guidelines outlined in the FAA's AC 150/5370-10A to minimize the impacts to the environment, including wetlands.

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. The Airport is not located within a 100-year floodplain; however, a 100-year floodplain is located adjacent to the Airport. The flood effects are associated with Tenmile Creek, and the floodplain is located directly west and southwest of the Airport, as shown in Figure F4, *ENVIRONMENTAL CONDITIONS MAP*.

According to FAA Orders 1050.1E and 505.4B, the FAA must determine if there would be a "significant floodplain encroachment" should development occur within a floodplain. If development occurred that may cause an impact to the 100-year floodplain located near the Airport, consultation with the FAA would be required to determine if the significant encroachment will cause "notable adverse impacts on natural and beneficial floodplain values" as a result of any of the proposed projects.

Wild and Scenic Rivers

According to the National Park Service's Nationwide Rivers Inventory, there are no wild and scenic rivers located within the vicinity of Lancaster Regional Airport and, therefore, there will not be any impacts to this nationally significant river resource as a result of proposed airport development.

Coastal Resources

Lancaster Regional Airport is not located within a coastal county; therefore, the Texas Coastal Management Program is not applicable, nor will any proposed development projects have any impacts to coastal resources.

Farmland

According to the National Soil Survey by the National Resources Conservation Service (NRCS), there are several areas of land on and surrounding the Airport that are considered to be prime farmland.

The north, east, and majority of the south sections of land within airport property are composed of Branyon clay, with zero to one percent slopes, and considered to be prime farmland. Several soil types are found on the western sections of land within airport property. These include Austin silty clay, one to three percent slopes; Altoga silty clay, five to 12 percent slopes, eroded; Lewisville silty clay, one to three percent slopes; and, Lewisville silty clay, three to five percent slopes. Except for Altoga silty clay, all of these soils on the western section of airport property are considered to be prime farmland. All of these soils are located on airport property, and were generated through online mapping of the property from the Natural Resources Conservation Service (NRCS) website.

Consultation with the U.S. Department of Agriculture (USDA) and the NRCS is required to determine if the Farmland Protection Policy Act (FPPA) applies to the land or applies to any land to be converted from non-agricultural use as a result of the proposed projects.

Section 4(f) Property

Section 4(f) of the Department of Transportation Act (recodified at 49 USC, Subtitle I, Section 303) provides that no publicly owned park, recreation area, wildlife or waterfowl refuge, or land of a historic site that is of national, state, or local significance will be used, acquired, or affected by programs or projects requiring federal assistance for implementation. Currently, there are no Section 4(f) potential resources within the immediate vicinity of the Airport.

Hazardous Substances and Wastes

No hazardous substances and/or wastes will be generated from any development proposed by this Airport Master Plan. However, construction activities can generate hazardous wastes, and some construction materials constitute hazardous substances. These include fuel, oil, lubricants, paints, solvents, concrete-curing compounds, fertilizers, herbicides, and pesticides. Proper practices can be implemented to prevent or minimize the potential for these hazardous substances to be released into the environment and are included below:

- **Chemicals, petroleum-based products, and waste materials, including solid and liquid waste, should be stored in areas specifically designed to prevent discharge into storm water runoff.**
- **Areas used for storage of toxic materials should be designed with full enclosure in mind, such as the establishment of a dike around the perimeter of the storage area.**
- **Construction equipment maintenance should be performed in a designated area and control measures, such as drip pans to contain petroleum products, should be implemented.**
- **Spills should be cleaned up immediately and disposed of properly.**

Construction Impacts

In order to minimize any adverse environmental impacts associated with the proposed projects, such as temporary water, air, erosion, fugitive dust, and equipment emissions, construction activities will follow the standards and guidelines specified in FAA AC 150/5370-10A, *Standards for Specifying Construction of Airports*.

Need for Additional Environmental Documentation

According to FAA Orders 5050.4B, *NEPA Implementing Instructions for Airport Actions*, and 1050.1E, *Environmental Impacts: Policies and Procedures*, an Environmental Assessment may be required for the runway and taxiway extension, and the acquisition of additional airport property. This is especially true if several of the projects are enacted at the same time. The construction of the parallel taxiway, any new hangar or apron construction on airport property, and the Runway 31 MALSR installation would not normally require an Environmental Assessment if implemented separately, but may require a "coordinated categorical exclusion." A coordinated categorical exclusion requires contact with the various governmental agencies for a determination of environmental impacts that the specific project or projects might have at the time of implementation.

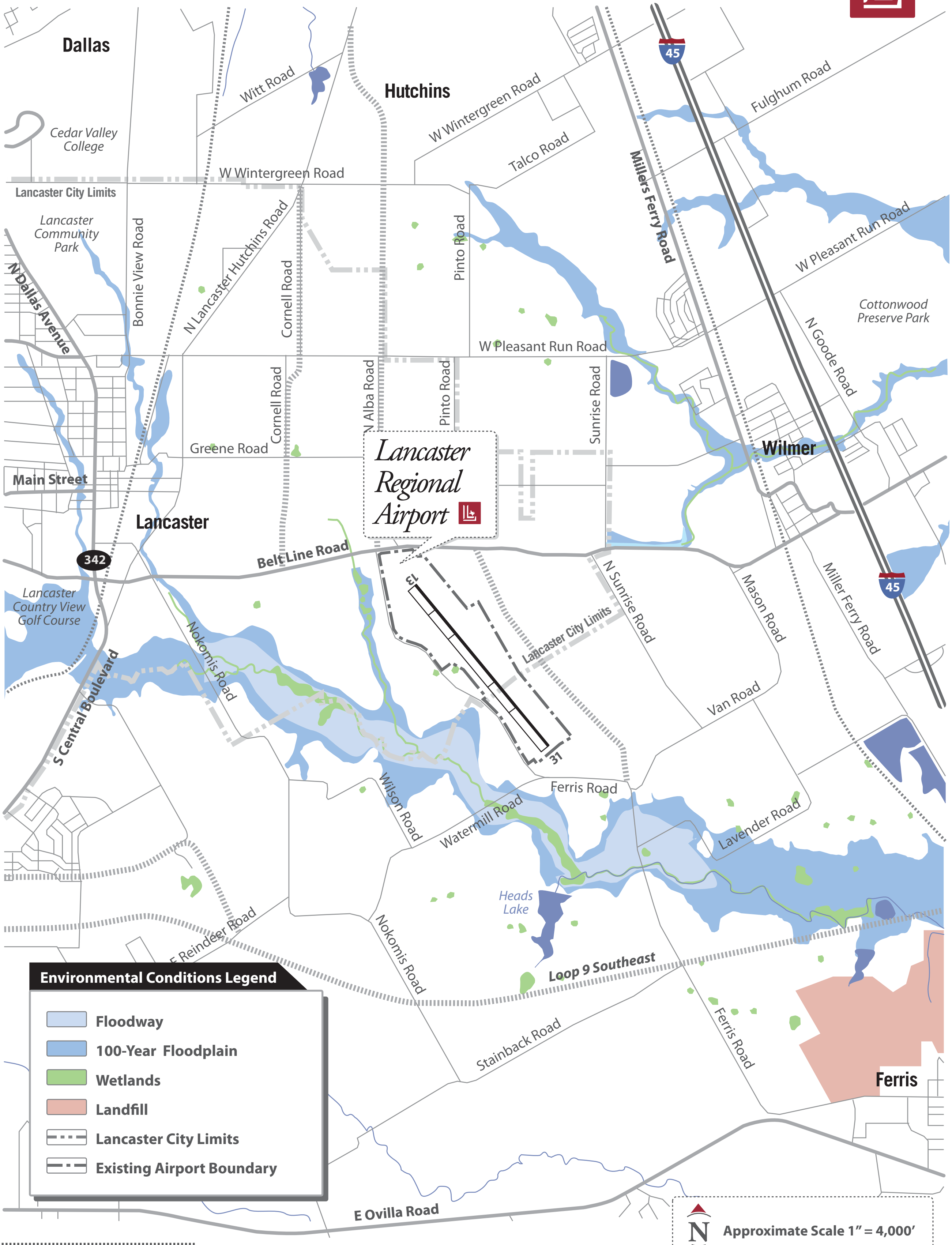


Figure F4 **Environmental Conditions Map**

Source: Yahoo Maps, Data Copyright 2007 NavTeq, TeleAtlus. City of Lancaster GIS Planning Data, US Fish & Wildlife Service (USFWS), and Federal Emergency Management Agency (FEMA).

G Airport Plans

INTRODUCTION. The plan for the future development of Lancaster Regional Airport has evolved from an analysis of many considerations. Among these are: aviation demand forecasts and facility requirements; aircraft operational characteristics; environmental considerations; and, as characterized in the previously noted statement of goals, the general direction of airport development prescribed by airport management. Forecasts are utilized as a basis for planning; however, facilities are only to be constructed to meet actual demand.

Previous chapters have established and quantified the future development needs of the Airport. In this chapter, the various elements of the plan are categorically reviewed and detailed in summary and graphic format. A brief written description of the individual elements, represented in the set of Airport Plans for Lancaster Regional Airport, is accompanied by a graphic description presented in the form of the Airport Layout Plan, the Development Area Plan, and the Land Use Drawing.

Airport Layout Plan

The Airport Layout Plan (ALP) is a graphic depiction of existing and ultimate airport facilities that will be required to enable the Airport to properly accommodate the forecast future demand. In addition, the ALP also provides detailed information on both airport and runway design criteria, which is necessary to define relationships with applicable standards. The following illustration, entitled *AIRPORT LAYOUT DRAWING*, and the following paragraphs describe the major components of the future Airport Conceptual Development Plan.

Runway System

Runway Configuration. The Airport's runway configuration will remain structured around one runway. Runway 13/31 is currently programmed[1] to be extended 1,500 feet to the south for a total length and width of 6,500 x 100 feet. The existing pavement of Runway 13/31 and the extended portion will be strengthened to 60,000 pounds bearing capacity in conjunction with the

[1] Construction for the runway extension began December 2009. The ALP illustrates the programmed 6,500- foot runway length as the existing length.

programmed runway extension. Ultimately, Runway 13/31 is proposed to be extended 1,500 feet to the south for a total runway length and width of 8,000 x 100 feet, with pavement strengthened to 100,000 pounds bearing capacity.

Another important consideration related to runway development at Lancaster Regional Airport is the existing and planned instrument approach system:

- **Runway 13 is programmed for a future non-precision approach with not lower than ¾-mile visibility minimums.**
- **Runway 31 is programmed for an upgrade to GPS or LPV precision instrument approach with ½-mile visibility minimums. This will require the installation of a Medium Intensity Approach Lighting System with Runway Alignment indicator Lights (MALSR)[2].**

Runway Lighting and Landing Aids. The Medium Intensity Runway Lights (MIRLs) edge lighting, along with the two-light Precision Approach Path Indicator (PAPI) lights serving both ends of Runway 13/31, and the Runway End Identifier Lights (REILs) serving Runway 31 will be maintained, and REILs are programmed to be installed on Runway 13.

Taxiway System

Recommended taxiway system improvements include:

- **Extend Taxiway "A" 1,500 feet to the south (50 feet wide), located 400 feet west from the runway centerline (currently programmed in conjunction with the 1,500-foot runway extension).**
- **Relocate Taxiway "A" (50 feet wide), located 400 feet west of the runway centerline.**
- **Extend Taxiway "A" 1,500 feet to the south, 50 feet wide, located 400 feet west of the runway (in conjunction with the ultimate runway extension).**
- **Construct a full-length parallel taxiway, 50 feet wide, 400 feet east of the runway centerline.**

[2] The MALSR will be relocated and installed with the ultimate Runway 31 extension.

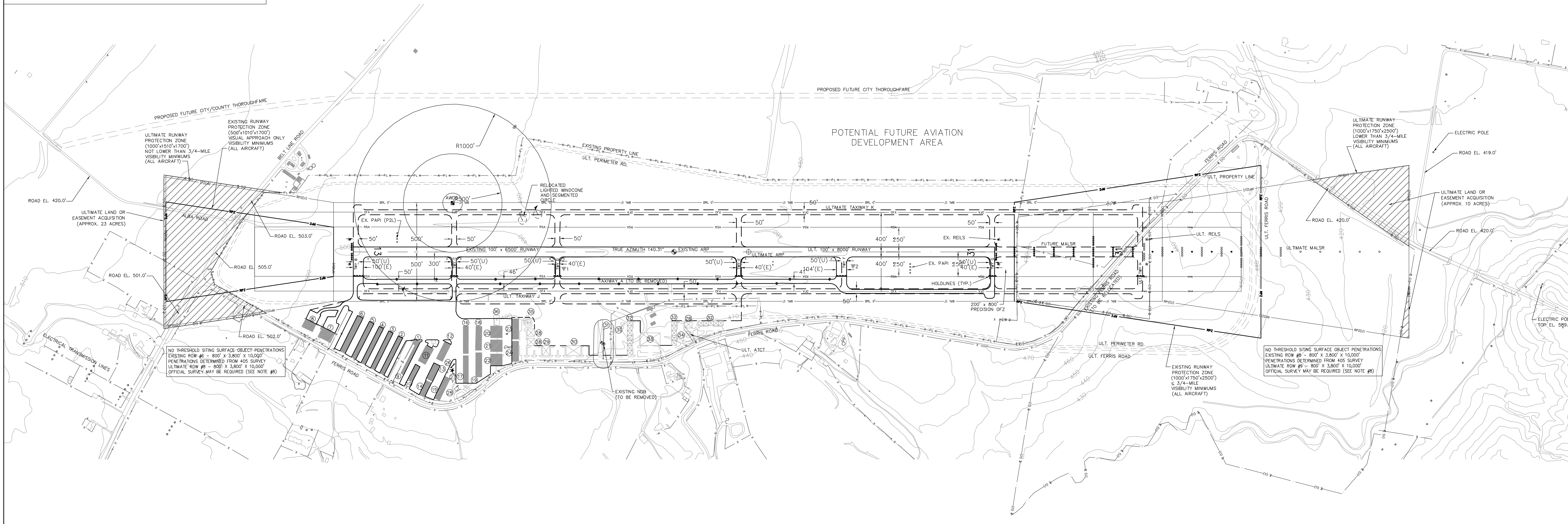
RUNWAY END COORDINATES AND ELEVATIONS			
RUNWAY END	LATITUDE	LONGITUDE	ELEVATION
EXISTING END OF RUNWAY 13	32°35'04.13" N	96°43'27.27" W	501.1'
ULTIMATE END OF RWY 13	32°35'04.13" N	96°43'27.27" W	501.1'
EXISTING END OF RWY 31	32°34'14.64" N	96°42'38.76" W	475.3'
ULTIMATE END OF RWY 31	32°34'03.22" N	96°42'27.57" W	470.0'

SOURCE:
EXISTING COORDINATES AND ELEVATIONS ARE NAD 83 AND NAVD 88, AND WERE OBTAINED FROM http://avnwww.jccbi.gov/pls/datasheet_prd/pkg_airport.PRO_AIRPORT_RUNWAY?v_cntl_num=1654, January 2010.

COMMENTS
ULTIMATE COORDINATES FOR RUNWAY 31 CALCULATED WITH http://www.ngs.noaa.gov/cgi-bin/Inv_Fwd/inverse2.prl. ULTIMATE ELEVATION ESTIMATED USING "LANCASTER_TOPOGRAPHY_05.dwg FROM LANCASTER REGIONAL AIRPORT.

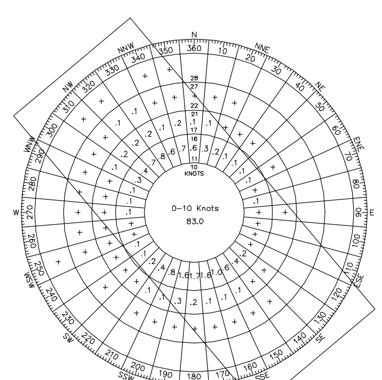
SURVEY MARKERS					
NUMBER	DESIGNATION	PID	LATITTUDE	LONGITUDE	ELEVATION (MSL)
1	LANPORT	CS 3200	33°34'46.80174" N	96°43'12.86611" W	489.1'
2	LANPORT AZ MK	CS 3201	32°34'24.65486" N	97°40'49.688" W	476.5'

SOURCE: SURVEY MARKER INFORMATION OBTAINED FROM LANCASTER REGIONAL AIRPORT, "SHT1_LANCASTER_ALD_05.dwg", JULY 2005.



RUNWAY DATA TABLE				
	RW 13-31			
	EXISTING		ULTIMATE	
RUNWAY ARC	C/D-II		C/D-III	
DESIGN AIRCRAFT & ARC	CL-601 (C-II)		GULFSTREAM V (C-III)	
BALANCED FIELD LENGTH *	6300'		6200'	
RUNWAY LENGTH & WIDTH (ft.)	6500' X 100'		8000' X 100'	
PAVEMENT DESIGN STRENGTH (lbs.)	40,000 SW/60,000 DW		50,000 SW/100,000 DW	
RUNWAY LIGHTING	MIRL		MIRL	
PERCENT EFFECTIVE GRADIENT	0.4%		0.4%	
PERCENT WIND COVERAGE	99.65%		99.65%	
MAXIMUM ELEVATION ABOVE MSL	500.7'		500.7'	
RW SURFACE TYPE	ASPH		ASPH,CONC	
RSA – LENGTH BEYOND RW END	1000'		1000'	
RSA – WIDTH	500'		500'	
OFA – LENGTH BEYOND RW END	1000'		1000'	
OFA WIDTH	800'		800'	
OFZ – LENGTH BEYOND RW END	200'		200'	
OFZ WIDTH	400'		400'	
RUNWAY END	13	31	13	31
APPROACH TYPE	VISUAL	NDB,GPS	GPS,LPV	GPS,LPV
APPROACH VISIBILITY MINIMA	VISUAL	3/4 MILE	3/4 MILE	1/2 MILE
THRESHOLD SITING SURFACE & SLOPE	#6 20:1	#8 20:1	#8 20:1	#9 34:1
RUNWAY MARKING	NPI	NPI	NPI	PIR
RUNWAY VISUAL AIDS	PAPI	PAPI,REILS	PAPI,REILS	PAPI,REILS,MALSR
TOUCHDOWN ZONE ELEVATION	501.1'	487.0'	501.1'	480.0'
FAR PART 77 APPROACH CATEGORY	VISUAL	NON-PRECISION	PRECISION	PRECISION
FAR PART 77 APPROACH SURFACE SLOPE	20:1	34:1	34:1	50:1
TAKE-OFF RUN AVAILABLE (TORA)	6,500'	6,500'	8000'	8000'
TAKE-OFF DISTANCE AVAILABLE (TODA)	6,500'	6,500'	8000'	8000'
ACCELERATE STOP DISTANCE AVAIL. (ASDA)	6,500'	6,500'	8000'	8000'
LANDING DISTANCE AVAILABLE (LDA)	6,500'	6,500'	8000'	8000'

* – International Standard Atmosphere (ISA), sea level, four passengers and maximum fuel.



16-KNOT WIND COVERAGE		
RUNWAY	ALL-WEATHER	IFR
RUNWAY 13	86.38%	82.75%
RUNWAY 31	73.36%	79.28%
COMBINED COVERAGE	99.65%	99.84%

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center. Station 72214. Lancaster, Texas. Period of Record 2004-2009, and tailwind component of 5-knots.
Notes: Wind analysis tabulation provided by BARNARD DUNKELBERG & COMPANY utilizing the FAA Airport Design Software supplied with FAA AC 150/5300-13.
Ceiling of less than 1,000 feet, but equal to or greater than 200 feet and/or visibility less than 3 miles, but equal to or greater than 1/2 mile, and tailwind component of 5-knots.

AIRPORT DATA TABLE		
	EXISTING	ULTIMATE
AIRPORT ELEVATION (MSL)	501.1'	501.1'
AIRPORT NAVIGATION AIDS	NDB, GPS	NDB, GPS, LPV
MEAN MAX TEMP (Hottest Month °F)	96°F	96°F
AIRPORT REFERENCE CODE (ARC)	C/D-II	C/D-III
TAXIWAY MARKING	CENTERSTRIPE	CENTERSTRIPE
TAXIWAY LIGHTING	MITL	MITL
AIRPORT REFERENCE POINT COORDINATES	32°34'39.37" N	32°34'33.66" N
	96°43'03.10" W	96°42'57.50" W

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2. AERIAL PHOTOGRAPHY PROVIDED BY NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (NCTCOG), APRIL 2009.
3. EXISTING COORDINATES AND ELEVATIONS ARE NAD 83 AND NAVD 88, AND WERE OBTAINED FROM http://avnwww.jccbi.gov/pls/datasheet_prd/pkg_airport.PRO_AIRPORT_RUNWAY?v_cntl_num=1654, January 2010. HORIZONTAL DATUM NAD 1983 STATE PLANE, TEXAS NORTH CENTRAL FIPS 4202 SURVEY FEET, VERTICAL DATUM NAVD 1988, DO NOT APPLY CORRECTION.
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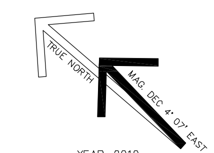
6. CAUTION ZONE LIGHTS ARE PRESENT IN THE FINAL 2000' OF BOTH RUNWAY ENDS.
7. NO OFZ OBJECT PENETRATIONS.
8. THERE ARE NO EXISTING THRESHOLD SITING SURFACE PENETRATIONS BASED ON FAA 405 SURVEY AS IDENTIFIED ON THE ALP APPROVED/SIGNED BY TxDOT ON MARCH 7, 2008.
9. AIRPORT REFERENCE POINT CALCULATED GEODETICALLY USING www.ngs.noaa.gov.



YEAR=2010
7' WEST – RATE OF CHANGE PER YEAR

0 500' 1000' 1500'
SCALE: 1" = 500'

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)	BRL 0'	BRL 0'
AIRPORT REFERENCE POINT		
WIND CONE & SEGMENTED CIRCLE		
THRESHOLD LIGHTS		
RW END IDENTIFIER LIGHTS (REILS)		
C&G BEACON		
VGSI		
HOLD POSITION AND SIGN		
ASOS/AWOS		
SURVEY MARKERS		
GROUND CONTOURS	1620	
SIGNIFICANT OBJECT LOCATION		
TREES/BRUSH		
NONDIRECTIONAL BEACON (NDB)		

NO.	REVISIONS	BY	CHK'D	DATE

TEXAS DEPARTMENT OF TRANSPORTATION AVIATION DIVISION

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DAVID FULTON, DIRECTOR, AVIATION DIVISION — DATE

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SIGNATURE — DATE

TITLE, AIRPORT SPONSOR'S REPRESENTATIVE

PREPARED BY:

BARNARD DUNKELBERG & COMPANY

SUSAN SPLETH — JUN 23 2010
DESIGNED BY — DATE

WILLIAM RUCKER — JUN 23 2010
DRAWN BY — DATE

MARK MCFARLAND — JUN 24 2010
CHECKED BY — DATE

AIRPORT LAYOUT DRAWING

LANCASTER REGIONAL AIRPORT
LANCASTER, TEXAS (LNC)

Texas Department of Transportation Aviation Division

SHEET OF

Figure G1 **Airport Layout Drawing**

Landside Development

As discussed in the previous chapters, the ALP also allocates various development areas for landside facilities. Landside facilities include terminal facilities, aircraft parking aprons, hangars, aircraft maintenance facilities, automobile access and parking, support facilities, etc. Detailed illustrations of these landside development areas are provided in the Landside Development Area section of this chapter. As provided on the ALP, proposed landside development includes:

Westside Development Area. The west side of the Airport currently contains the Airport's general aviation businesses and facilities (FBOs, aircraft maintenance, etc.), and will continue to be used for the general aviation activity at the Airport in the future. Immediately south of the existing hangar development area on airport property are some undeveloped sites that will be used to accommodate future demand. Also, as older structures reach their useful life, they will be replaced with newer ones.

In order for the Westside Development Area to be maximized for future aviation-use facilities development, approximately 14 acres of land acquisition will be required for the area south of the existing general aviation development area. Another factor that is critical in the future layout of the landside development area is to reserve room for the construction of a terminal building (if needed in the future). This will likely be needed if improved general aviation facilities are to be provided for corporate users.

In regard to the forecasted future aircraft operations, in conjunction with the landside facilities necessary to meet aviation demand, the landside development area on the west side of the Airport has been conceptually designed to provide an apron area large enough and flexible enough in its use to maximize its ability to accommodate corporate aircraft in the area adjacent to the terminal building. It should also be noted that a potential site for an Airport Traffic Control Tower (ATCT) has been identified on the west side of the Airport.

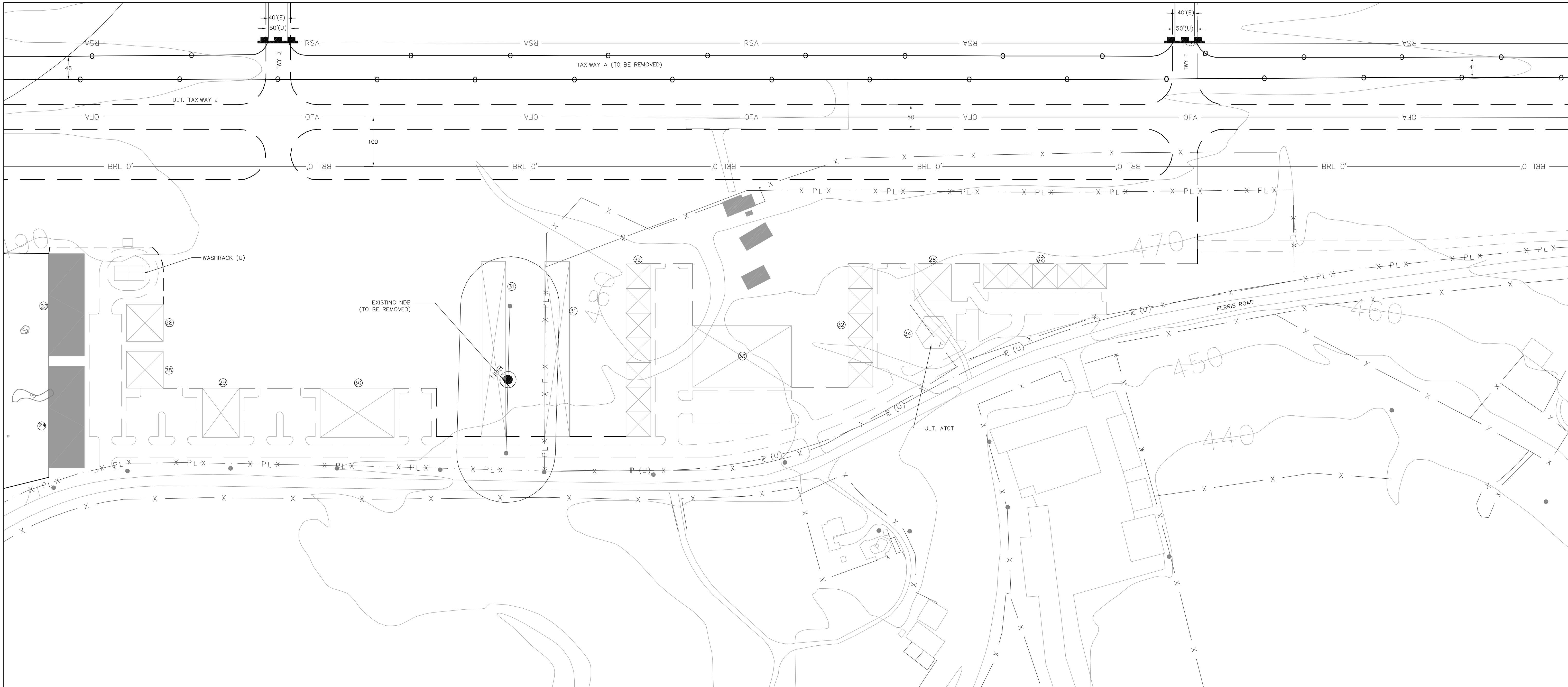
Eastside Development Area. As noted previously in Chapter E, *DEVELOPMENT CONCEPTS AND ALTERNATIVES ANALYSIS*, the strategy for the development of facilities on the east side of the Airport will evolve as demand for aviation-use facilities increases over the next few years. As indicated above, is expected that, in the short-term, the demand for aviation-use facilities can be accommodated on the west side of the Airport. When demand is experienced for larger aviation-use facilities (i.e., facilities associated with aircraft maintenance and repair) or for mixed-use facilities (aviation-use facilities that have associated office, commercial, or industrial components), the east side of the Airport will be the preferred location. Because of the uncertainty of the timing and scope of the demand for these "larger" aviation-use facilities, there is no recommendation for land acquisition on the east side of the Airport in this *Master Plan*.

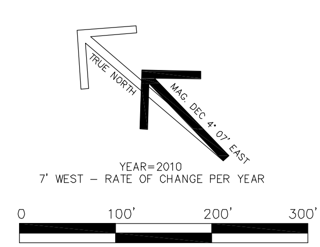
Development Area Plan

The following illustration, entitled *DEVELOPMENT AREA PLAN*, presents a detailed view of the more intensely developed landside use areas on the Airport.

Land Use Plan

The *LAND USE PLAN*, presented in one of the following illustrations, depicts existing and recommended use of all land within the ultimate airport property line and in the vicinity of the Airport [including the area contained in the future 65 day/night average sound level (DNL) noise contour]. The purpose of the *LAND USE PLAN* is to provide airport management a plan for leasing revenue-producing areas on the Airport. It also provides guidance to local authorities for establishing appropriate land use zoning in the vicinity of the Airport and is essentially structured around existing zoning and land use recommendations that the City of Lancaster already has in place.





BUILDING TABLE			
BUILDING NUMBER	DESCRIPTION		TOP ELEVATION
	EXISTING	ULTIMATE	
1	TERMINAL/ADMINISTRATION BUILDING	–	522.8
2	T–HANGAR (20 UNITS)	–	508.8
3	T–HANGAR (20)	–	510.3
4	T–HANGAR (20)	–	510.3
5	T–HANGAR (18)	–	511.6
6	T–HANGAR (14)	–	515.7
7	HANGAR	–	528.8
8	HANGAR	–	532.7
9	HANGAR	–	508.5
10	HANGAR	–	511.9
11	HANGAR	–	522.1
12	HANGAR	–	523.0
13	HANGAR	–	521.0
14	HANGAR	–	519.3
15	HANGAR	–	517.7
16	T–HANGAR (10)	–	511.1
17	T–HANGAR (10)	–	510.1
18	T–HANGAR (10)	–	517.0
19	T–HANGAR (10)	–	516.2
20	HANGAR	–	517.8
COMMENTS			

BUILDING TABLE			
BUILDING NUMBER	DESCRIPTION		TOP ELEVATION
	EXISTING	ULTIMATE	
21	–	HANGAR	517.8
22	–	HANGAR	517.3
23	–	HANGAR	517.3
24	–	HANGAR	517.0
25	–	EXISTING FUEL FARM	–
26	–	LIGHTING VAULT	501.9
27	–	BEACON	548.2
28	–	ULT. LARGE EXECUTIVE HANGARS	–
29	–	ULT. TERMINAL	–
30	–	ULT. CORPORATE HANGAR	–
31	–	ULT. T–HANGARS	–
32	–	ULT. SMALL EXECUTIVE HANGARS	–
33	–	ULT. LARGE CORPORATE HANGAR	–
34	–	ULT. ATCT	–
35	–	ULT. FUEL FARM	–
36	–	ULT. AIRCRAFT WASH RACK	–
COMMENTS			

AIRPORT DATA TABLE		
	EXISTING	ULTIMATE
AIRPORT ELEVATION (MSL)	501.1'	501.1'
AIRPORT NAVIGATION AIDS	NDB, GPS	NDB, GPS, LPV
MEAN MAX TEMP (Hottest Month °F)	96°F	96°F
AIRPORT REFERENCE CODE (ARC)	C/D–II	C/D–III
TAXIWAY MARKING	CENTERSTRIPE	CENTERSTRIPE
TAXIWAY LIGHTING	MITL	MITL
AIRPORT REFERENCE POINT COORDINATES	32°34'39.37" N 96°43'03.10" W	32°34'33.66" N 96°42'57.50" W

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ALD LEGEND		
FEATURE	EXISTING	ULTIMATE
RUNWAY/TAXIWAY OUTLINE		
RUNWAY/TAXIWAY TO BE REMOVED		
BUILDINGS/FACILITIES		
AIRPORT PROPERTY LINE		ℓ (U)
AIRPORT PROPERTY LINE w/FENCE		ℓ (U)
FENCE LINE		XU XU XU
BUILDING RESTRICTION LINE (BRL)	BRL 0'	BRL 0'
AIRPORT REFERENCE POINT		
WIND CONE & SEGMENTED CIRCLE		
THRESHOLD LIGHTS		
RW END IDENTIFIER LIGHTS (REILS)		
C&G BEACON		
VGSI		
HOLD POSITION AND SIGN		
ASOS/AWOS		
SURVEY MARKERS		
GROUND CONTOURS	620	
SIGNIFICANT OBJECT LOCATION		
TREES/BRUSH		
NONDIRECTIONAL BEACON (NDB)		

NO.	REVISIONS	BY	CHK'D	DATE

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PREPARED BY:

BARNARD
DUNKELBERG
& COMPANY

SUSAN SPLETH — JUN 23 2010
DESIGNED BY — DATE

WILLIAM RUCKER — JUN 23 2010
DRAWN BY — DATE

MARK MCFARLAND — JUN 24 2010
CHECKED BY — DATE

DEVELOPMENT AREA PLAN

LANCASTER REGIONAL AIRPORT
LANCASTER, TEXAS (LNC)

Texas Department of Transportation
Aviation Division

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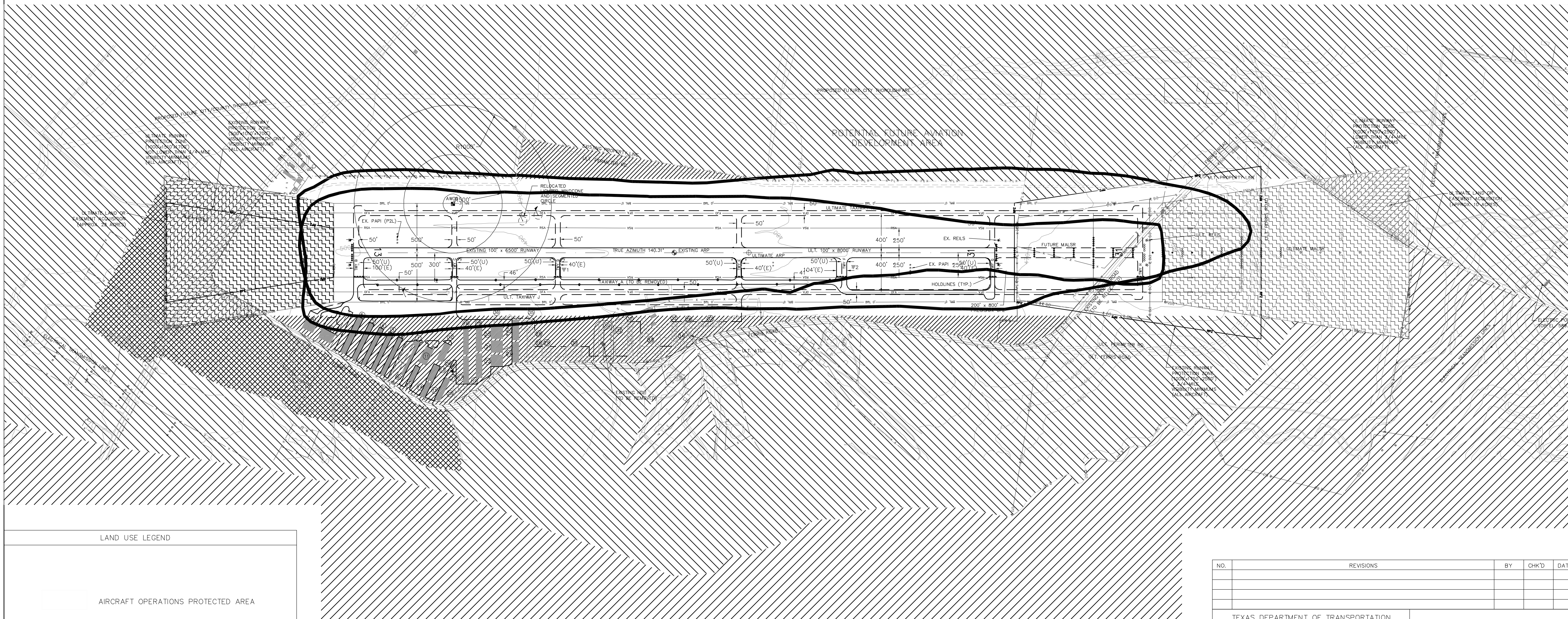
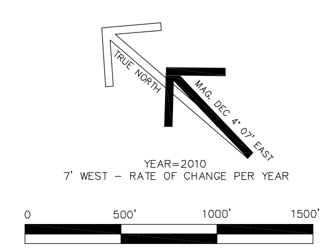
Figure G2 **Development Area Plan**



LAND USE LEGEND

- AIRCRAFT OPERATIONS PROTECTED AREA
- AVIATION DEVELOPMENT AREA
- RUNWAY PROTECTION ZONE
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- EXISTING 65 DNL NOISE CONTOUR (BASED ON 6,500' RUNWAY LENGTH)
- FUTURE 65 DNL NOISE CONTOUR (BASED ON 8,000' RUNWAY LENGTH)



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)	BRL D'	BRL D'
AIRPORT REFERENCE POINT		
WIND CONE & SEGMENTED CIRCLE		
THRESHOLD LIGHTS		
RW END IDENTIFIER LIGHTS (REILS)		
C&G BEACON		
VGSI		
HOLD POSITION AND SIGN		
ASOS/AWOS		
SURVEY MARKERS		
GROUND CONTOURS	1620	
SIGNIFICANT OBJECT LOCATION		
TREES/BRUSH		
NONDIRECTIONAL BEACON (NDB)		

NO.	REVISIONS	BY	CHK'D	DATE

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SUSAN SPLETH (DESIGNED BY)	JUN 23 2010 (DATE)
WILLIAM RUCKER (DRAWN BY)	JUN 23 2010 (DATE)
MARK MCFARLAND (CHECKED BY)	JUN 24 2010 (DATE)

LAND USE PLAN

LANCASTER REGIONAL AIRPORT
LANCASTER, TEXAS (LNC)

Texas Department of Transportation
Aviation Division

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Figure G3 **Land Use Plan**

H Implementation Plan

INTRODUCTION. This chapter provides the 20-year improvement program for continued development at Lancaster Regional Airport. The goals of this exercise are to identify projects deemed necessary to efficiently accommodate the forecasted aviation demand, project the time frame in which the projects should be accomplished, estimate the costs associated with each project, and identify potential funding sources for each. The results of this effort are presented in the Airport Capital Improvement Program (CIP).

The CIP lists each project chronologically and divides them into three phases: Phase I is the initial time frame (0-6 years), Phase II is the intermediate time frame (6-11 years) and Phase III is the long-term time frame (11-20 years). In addition to the CIP and the project funding overview, a pro-forma financial analysis is conducted to gauge the projected financial impacts that the implementation of the CIP may have on the Airport.

Project List and Cost Estimates

A list of capital improvement projects has been assembled from the facility requirements documentation previously presented. The project list has been coordinated with the Airport Layout Plan (ALP) and the current Airport Capital Improvement Program that is continuously updated by airport management, the Texas Department of Transportation (TxDOT), and the Federal Aviation Administration (FAA).

Cost estimates for the individual projects presented in this Master Plan CIP are based on 2010 dollars, which are escalated based on estimated Consumer Price Index (CPI) increases over the 20-year planning period. The following is a breakdown of the assumptions used for the CIP:

- **Cost estimates were calculated in 2010 dollars and adjusted to the given year with a 2.5% Consumer Price Index. (2010 Cost * 1.025^n = Cost in n years)**
- **Items in Phase II were assumed to be completed in 2018 (n=8 years)**
- **Items in Phase III were assumed to be completed in 2025 (n=15 years)**

Facility costs have been formulated using unit prices extended by the size of the particular facility and adjusted for the anticipated year of construction or appropriate phase within the CIP. That being said, these estimates are intended to be used for planning purposes only and should not be construed as detailed construction cost estimates, which can only be compiled following the preparation of detailed design documentation.

Implementation Schedule

The CIP provides suggested phasing for improvement projects throughout the 20-year planning period and, as previously mentioned, are broken down into three development plan phases. The projects listed in Phase I (i.e., the first six years) are in priority order by year. During the second and third phases (i.e., years 6-20), the projects are listed in priority order without year designators. With the best facts and assumptions available today, the tables provide information related to what projects will be needed, when those projects are likely to be constructed, and how the improvements are likely to be funded.

Phasing Plan

The suggested phasing for projects in the CIP is also provided in a graphic format to supplement the development plan tables. These are suggested schedules and variance from them may be necessary, especially during the latter time periods. Attention has been given to the first six years, as they are the most critical and the scheduled projects outlined in that time frame include many critical projects. The demand for certain facilities, and the economic feasibility of their development, are to be the prime factors influencing the timing of individual project construction. Care must be taken to provide for adequate lead-time for detailed planning and construction of facilities in order to meet aviation demands. It is also important to minimize the disruptive scheduling where a portion of the facility may become inoperative due to construction and to prevent extra costs resulting from improper project scheduling.

Funding Sources

Funding sources for the Capital Improvement Program depend on many factors, including project eligibility, the ultimate type and use of facilities to be developed, debt capacity of the Airport, the availability of other financing sources, and the priorities for scheduling project completion. For planning purposes, assumptions were made relating to the funding source of each capital improvement. The projects' costs provided in the Development Plan Project Costs tables are identified with likely funding sources. A detailed description of each potential funding source is provided in subsequent sections of this chapter.

The CIP project cost estimates have been categorized by the total cost for each facility requirement and divided into the portion eligible to be paid by TxDOT with state and FAA funds (note that FAA Airport Improvements Program [AIP] funds are administered through TxDOT via the State Block Grant program); that portion to be borne by the Airport Sponsor, the Airport, or related local government entities (i.e., local match); and, that portion or project(s) that is likely to be funded from private sources. The pro-forma analysis will identify if, and to what extent, Lancaster Regional Airport will be able to contribute funds to satisfy the local match requirements of a project grant.

If aviation demands continue to indicate that improvements are needed, and if the proposed improvements prove to be environmentally acceptable, the capital improvement financial implications are likely to be acceptable for TxDOT and the Airport Sponsor. However, it must be recognized that this is only a programming analysis and not a commitment on the part of the Sponsor or the FAA. If the cost of an improvement project is not financially feasible, its construction will not be instigated. Before detailed planning on a particular project is developed, the funding structures and requirements should be identified and determined to reflect the current funding policies by the various funding entities.

Capital Improvement Program (CIP)

The projects, phasing, and costs presented in the Master Plan CIP are the best projections that can be made at the time of formulation. The purpose is to provide a reasonable projection of capital needs, which can then be used in fiscal programming to test for financial feasibility. To assist in the preparation of the Airport's CIP that the Airport keeps on file and updates annually with TxDOT, the first phase of the projects list and cost estimates has been organized in a format similar to that used by TxDOT. However, as soon as it is published, the long-term project list presented here begins to be out of date and, therefore, will always differ to some degree with the Airport's five-year CIP on file with the FAA.

Table H1, Table H2, and Table H3, which follow, present the Lancaster Regional Airport CIP Phase I, Phase II, and Phase III, respectively. Figure H1 provides a graphic representation of the CIP's phasing plan.

Table H1 **PHASE I (0-5 YEARS) DEVELOPMENT PLAN PROJECT COSTS**

	Project Description	Total Costs	TxDOT/ FAA[1]	Sponsor/ Local[2]	Funding Source
	Year 1 (FFY 2011)				
A.1	Design/engineering for west side parallel taxiway relocation (50 ft. wide at 400 ft. separation)	$625,000	$562,500	$62,500	CIP Grant
	YEAR 1 TOTAL	**$625,000**	**$562,500**	**$62,500**	
	Year 2 (FFY 2012)				
A.2	Relocate/construct west side parallel taxiway to 60,000 lbs bearing capacity (50 ft. wide at 400 ft. separation), and remove existing taxiway pavement	$5,160,000	$4,644,000	$516,000	CIP Grant
A.3	Overlay existing west side ramp to 60,000 lbs bearing capacity	$891,670	$802,503	$89,167	CIP Grant
A.4	Environmental study/documentation for ATCT facility	$150,000	$103,500	$46,500	ATCT
A.5	Design/engineering for ATCT facility	$200,000	$138,000	$62,000	ATCT
	YEAR 2 TOTAL	**$6,401,670**	**$5,688,003**	**$713,667**	
	Year 3 (FFY 2013)				
A.6	Land acquisition for west side hangar development (approx. 14 acres)	$210,000	$189,000	$21,000	CIP Grant
A.7	Relocate NDB (if not already decommissioned)	$53,845	$48,460	$5,384	CIP Grant
A.8	Construct west side aircraft parking apron	$1,171,988	$1,054,789	$117,199	CIP Grant
A.9	Construct new terminal building	$1,494,689	$747,345	$747,345	TBP
A.10	Construct auto parking and entry road system	$237,622.00	$213,860	$23,762	CIP Grant
	YEAR 3 TOTAL	**$3,168,144**	**$2,253,454**	**$914,690**	
	Year 4 (FFY 2014)				
A.11	Design/engineering and install RW 31 MALSR	$962,525	$866,272	$96,252	CIP Grant
A.12	Implement precision instrument approach procedure to RW 31	$0	$0	$0	FAA F&E
A.13	West side ramp and taxilane development - Phase 1	$3,567,063	$3,210,357	$356,706	CIP Grant
	YEAR 4 TOTAL	**$4,529,588**	**$4,076,629**	**$452,959**	
	Year 5 (FFY 2015)				
A.14	Install self-serve fuel facility	$464,443	$232,222	$232,222	CIP Grant
A.15	Install aircraft wash rack	$135,769	$122,192	$13,577	CIP Grant
A.16	Construct ATCT facility (including ATCT staff auto parking)	$1,979,964	$1,366,175	$613,789	ATCT
A.17	Construct entry road system	$68,457	$47,235	$21,222	ATCT
A.18	Construct large executive hangar (including auto parking)	$0	$0	$0	Private
A.19	Construct large executive hangar (including auto parking)	$0	$0	$0	Private
A.20	Construct nested T-hangar facility	$0	$0	$0	Private
	YEAR 5 TOTAL	**$2,648,633**	**$1,767,824**	**$880,809**	
	Sub-Total/Phase I	**$17,373,034**	**$14,348,410**	**$3,024,625**	

Sources: Barnard Dunkelberg & Company, RW Armstrong, Lancaster Municipal Airport staff, and the Texas Department of Transportation.

Notes: Cost estimates, based upon 2010 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation.
Unless otherwise noted, cost estimates include contingency and engineering.

[1] FAA AIP, NPE Discretionary, and State funds administered through TxDOT/State Block Grant program.

[2] Local match requirement from current revenues, cash reserves, bonds, etc. 90/10 split for AIP, NPE funds.

CIP Grant: TxDOT CIP Grant Program (includes FAA NPE, Discretionary, and state apportionment funds).

ATCT: Air Traffic Control Tower Program.

RAMP: Routine Airport Maintenance Grant Program.

TBP: Terminal Building Program.

FAA Direct: 100% funded by FAA Facilities & Equipment (F&E).

Private: No cost associated, anticipated funding through private/third-party/partnership developer.

Table H2 **PHASE II (6-10 YEARS) DEVELOPMENT PLAN PROJECT COSTS**

	Project Description	Total Costs	TxDOT/ FAA[1]	Sponsor/ Local[2]	Funding Source
B.1	West side ramp and taxilane development - Phase 2	$2,996,578	$2,696,920	$299,658	CIP Grant
B.2	Construct Perimeter Road - Phase 1	$1,814,149	$1,632,734	$181,415	CIP Grant
B.3	Construct large corporate hangar (including auto parking and entry road)	$0	$0	$0	Private
B.4	Install emergency generator	$73,713	$66,342	$7,371	CIP Grant
B.5	Environmental study/documentation for 1,500 ft. extension to RW 31 and associated parallel taxiway (8,000 ft. total length) at 100,000 lbs bearing capacity. Includes MALSR relocation and Ferris Road realignment.	$300,000	$270,000	$30,000	CIP Grant
B.6	Design/engineering for 1,500 ft. extension to RW 31 and associated parallel taxiway (8,000 ft. total length) at 100,000 lbs bearing capacity. Includes MALSR relocation and Ferris Road realignment.	$2,000,000	$1,800,000	$200,000	CIP Grant
B.7	Land acquisition or easement (approx. 23 acres) for RW 13 RPZ	$345,000	$310,500	$34,500	CIP Grant
B.8	Implement non-precision instrument approach procedure to RW 13	$0	$0	$0	FAA F&E
B.9	Rehabilitate RW 13/31 pavement	$1,613,706	$1,452,336	$161,371	CIP Grant/RAMP
B.10	Construct large corporate hangar (including auto parking and entry road)	$0	$0	$0	Private
B.11	Construct nested T-hangar facility	$0	$0	$0	Private
B.12	Construct small executive hangars (including auto parking and entry road)	$0	$0	$0	Private
B.13	Rehabilitate west side ramp and taxiways	$3,515,447	$3,163,902	$351,545	CIP Grant/RAMP
	Sub-Total/Phase II	**$12,658,594**	**$11,392,734**	**$1,265,859**	

Sources: Barnard Dunkelberg & Company, RW Armstrong, Lancaster Municipal Airport staff, and the Texas Department of Transportation.

Notes: Cost estimates, based upon 2010 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation. Unless otherwise noted, cost estimates include contingency and engineering.

[1] FAA AIP, NPE Discretionary, and State funds administered through TxDOT/State Block Grant program.

[2] Local match requirement from current revenues, cash reserves, bonds, etc. 90/10 split for AIP, NPE funds.

CIP Grant: TxDOT CIP Grant Program (includes FAA NPE, Discretionary, and state apportionment funds).

ATCT: Air Traffic Control Tower Program.

RAMP: Routine Airport Maintenance Grant Program.

TBP: Terminal Building Program.

FAA Direct: 100% funded by FAA Facilities & Equipment (F&E).

Private: No cost associated, anticipated funding through private/third-party/partnership developer.

Table H3 **PHASE III (11-20 YEARS) DEVELOPMENT PLAN PROJECT COSTS**

	Project Description	Total Costs	TxDOT/ FAA[1]	Sponsor/ Local[2]	Funding Source
C.1	Land acquisition or easement for RW 31 RPZ (approx. 57 acres)	$855,000	$769,500	$85,500	CIP Grant
C.2	Realign Ferris Road	$4,214,548	$3,793,093	$421,455	CIP Grant
C.3	Extend/construct RW 31 and associated parallel taxiway 1,500 ft. (8.000 ft. total length), strengthen extended and existing runway to 100,000 lbs bearing capacity. (Includes MALSR relocation)	$11,586,385	$10,427,747	$1,158,639	CIP Grant
C.4	Construct Perimeter Road - Phase 2	$1,813,280	$1,631,952	$181,328	CIP Grant
C.5	Environmental study/documentation for east side parallel taxiway	$200,000	$180,000	$20,000	CIP Grant
C.6	Design/engineering for east side parallel taxiway	$1,753,928	$1,578,535	$175,393	CIP Grant
C.7	Construct east side parallel taxiway (50 ft. wide at 400 ft. separation)	$8,769,638	$7,892,674	$876,964	CIP Grant
C.8	West side ramp and taxilane development - Phase 3	$925,977	$833,379	$92,598	CIP Grant
C.9	Construct small executive hangars (including auto parking and entry road)	$0	$0	$0	Private
C.10	Construct small executive hangars (including auto parking)	$0	$0	$0	Private
C.11	Purchase airport FOD sweeper	$267,935	$241,142	$26,794	CIP Grant
C.12	Construct large executive hangar (including auto parking)	$0	$0	$0	Private
	Sub-Total/Phase III	**$30,386,691**	**$27,348,022**	**$3,038,669**	
	GRAND TOTALS	**$60,418,319**	**$53,089,166**	**$7,329,153**	

Sources: Barnard Dunkelberg & Company, RW Armstrong, Lancaster Municipal Airport staff, and the Texas Department of Transportation.

Notes: Cost estimates, based upon 2010 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation. Unless otherwise noted, cost estimates include contingency and engineering.

[1] FAA AIP, NPE Discretionary, and State funds administered through TxDOT/State Block Grant program.

[2] Local match requirement from current revenues, cash reserves, bonds, etc. 90/10 split for AIP, NPE funds.

CIP Grant: TxDOT CIP Grant Program (includes FAA NPE, Discretionary, and state apportionment funds).

ATCT: Air Traffic Control Tower Program.

RAMP: Routine Airport Maintenance Grant Program.

TBP: Terminal Building Program.

FAA Direct: 100% funded by FAA Facilities & Equipment (F&E).

Private: No cost associated, anticipated funding through private/third-party/partnership developer.

0 600' 1200' 1,800'
GRAPHIC SCALE IN FEET

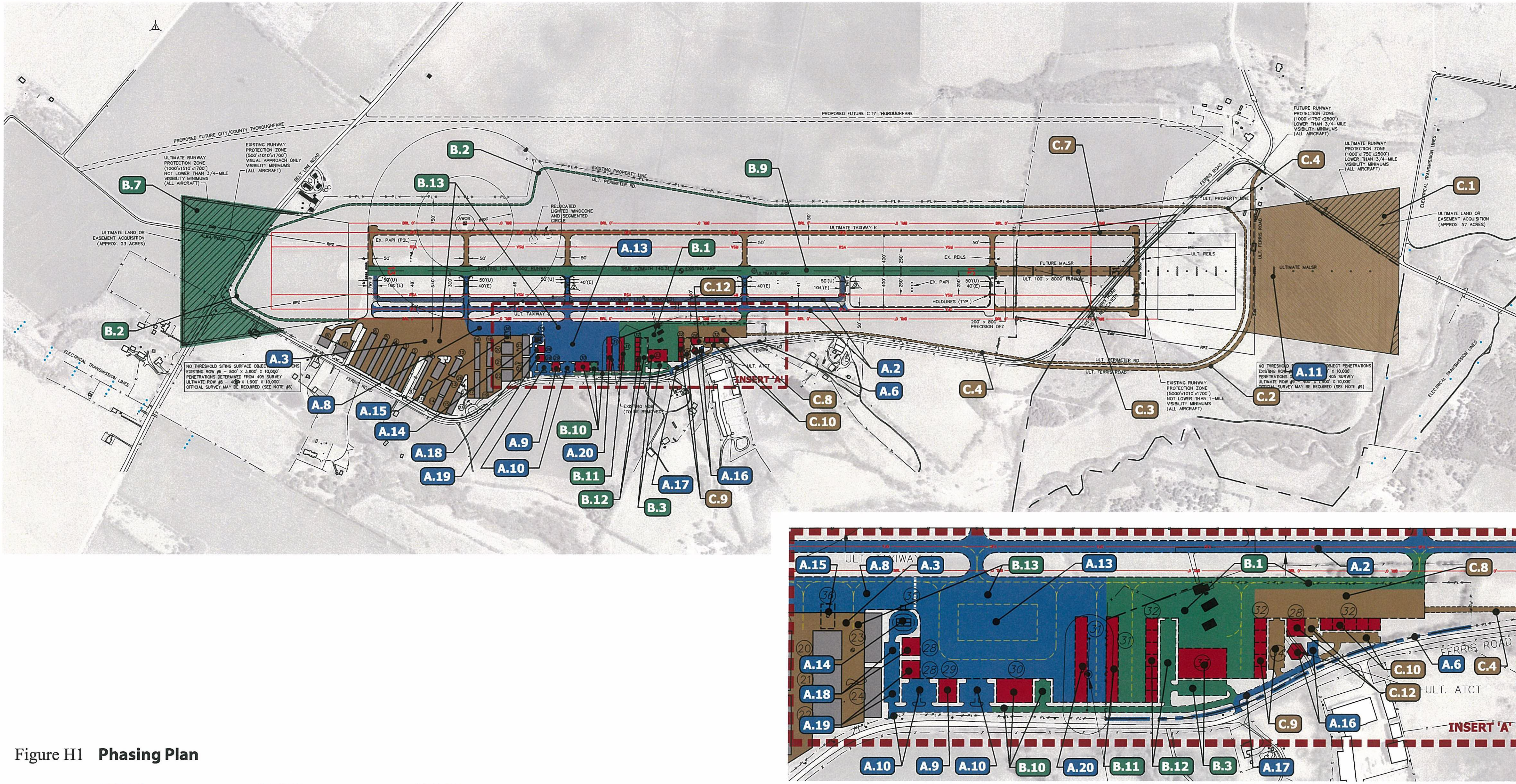


Figure H1 **Phasing Plan**

PHASE I | PHASE II | PHASE III

Sources: City of Lancaster Master Thoroughfare Plan; Dallas Logistics Hub Site Plan; Texas Tri-Modal Master Plan; FEMA, Dallas County 100-Year Floodplain.

Potential Funding Sources

Potential funding sources for any proposed improvements to Lancaster Regional Airport can be found at a variety of agencies, both federal and state. Many of the available funds come in the form of grants, should the project meet eligibility requirements, while additional financing options are available in the form of general obligation or subsidized bonds (i.e., debt). The following sections will list available sources and detail the eligibility requirements for each.

Airport Improvement Program (AIP)

The AIP provides grants to public agencies for the planning and development of public-use airports. Lancaster Regional Airport is classified by the U.S. Department of Transportation and the Federal Aviation Administration as a Non-Primary Reliever airport. AIP funds can be used for most airport improvement needs (i.e., capital improvements), but not operations costs. Note, however, that AIP funds are typically not available for revenue generating projects; so, it may be difficult, though not impossible, for the airport sponsor to use these funds for projects designated for revenue generating activity (e.g., GA terminals, aircraft hangars, FBOs).

However, since Texas participates in the State Block Grant Program, TxDOT is responsible for administering all FAA funds slated for general aviation and reliever airports within Texas. The Airport Sponsor petitions the TxDOT Aviation Division for airport grant funds versus the FAA, as is the case in non-block grant states. TxDOT airport funds include non-primary entitlement funds and discretionary dollars that traditionally fall within the FAA's AIP umbrella. TxDOT is responsible for determining which locations will receive funds for ongoing project administration and implementation, and has some additional leeway in how those funds are used.

Texas Department of Transportation (TxDOT)

TxDOT aviation grant programs are used to allocate funds for general aviation and reliever airports in the State of Texas. The TxDOT Aviation Division is responsible for dispersion of these aviation funds, which are administered by the FAA AIP and Texas Aviation Facilities Development Program. Airports seeking state and federal funds must apply for these grants. Details for each program are provided below.

Capital Improvement Projects (CIP) Grant Program. The TxDOT Aviation Division includes airport projects in its Aviation Capital Improvement Program based on priority, airport sponsor justification, funding availability, and project costs. Once the project becomes eligible for state funding, up to 90% of the project cost is paid, leaving the airport sponsor or local government with the remaining percent. For certain projects, such as terminal buildings, the state and local shares are 50% each.

Routine Airport Maintenance Grant Program (RAMP). RAMP, the funding element of the TxDOT Pavement Management Program, allows each airport to receive grant funding for "lower cost" programs such as entrance road improvement and parking lot improvement. RAMP is not limited to pavement projects, as it also includes projects such as the replacement of the rotating beacon. This program provides up to a $50,000 match for an airport's expenditure during a fiscal year. TxDOT determines the eligibility of any proposed project and does not commence funding until a grant agreement has been signed.

Terminal Building Program (TBP). The Terminal Building Program was established to assist airports with costs for terminal area improvements. A requirement for eligibility includes the airport is publicly owned or leased, has a daily on-site manager, and has fuel for sale to the flying public. Projects meeting the requirements are eligible for assistance up to $1,000,000 for approved projects and require a 50% local match.

Airport Traffic Control Tower (ATCT) Program. Airport Traffic Control Towers increase the safety of an airport and its surrounding community. To ensure the Air Traffic System is sufficient in Texas, TxDOT has implemented the Airport Traffic Control Tower Program. This program provides funding up to $1,666,667 for the construction of an ATCT. The justification for these types of projects is based upon the FAA Benefit-Cost Analysis (BCA) rules and guidelines.

Federal Economic Development Agency (EDA) Grants

Federal EDA grants are typically tied to job creation or projects that increase a region's economic and business competitiveness. If an airport project can meet the requirements for enhancing the economic competitiveness of the surrounding community, or its need be framed in such a manner, the facility may be eligible for funds under Catalog of Federal Domestic Assistance (CFDA) 11.33. If any of the prospective tenants of the facility can ensure a level of private sector employment that meets program requirements, the facility may be eligible for funds under CFDA 11.307. Details for each program are provided below.

- **CFDA 11.300 Public Works and Economic Development Program:** Public Works and Economic Development investments help support the construction or rehabilitation of essential public infrastructure and facilities necessary to generate or retain private sector jobs and investments, attract private sector capital, and promote regional competitiveness, including investments that expand and upgrade infrastructure to attract new industry, support technology-led development, redevelop Brownfield sites, and provide eco-industrial development.

- **CFDA 11.307 Economic Adjustment Assistance Program:** The Economic Adjustment Assistance Program provides a wide range of technical, planning, and infrastructure assistance in regions experiencing adverse economic changes that may occur suddenly or over time. This program is designed to respond flexibly to pressing economic recovery issues and is well suited to help address challenges faced by U.S. regions and communities.

Lancaster Department of Economic Development

The Lancaster Department of Economic Development is the primary agency that assists with new business development, the coordinating of economic assistance, and incentive arrangements for the business community seeking to expand, establish, or relocate commercial operations to Lancaster. Projects considered eligible for assistance from the Department of Development are those that create immediate jobs or taxable infrastructure improvements. When assistance is sought by interested parties, the Department of Development receives recommendations from the Lancaster Economic Development Corporation (LEDC), which is the entity responsible for administering an Economic Development sales tax. This tax serves as the funding source for any incentives the Department of Development offers.

> "The main criteria used in evaluating business development by the Board are increased tax base, capital investment, jobs and local sales tax generation where applicable. It is essential that written incentive requests be made and acted upon by the LEDC Board and City Council prior to the commencement of construction or remodeling. Incentives are not considered retroactively."[1]

Airport projects that typically qualify for local EDA assistance would be the construction or relocation of a corporate aviation operation (due to the creation of new jobs and location of taxable infrastructure), an aircraft maintenance facility (should the number of jobs meet the predetermined threshold), or any landside commercial development (again, should the number of jobs and taxable infrastructure thresholds be met).

Bonds

Bonds, or debt securities, are common in the U.S. airport system and are responsible for funding large portions of improvement projects. There are several types of bonds that can be issued by public authorities, credit institutions, companies, and supranational institutions in the primary markets.

Airport or Municipal Bond. A publicly-owned airport may seek bonds in order to sponsor projects where existing funds are limited. In the case of Lancaster Regional Airport, the City of Lancaster has the

[1] Lancaster Economic Development Department, City of Lancaster website, www.lancaster-tx.com.

authority to issue bonds on behalf of an airport project. The servicing of such a bond can be guaranteed through the anticipated revenue associated with the project (if the project has revenue generation capability), or through the City's general revenue or general fund (i.e., tax dollars).

American Recovery & Reinvestment Act (ARRA) Recovery Zone Facility (RZF) Bonds and Recovery Zone Economic Development (RZED) Bonds. If an airport project can be defined in terms of job creation with a measurable economic impact, such as a corporate hangar complex or aircraft maintenance operation, these bonds may be applicable. Created by the *American Recovery and Reinvestment Act* (Recovery Act), Recovery Zone Bonds are targeted to areas particularly affected by job loss and will help local governments obtain financing for much needed economic development projects, such as public infrastructure development. The Recovery Act included $25 billion for two new types of Recovery Zone Bonds – $10 billion for Recovery Zone Economic Development Bonds and $15 billion for Recovery Zone Facility Bonds.

Recovery Zone Economic Development Bonds are one type of taxable Build America Bond that allows state and local governments to obtain lower borrowing costs through a new direct federal payment subsidy, for 45% of the interest, to finance a broad range of qualified economic development projects, such as job training and educational programs. Recovery Zone Facility Bonds are a type of traditional tax-exempt private activity bond that may be used by private businesses in designated recovery zones to finance a broad range of depreciable capital projects[2].

Other Funds

Funding for an airport need not be limited to grant and bond sources listed in the previous sections. Additional sources for the required capital can be used, at the discretion of the municipality, to finance the project either in whole or in conjunction with other sources of funds. It is important to note that financing for a project can consist of multiple sources, and, a single grant or financing mechanism, once obtained, need not be the sole, exclusive source of funding. The following sections list other potential sources of funding for airport improvements.

City Funds. At the discretion of the municipality, general revenue funds may be used to fund individual projects, or used to meet the match requirements of TxDOT grants.

Airport Land Sales. The proceeds from any sale of airport land may be applied to the financing needs of an airport project. Note, however, that any sale of airport land is subject to the approval of the FAA.

[2] U.S. Department of Treasury Press Release, June 12, 2009.

Typically, the FAA will approve airport land sales if it is demonstrated that the proceeds of the sale will be reinvested in the Airport.

Federal Earmarks. Federal dollars can be assigned to specific local projects during the annual Appropriations process (the budgeting of funds for discretionary projects and programs). Any airport project seeking such funds will need a sponsor at the Federal level (a local U.S. House Representative or U.S. Senator) to request the project funding in the Federal Appropriations Bill, and champion said project through the Appropriations process.

Private Financing. Many airports use private third party financing when the planned improvements will be primarily used by a private business or other organization. Such projects are not ordinarily eligible for federal funding. Projects of this kind typically include hangars, fixed based operator (FBO) facilities, fuel storage, exclusive aircraft parking aprons, industrial aviation-use facilities, non-aviation office/commercial/industrial developments, and various other projects. Private development proposals are considered on a case-by-case basis. Often, airport funds for infrastructure, preliminary site work, and site access are required to facilitate privately developed projects on airport property.

Airport Revenue. The Airport generates revenue through ground and facility leases, fuel sales, and tie-down fees. At many airports, including Lancaster Regional Airport, generating the necessary cash flow to balance the operations and maintenance can be a difficult task and generation of money to adequately fund capital costs associated with the operation of an airport is even more of a challenge. Many general aviation airports rely on supplemental money from their Sponsor to assist with funding major projects.

Airport Financial Analysis

Calculating the net revenue potential of the Airport based on current and projected operations and facilities (i.e., revenue sources), coupled with the planned revenue generating improvements (listed in the CIP), entails conducting a pro-forma financial analysis that compares projected revenue derived from the improvements versus the anticipated expenses associated with the improvements. The pro-forma analysis does not account for debt servicing costs or grant income, but focuses on airport-generated revenue and operations expenses.

Revenue and Expense Projections

The CIP identifies several projects that will increase the revenue generated at Lancaster Regional Airport during the 20-year planning period beyond just an average increase expected for inflation. Net revenue potential is based on the following factors:

- **Existing lease revenue adjusted for lease rate escalation over the forecast period**
- **Construction of additional hangars and associated ground lease revenue**
- **New terminal building with increased leasable office/commercial space**
- **Increase in based aircraft (as per the based aircraft forecast), correlating to increase fuel sales**

Projects listed in the CIP that have the potential to increase revenue at the Airport over the planning period include the construction of a new terminal building and ground lease revenue associated with the private development of additional corporate, executive, and T-hangars. The CIP plans for construction of two large executive hangars and one nested T-hangar during Phase I; a general/medium corporate hangar, a large corporate hangar, a small executive hangar complex, and a nested T-hangar facility during Phase II; and, two small executive hangar complexes and a large executive hangar during Phase III.

The following assumptions were used when calculating the airport revenue potential in the pro-forma analysis:

- **Average annual fuel sales of 576 gallons per based piston-engine aircraft, calculated using 10-year average annual 100LL fuel sales and based piston aircraft forecast.**
- **Average annual fuel sales of 2,221 gallons per based turbine aircraft, calculated using 10-year average Jet A fuel sales and based turbine aircraft forecast.**
- **2010 target margin per gallon of fuel adjusted upward for 2.5% annual CPI increase through the forecast period.**
- **Construction of new GA terminal (A.9) with 50% more leasable office area and 100% occupancy by FY 2014.**
- **Phase I new ground lease of 52,525 square feet for construction of A.18, A.19, A.20 in 2015. Square feet calculations include building and parking footprint plus 10% buffer.**
- **Phase II new ground lease of 42,900 square feet for construction of B.3 in 2017; 24,200 square feet for the construction of B.10 in 2018; 19,525 square feet for the construction of B.11 in 2019; and, 52,800 square feet for the construction of B.12 in 2020. Square feet calculations include building and parking footprint plus 10% buffer.**

- **Phase III new ground lease of 30,800 square feet for construction of C.9 in 2023; 26,400 square feet for the construction of C.10 in 2025; and, 16,500 square feet for the construction of C.12 in 2027. Square feet calculations include building and parking footprint plus 10% buffer.**
- **Assumes constant staffing levels through the forecast period.**
- **Lease rates for current and anticipated leases (ground, hangar, and terminal) will adjust upward 2.5% annually in line with CPI estimates.**

Expense projections are based upon 2009 airport expenses as reported in the Airport's financial records. They are adjusted upward based on a 2.5% annual CPI increase.
Table H4 details the results of the 20-year pro-forma financial analysis. According to these projections, which are based on the scheduled completion of all revenue producing elements listed in the CIP, the Airport will break even in 2024 and begin generating surplus revenue thereafter. These findings indicate that the Airport will have limited capacity to fund substantial improvements listed in the CIP, with airport-generated revenue, until the end of the planning period.

Table H4 **PRO-FORMA FINANCIAL ANALYSIS**

	FY 2009	FY 2010	FY 2015	FY 2020	FY 2025	FY 2030
Revenue ($)						
Fuel						
Fuel Sales-100LL (Gallons)[1]	83,800	83,800	83,512	86,104	92,439	99,926
Fuel Sales-Jet A (Gallons)[2]	43,300	45,521	57,733	67,726	83,269	105,474
Target Margin per Gallon ($)[3]	0.70	0.70	0.79	0.90	1.01	1.15
Net Fuel Profit	$88,970	$90,524	$111,864	$137,840	$178,135	$235,601
Property						
Airport Office Rental[4]	23,500	24,088	40,879	46,251	52,329	59,205
Hangar Rental	202,000	207,050	234,258	265,042	299,870	339,276
Ground Lease	45,116	46,244	52,321	59,196	66,975	75,776
Phase I Ground Lease[5]	-	-	10,964	12,405	14,035	15,880
Phase II Ground Lease[6]	-	-	-	32,929	37,256	42,152
Phase III Ground Lease[7]	-	-	-	-	15,284	22,281
Penalties/Other Income	$2,827	$2,898	$3,279	$3,710	$4,197	$4,749
Gross Revenue ($)	**$362,414**	**$370,804**	**$453,566**	**$557,373**	**$668,082**	**$794,920**
Expense ($)						
Salaries and Benefits[8]	(192,476)	(197,288)	(223,213)	(252,545)	(285,732)	(323,279)
Supplies	(14,900)	(15,273)	(17,279)	(19,550)	(22,119)	(25,026)
Maintenance	(122,107)	(125,160)	(141,607)	(160,215)	(181,269)	(205,089)
Utilties/Professional Services	(112,796)	(115,616)	(130,809)	(147,998)	(167,446)	(189,450)
Gross Expense ($)	**($442,279)**	**($453,336)**	**($512,908)**	**($580,308)**	**($656,566)**	**($742,844)**
Net Income/(Loss)	**($79,865)**	**($82,532)**	**($59,342)**	**($22,936)**	**$11,516**	**$52,076**

Sources: Lancaster Municipal Airport Records, Airport Management, RW Armstrong analysis.

Notes: This pro-forma analysis does not account for debt servicing costs or grant income. Revenue (including per square foot land lease rates) and Expense increases are based upon a projected 2.5% annual CPI growth unless otherwise noted.

[1] Assumes average annual fuel sales of 576 gallons per based piston-engine aircraft; calculated using 10-year average annual 100LL fuel sales and based piston aircraft forecast.

[2] Assumes average annual fuel sales of 2,221 gallons per based turbine aircraft; calculated using 10-year average Jet A fuel sales and based turbine aircraft forecast.

[3] 2010 target margin per gallon of fuel adjusted upward for 2.5% annual CPI increase through the forecast period.

[4] Assumes construction of new GA terminal (A.9) with 50% more leasable office area and 100% occupancy by FY 2014.

[5] Assumes new ground lease of 52,525 sf for construction of A.18, A.19,and A.20 in 2015. SF calculations include building and parking footprint plus 10% buffer.

[6] Assumes new ground lease of 42,900 sf for construction of B.3 in 2017; 24,200 sf for the construction of B.10 in 2018; 19,525 sf for the construction of B.11 in 2019; 52,800 sf for the construction of B.12 in 2020. SF calculations include building and parking footprint plus 10% buffer.

[7] Assumes the ground lease of 30,800 sf for construction C.9 in 2023; 26,400 sf for the construction of C.10 in 2025; 16,500 sf for the construction of C.12 in 2027. SF calculations include building and parking footprint plus 10% buffer.

[8] Assumes constant staffing levels through the forecast period.

APPENDIX I Air Cargo Analysis

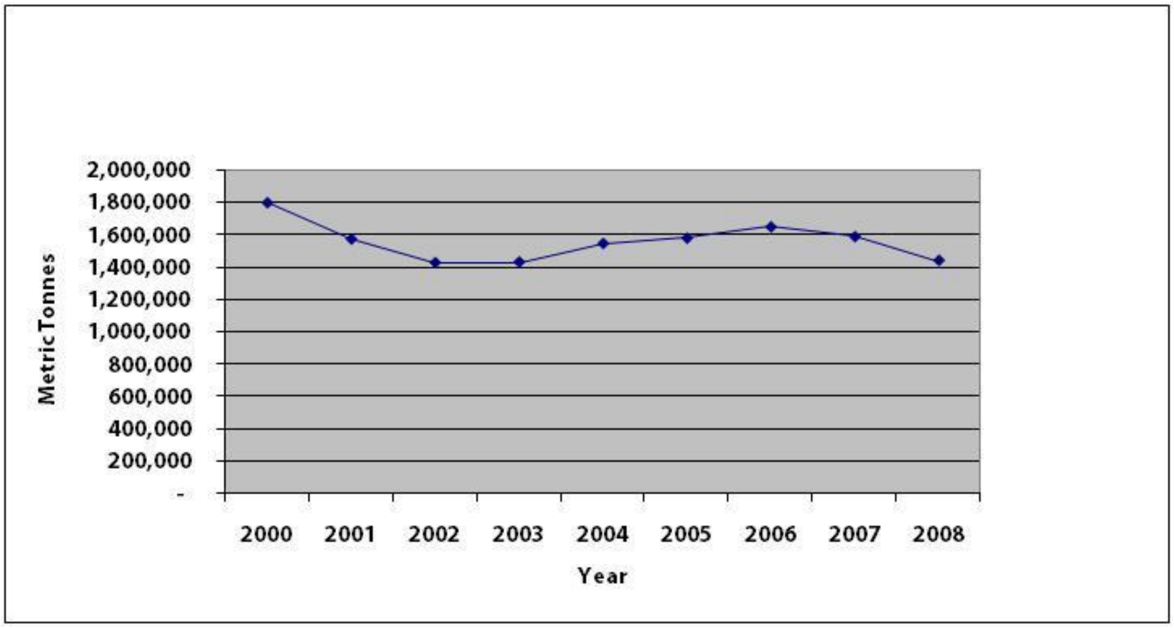
INTRODUCTION. In May 2009, Webber Air Cargo Inc. – under contract to Barnard Dunkelberg & Company – completed a review of near and long-term outlooks for air cargo development at Lancaster Regional Airport, for the City of Lancaster, Texas. The assessment is undertaken amidst widespread contraction for the air cargo industry in North America and globally. Following review of this document by the Study Committee, a summarized version will be included in the Master Plan final report.

The planning horizon for the Airport well exceeds current economic conditions, yet ongoing industry developments shape the long-term because fewer carrier-prospects exist. Moreover, an alternative cargo gateway hinges on need caused by congestion – even anticipated – at the primary gateway.

As revealed in Figure 1.1, between 2000 and 2008, total air cargo at Texas' five biggest[1] cargo airports (by volume) fell approximately 20%. More than a decade's worth of air cargo industry growth was essentially erased, which (at a minimum) extended when the region might have a demonstrable need for a cargo alternative.

[1] Dallas/Ft. Worth, Ft. Worth Alliance, Austin Bergstrom, Houston Intercontinental & San Antonio.

Figure 1.1 **ANNUAL CARGO TOTALS: FIVE BIGGEST TEXAS AIRPORTS 2000 – 2008**



Source: Webber Air Cargo Inc.

Understanding factors that might potentially cause interest in such an alternative requires familiarity with the various business models of air cargo carriers and specifically how they interact with one another and with allied interests (principally freight forwarders). Dallas/Fort Worth International Airport (DFW) has a representative roster of air cargo carriers and therefore its tenant base is used to provide an organizational framework for considering those factors in **Section One**.

Already a regional hub for FedEx Express, Fort Worth Alliance Airport (AFW) is Lancaster's most immediate potential rival for capturing the cargo overflow of DFW. In this study's **Section Two**, both DFW and AFW will be reviewed on the basis of providing regional air cargo capacity that shapes the need for cargo operations at Lancaster. Beyond the Metroplex, primary airports in Austin (AUS), San Antonio (SAT) and Houston Intercontinental (IAH) will also be explored to aid comprehension of how other Texas airports that are hubs for neither passenger nor cargo airlines have performed.

In addition to being a nearby competitor, AFW provides an example of a relatively successful all-cargo airport development. Another successful example is Rickenbacker International Airport in

Columbus, Ohio. Examples of relative failures exist in Illinois and North Carolina. For these and other alternative cargo airports, critical factors in both successes and failures will be explored in **Section Three**.

In **Section Four**, Lancaster Regional Airport is placed into the context of all the preceding elements in order to evaluate what may or may not be viable opportunities for cargo development. Under assumptions suggested by those elements, forecasts will project likely cargo volumes at Lancaster under a variety of scenarios.

Section One: Air Cargo Business Models

Familiarity with diverse business models of air cargo carriers is imperative to understand operational motivations that either strengthen principal air cargo gateways or might provide the operational independence to explore alternatives such as Lancaster. Air cargo capacity is provided by carriers on freighter (all-cargo) and passenger (belly cargo) aircraft. Among European and Asian carriers, it is also common for so-called combination carriers to operate both freighter and passenger flights. Often, cargo capacity is brokered by freight forwarders to shipper customers (manufacturers and distributors). Because they traditionally have rarely owned the actual transport resources (aircraft and trucks), forwarders are also known as indirect carriers. Integration through acquisitions has greatly blurred the distinctions between direct and indirect carriers. **Table 1.1** reveals examples of each air cargo business model currently operating at DFW.

Table 1.1 **TYPES OF AIR CARGO CARRIERS PRESENTLY OPERATING AT DFW (AS OF JUNE 2009 – NOT COMPREHENSIVE)**

Integrators	All-Cargo	All-Cargo (Cont.)	Belly
FedEx	Capital Cargo	Singapore Airlines Cargo*	American
UPS	Cathay Pacific*	Yangtze River Express	British Airways
BAX Global (ATI)	Air China Cargo*	**Combination**	Delta
DHL/ABX*	Caribbean Transport	Korean Air	Grupo TACA
ACMI	China Airlines*	Lufthansa	Japan Airlines
Polar/Atlas	China Cargo Airlines		KLM
Evergreen	Estafeta		Mexicana
Kalitta	EVA Air Cargo*		Air France
Southern	Express One		Air Canada

Source: Webber Air Cargo Inc.

* Carriers operating only freighters at DFW but passenger flights at other US gateways

Dominant in North America are the integrated carriers such as FedEx and United Parcel Service (UPS), which operate proprietary equipment in multiple modes (typically air and truck) to provide a diversity of services unmatchable by their smaller competitors. Other all-cargo airlines provide only airport-to-airport service mostly on behalf of freight forwarders and large industrial shippers but occasionally on behalf of other carriers. Belly cargo capacity provided by passenger aircraft has been marginalized or reduced on domestic segments as U.S. passenger carriers have reduced frequencies and aircraft size but still provide critical international capacity using more wide body aircraft. Combination carriers operating both passenger and freighter flights are common in Europe and Asia but the final such U.S. carrier – Northwest Airlines – recently announced it would leave the freighter business after being acquired by Delta. Only two passenger carriers – Korean Air and German carrier Lufthansa – also operate freighters at DFW but five carriers operating only freighters at DFW operate passenger flights at other U.S. gateways.

Table 1.2 **AIR CARGO CARRIER MARKET SHARES AT DFW – CALENDAR YEAR 2008**

	2008 Market Share	Total 2008	Total 2007	% Change
Integrated Carriers	45.81%	332,576.1	382,100.2	-13.0%
All-Cargo Freighters	32.68%	237,285.6	256,106.2	-7.3%
Belly Cargo Carriers	19.51%	141,681.5	156,155.9	-9.3%
Other Carriers	2.00%	14,521.5	2,917.3	397.8%

Source: Dallas/Ft. Worth International Airport.

Depicted in Table 1.2, the dominant carriers at DFW are integrated carriers with FedEx and UPS comprising about 40% of total cargo and well over 55% of domestic cargo. FedEx is also the sole cargo carrier at Alliance. Non-integrated all-cargo carriers account for almost one-third of DFW's total cargo. Belly cargo carriers at DFW account for almost 20%, which is much more than at most airports almost entirely on the basis of DFW hub carrier American Airlines.

Because Lancaster presently has no scheduled air cargo carriers and DFW has a nearly comprehensive roster of the major carriers, DFW's current cargo operations will be used to provide an organizational framework for this section. This methodology will also be helpful in later considerations of regional airport competition.

1.1: Integrators

Generally, the term *integrator* applies to entities operating multiple transportation modes with proprietary resources (typically aircraft and over-the road trucking fleets) and a greater breadth of services than more limited service providers. The number of integrators has dwindled as UPS acquired the former Emery Worldwide and DHL absorbed elements of the former Airborne Express. Recently DHL decided to abandon the U.S. domestic market in order to concentrate on purely international shipments.

Table 1.3 **TOTAL DOMESTIC FREIGHT – INTEGRATED CARRIER MARKET SHARES AT DFW – CALENDAR YEAR 2008**

Integrators	2008 Market Share	Total 2008	Total 2007	% Change
Airborne Express (DHL)	3.3%	13,855.0	15,780.0	-12.2%
Air Trans Int'l (BAX Global)	3.5%	14,645.0	16,454.2	-11.0%
FedEx	31.7%	132,682.1	158,046.8	-16.0%
Martinaire	0.4%	1,785.2	2,090.0	-14.6%
United Parcel Service	40.6%	169,608.8	189,729.1	-10.6%
Total Integrators	**79.6%**	**332,576.1**	**382,100.2**	**-13.0%**
Total DFW Cargo		**417,995.1**	**475,408.5**	**-12.1%**

Source: Dallas/Ft. Worth International Airport.

As is evident in Table 1.3, FedEx and UPS accounted for over 70% of total domestic freight at DFW in calendar year 2008. DHL contract carrier Airborne and integrated forwarder BAX Global account for another 6.8%. Addison-based contract carrier Martinaire Aviation accounts for only a nominal volume. DFW management includes these three as integrated carriers but none compare with FedEx and UPS. As will be explored in Section Three, what may be most relevant to Lancaster's proponents is that no all-cargo airport now operating in the U.S. has achieved success without being anchored by either FedEx or UPS. The integrators – alone – possess the scale of operations and internal resources (trucking and ground-handling, among them) to sustain operations at all-cargo airports, absent other carriers.

UPS and FedEx are now the two largest trucking companies in North America and much of Airborne Express's appeal to DHL was a ground network superior to its own – perceived as its Achilles heel in competing against UPS and FedEx. In the U.S., near-term expansion is likely to be limited to new trucking and air "spoke" operations driven entirely by local origin & destination demand. As will be explored later, UPS and DHL's holding companies also acquired numerous freight forwarders and all integrators are still major purchasers of lift from other carriers.

1.1.1 United Parcel Service Co. (UPS)

With almost $50 billion in annual revenues, UPS is the world's largest delivery company. Its main air hub is in Louisville, Kentucky and its regional air hub is located at DFW. UPS utilizes a fleet of 577 aircraft with 314 of those chartered and 263 UPS-owned jets to fly 959 daily domestic segments and 763 daily international segments. It serves 400 U.S. domestic airports.

Table 1.4 **THE UPS AIRCRAFT FLEET (AS OF JUNE 2009)**

Boeing 727-100 Series (1)	14
Boeing 747-100	7
Boeing 747-200	4
Boeing 747-400	10
Boeing 757-200	75
Boeing 767-300 ER	32
McDonnell-Douglas DC-8-71 & 73	44
Airbus A-300F4-600R	53
Boeing MD-11 Long Range Freighter	38

Source: United Parcel Service.

While UPS has grown into one of the world's biggest air cargo carriers, it began as a trucking company and still derives its dominance from surface transportation. Of its daily U.S. volume of 15.6 million packages and envelopes, only about 15% are transported by air. In addition to providing transport in its proprietary trucks and aircraft, UPS also operates as a freight forwarder (UPS Supply Chain Solutions) procuring space on common carriers operating aircraft (both passenger and all-cargo freighters), trucks (both truckload and less-than-truckload), rail and maritime services.

In late 2004, UPS acquired Menlo Worldwide Forwarding whose assets included the resources of the former Emery Worldwide cargo airline. In 2005 UPS announced it would close the former Emery heavy-freight hub in Dayton, Ohio and move those operations to UPS' own network hub in Louisville, as well as to UPS' regional hubs.

Of its regional air hubs, UPS' DFW operation has a sort hub occupying 323,000 sq. ft. and ramp size of 18 acres with 17 aircraft parking positions. There is also a heavy freight facility of 49,000 sq. ft. The air sort has capacity for 46,000 packages/documents per hour and averages 45 daily in/outbound flights. Its principal service area is Texas, Louisiana, Arizona, Oklahoma, Colorado, Kansas and New Mexico.

UPS' DFW operation is somewhat atypical in being located at a major hub. UPS has often located regional hubs at secondary airports, using Rockford instead of Chicago O'Hare and Los Angeles/Ontario International Airport instead of LAX. In both cases, UPS was not confident it could sustain long-term growth at congested legacy hubs but apparently believed DFW would continue to have sufficient growth potential to accommodate its long-term needs.

In 1999, UPS Logistics Group purchased 18 acres at Alliance for a 320,000 square foot distribution and technology center. UPS Logistics Group consists of 6 primary business units, including UPS Worldwide Logistics (UPS WWL) - the operating unit at Alliance Airport. UPS WWL has several customers on and immediately around Alliance who utilize UPS WWL for their multi-modal capabilities. Given the large volume of heavy freight activity - Maytag appliances, for example – UPS WWL uses the rail link extensively. UPS' Alliance operation is exceptional with surface freight but UPS continues to truck all of its airfreight to DFW.

1.1.2 FedEx

Smaller in total than UPS, FedEx had 2008 revenues of $38 billion with a daily volume of more than 7.5 million shipments for express, ground, freight and expedited delivery services. Rather than acquiring other integrators or forwarders as UPS did, FedEx has acquired several trucking companies once listed among the ten largest in North America. As part of a $1.8 billion network expansion plan to nearly double average daily hub package volume capacity in North America, FedEx has added ten new and expanded 19 other central distribution *trucking* hubs.

FedEx Express, the airfreight subsidiary of the FedEx holding company, operates an all-cargo aircraft fleet of 670 aircraft (Table 1.5), which is larger than UPS' proprietary fleet and charters combined. Conversely, FedEx's trucking operations, FedEx Ground, operates a fleet about half that of UPS. FedEx Express' daily volume averages 3.4 million packages and 11 million pounds of freight.

Table 1.5 **THE FEDEX AIRCRAFT FLEET (AS OF JUNE 2009)**

Boeing 727-200	80
Boeing 757-200	22
McDonnell-Douglas DC-10-10	1
McDonnell-Douglas DC-10-30	9
Airbus A310-200/300s	66
Airbus A-300-600	71
Boeing MD-10-10	61
Boeing MD-10-30	11
Boeing MD-11	58
ATR-72	13
ATR-42	26
Cessna 208A	10
Cessna 208B	242
Total	670

Source: FedEx Express.

FedEx Ground has its origins in several former carriers that include the former Roadway Package Service (RPS), which became Caliber in 1996 before being acquired by FedEx in 1998. The service was renamed FedEx Ground in 2000. Today, FedEx Ground accounts for around 2.6 million packages per business day. Its network is headquartered in Pittsburgh, Pennsylvania and comprises 29 ground hubs and over 500 pick-up/delivery terminals.

Indicative of size of regional Ground hubs, in December 2007 FedEx selected Perrysburg Township, Ohio for a 400,000 sq. ft. facility developed on a 127-acre site. The hub had initial capacity for 22,500 packages per hour but is expandable to 45,000. The project had an estimated cost of $87 million and initially employed 550, increasing to 800 at ultimate build-out. According to FedEx, the Perrysburg site was selected for its "ease of access to major highways, proximity to customers' distribution centers and a strong local labor pool from which to recruit employees".

FedEx Freight is the product of FedEx's acquisitions of two Less-than-Truckload (LTL) carriers. LTL shipping is the transporation of relatively small amounts of freight. The alternatives to LTL carriers are parcel carriers or full truckload carriers. Viking Freight was acquired with RPS in 1998 when both were part of the Caliber system. In 2001, FedEx acquired American Freightways and in 2002 combined the two networks into FedEx Freight as a comprehensive coast-to-coast less-than-truckload carrier. FedEx Freight is now the largest U.S. regional provider of next-day and second-day less-than-truckload services.

Another subsidiary created by the Caliber acquisition was **FedEx Custom Critical**, which evolved from the former Roberts Express pickup-and-delivery cartage company. The service focused on customized surface expediting which provided exclusive-use, non-stop service that matched vehicle size to the customer's shipment, moving fast and at a lower cost than standard airfreight products. The subsidiary is headquartered in Green, Ohio and operates around 1,400 vehicles.

FedEx's $300 million Southwestern hub at Alliance occupies 168 acres and employs approximately 800 workers to service more than 650 flights per month. The air hub directly serves 18 U.S. markets. The terminal is about 600,000 sq. ft. and accommodates two daily sorts for about 100,000 packages daily. Alone, the FedEx operation was sufficient to elevate Alliance to being the 31st largest cargo airport in North America in 2008 with about 154,000 metric tonnes even after an almost 35% decrease from 2007 volumes. Its growth came at the expense of DFW, which nonetheless remained North America's 10th largest cargo airport with over 650,000 metric tonnes in 2008. Even with the Alliance regional hub, FedEx has maintained substantial operations at DFW to meet demands of local time-sensitive shippers, while using Alliance largely for plane-to-plane transfers. As indicated in Table 1.3, FedEx remains DFW's 2nd largest domestic cargo carrier with over 30% market share in this category.

1.1.3 Integrated Forwarders

After acquiring assets of the former Airborne Express (ABX), **DHL** closed its own former hub at Cincinnati/Northern Kentucky International Airport (CVG) to consolidate at the former Airborne hub in Wilmington, Ohio. DHL also consolidated redundant ABX and DHL stations in many secondary markets. DHL recently announced it is exiting the U.S. domestic market altogether to limit its U.S. focus to international shipments of U.S. origin/destination - creating another layer of vacancies at on-airport cargo facilities throughout North America. The DHL decision also made surface transportation facilities redundant, creating additional vacant capacity in relatively new facilities.

For DFW, the DHL operation (on ABX aircraft) in 2008 accounted for only 3.3% of total domestic cargo tonnage. This total is deceptive because DHL's sister company, forwarder Danzas, is a major freight forwarder procuring substantial capacity aboard DFW's belly and all-cargo airlines. Dependence upon these carriers makes it inconceivable DHL would leave the region's main international gateway.

Once perceived as a potential integrator rival to FedEx and UPS, **BAX Global** has dramatically reduced its aircraft fleet, operating more as a slightly integrated forwarder than a true integrator. Along with German forwarding giant Schenker, BAX Global was acquired by Deutsche Bahn (German Railroad) to combine the former #5 and #6 freight forwarders in the world[2]. The combined operation has continued to pull down rather than expand on-airport domestic stations. Its 2008 operations (provided by Air Transport International) amounted to only 3.5% of DFW's domestic tonnage, although again, like DHL, BAX Global undoubtedly continues to buy substantial international capacity from DFW's other carriers, particularly American Airlines and foreign flag carriers.

DFW lists Dallas, Texas-based **Martinaire** as an integrator although it would be more accurate to acknowledge that they provide "feeder" flights to integrators such as FedEx and UPS. Specifically, Martinaire operates both scheduled and on-demand (charter) express cargo flights relying upon its fleet of 41 Cessna 208B (Caravan) aircraft and 4 Metro III aircraft. Martinaire operates overnight feeder service to 60 U.S. cities, expanding greatly after partnering with similarly disposed Mid-Atlantic Freight in 2004. Its corporate headquarters and maintenance facilities are located at Addison Airport (ADS) in Addison, Texas and bases aircraft there, as well as at DFW, SAT (San Antonio) and Lansing, Michigan where Martinaire has historically served the auto manufacturing industry's time-sensitive needs. With its primary fleet only offering payload capacity of 3,400 lbs., Martinaire provides a critical service to smaller markets but accounted for only 0.4% of total domestic cargo at DFW in 2008 – likely on behalf of one of the integrators and therefore not easily detached from the location of those operations.

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[2] World's Top IATA Forwarders in 2004.

1.2: Non-Integrated All-Cargo Airlines

Traditional all-cargo airlines offer airport-to-airport transport of heavy freight by one of two business models. "Wet lease" or **ACMI** (aircraft, crew, maintenance and insurance) providers operate cargo flights on a leased basis to other carriers and (less typically) to individual freight forwarders. All-cargo airlines also may operate their own **scheduled** and chartered flights, selling space directly to freight forwarders and occasionally to large industrial shippers. Covered in the preceding section, **Martinaire** would as likely be associated with ACMI carriers than with the integrators they serve. DFW's cargo statistics attribute almost 29% of total domestic cargo carriers who most likely are ACMI carriers operating on behalf of other scheduled carriers.

U.S. based **Atlas** Air Worldwide Holdings (AAWW) exemplifies both business models through two subsidiaries. Atlas Air is primarily AAWW's ACMI operator, while Polar Air Cargo, Inc. is AAWW's scheduled and chartered freighter operator. Under ACMI or wet lease contracts, customers receive a dedicated aircraft that is crewed, maintained and insured by Atlas in exchange for an agreed-upon block hour rate and level of operation. The customer absorbs all other direct expenses of operation, such as fuel, landing fees and ground handling. The customer also bears the commercial risk of load and yield.

AAWW subsidiary **Polar** provides scheduled all-cargo services on airport-to-airport routes for the largest freight forwarders. Polar's scheduled, all-cargo network serves four principal economic regions: North America, South America, Asia, and Europe. Its biggest clients include the forwarder divisions of integrators DHL and UPS, as well as EGL Eagle, Nippon Express, Kuehne & Nagel, Panalpina and Schenker/BAX Global.

Among scheduled all-cargo airlines, Luxembourg-based **Cargolux** has maintained a consistent strategy that often seems willfully out of step with the industry's clamor for vertical integration. As quoted in Air Cargo World[3], Cargolux CEO Uli Ogiermann stated Cargolux' model succinctly: "We recognize that the forwarder is our most important customer base. We want to work with them to help them create value for their business, which is why we are not in the business of providing value-

[3] "Cargolux Planning" by Roger Turney, Air Cargo World, March 2006.

added premium products. We want to deliver a simple airport-to-airport product, which is exactly what our customer base asks us to deliver."

While 50-60% of Cargolux's business is derived from only the top 10 forwarders, Ogiermann has suggested that Cargolux could work with even fewer (but bigger) ones because as the forwarders have grown in scale, their network strength and IT investments have made it easier for Cargolux to serve them. Cargolux also can be swayed by a few industrial shippers, as responding to the demand generated by the pharmaceutical industry, Cargolux added Indianapolis (home of Eli Lilly) to its U.S. destinations – joining New York, Huntsville, Atlanta, Los Angeles, San Francisco, Chicago and an oil industry-driven Houston. Presently, Cargolux does not currently serve DFW.

Two all-cargo airlines previously listed among DFW's all-cargo tenants have ceased operating under their former identities at least. Netherlands-based **Martinair** (no relation to the Texas-based Martinaire already mentioned) has been absorbed into the European partnership of Dutch combination carrier KLM and Air France. Formerly the largest domestic all-cargo airline, **Kitty Hawk Inc.** shut down all its scheduled services in late October 2007. Kitty Hawk's closure created yet another vacant air cargo hub at its former 240,000 sq. ft. facility at Fort Wayne International Airport, which received about $165,000/month in rents used to defray the cost of building the structure originally used to lure Kitty Hawk. The lease was to have run until 2020, so the Airport and its community are scrambling for a new tenant to pay for the expensive, vacant compound.

While some proclaim otherwise given the lack of passenger priorities, one could argue that all-cargo airlines are the least independent segment of the air cargo industry. ACMI operators repeatedly observe they simply operate the aircraft between points requested by their airline and forwarder clientele. Scheduled operators largely say the same about forwarders and large industrial shippers.

Five foreign carriers operate only freighter aircraft at DFW but both passenger and freighter aircraft at other international gateways. While current DFW operations might justify their inclusion as all-cargo airlines, they will be explored in the combination carriers section that follows in order to recognize the disincentive of leaving DFW for an alternative airport should the carrier ever desire to initiate passenger flights.

1.3 Passenger & Combination Carriers

Except for major passenger hubs such as DFW, passenger carriers have ceded almost all domestic cargo market shares to integrated carriers. At DFW, for example, American Airlines accounts for about 10% of total *domestic* freight while **all** other passenger carriers combine to account for only 1.3%. In contrast, American accounts for over 20% of DFW's total international cargo and when combined with belly operations from British Airways and KLM, pure belly cargo carriers account for over 25%.

The ability to access that capacity, as well as additional frequencies and destinations often uniquely provided by passenger carriers, fortifies traditional passenger hubs as cargo gateways relied upon by international freight forwarders and large industrial shippers. Although they retain their own sales teams, passenger carriers depend on freight forwarders and integrators to sell much of their capacity.

Five Asian carriers operate only freighters at DFW but operate passenger aircraft at other U.S. gateways such as Los Angeles International Airport and Chicago O'Hare. These carriers are Hong Kong-based Cathay Pacific Airways, Singapore Airlines, Taiwan-based China Airlines, Taiwan-based EVA Air and Air China. Together these five Asian carriers accounted for almost 48% of international air cargo at DFW in December 2008. Two carriers, Lufthansa and Korean Air, actually operating combination service at DFW account for another 17.6%, giving the loosely categorized combination carrier, group about 65% of DFW's international cargo. Reviewing Table 1.6 for global rankings of air cargo carriers, the dominance of such carriers at DFW is consistent with a global situation in which after the two integrated carriers FedEx and UPS, combination carriers accounted for the next seven largest cargo carriers in the world.

Table 1.6 **TOP 20 AIR CARGO CARRIERS (RANKED BY 2007 GLOBAL FREIGHT-TONNE KILOMETERS[4])**

Air Cargo Carrier	Country	TX Service	Service Type
1 FedEx Express	USA	AFW/DFW/IAH	Integrator
2 UPS	USA	DFW/IAH	Integrator
3 Korean Air Lines	Korea	DFW/IAH	Combination
4 Lufthansa	Germany	DFW/IAH	Combination
5 Cathay Pacific Airways	Hong kong	DFW/IAH	Combination*
6 Singapore Airlines Cargo	Singapore	DFW/IAH	Combination*
7 China Airlines	Taiwan	DFW/IAH	Combination*
8 Air France	France	DFW/IAH	Combination
9 Emirates	UAE	IAH	Combination
10 Cargolux	Luxembourg	IAH	All-cargo
11 EVA Air	Taiwan	DFW/IAH	Combination*
12 KLM	Netherlands	DFW/IAH	Combination
13 Japan Airlines	Japan	DFW	Combination
14 British Airways	UK	DFW/IAH	Belly
15 Martinair	Netherlands	DFW	All-cargo
16 Air China	China	DFW	Combination*
17 Asiana	Korea	NONE	Combination
18 United Airlines	USA	DFW/IAH	Belly
19 Northwest Airlines	USA	DFW/IAH	Belly
20 American Airlines	USA	DFW/IAH	Belly

Source: Air Cargo World, September 2008.
** Combination carriers operating only freighters at DFW but passenger flights at other U.S. gateways.*

While belly-only cargo carriers have relatively negligible roles in domestic cargo, they still provide critical capacity on international segments from U.S. hub airports, as well as the domestic link for international carriers who may interline with American, for example at DFW, in order to reach shippers in the U.S. interior. At DFW, belly-only carriers accounted for 27.2% of December 2008's international freight with 21.6% of total international cargo carried by American, alone. Adding pure belly volumes to those transported by combination carriers (including those that are only combination carriers at other gateways) accounts for almost 93% of international cargo at DFW.

Such a concentration is troubling for Lancaster, Alliance and any other would-be alternative to the established gateway because not only are the passenger carriers somewhat captive to DFW but combination carriers also extract tremendous efficiencies from collocating both their passenger and

[4] A standard measure of cargo carriers, FTK's represent one metric tonne of freight carried one kilometer.

freighter operations whenever possible, in order to utilize the same labor, facilities and even IT systems to accommodate both their belly and freighter volumes. More telling is that even as these Asian and European carriers have expanded from airports like New York's JFK and LAX, it has only been to additional major hubs like Atlanta Hartsfield International Airport and DFW. These carriers have not demonstrated any willingness to try secondary airports. In no small part, pure belly, combination and all-cargo carriers are tethered to major gateways by each other as complements and by major freight forwarders who use all of them.

The intertwining of carriers is symptomatic of a larger general constraint on any would-be alternative international gateway. Revealed in Table 1.7, a great variety of cooperative and even equity alliances exist, many involving Asian all-cargo airlines - Jade, Yangtze, Shanghai Airlines, China Cargo Airlines and Great Wall among them. Capacity of these all-cargo airlines is carefully coordinated to supplement partners, ultimately enforcing traditional gateways. Aligned carriers may also ground-handle one another and share warehouse space.

Foreign-flag carriers also lack U.S. domestic air networks and therefore may rely upon U.S. belly carriers to carry regional cargo to/from U.S. secondary markets to meet international flights. When flights are delayed or cancelled, carriers rely on other carriers to satisfy guarantees given to cargo customers. All of these forces converge to dampen carrier enthusiasm for fledgling alternatives perceived as lacking the network connectivity that is the hallmark of traditional gateways.

Table 1.7 **MAJOR CARRIER ALLIANCES (NOT COMPREHENSIVE)**

Airline Alliances

Sky Team	***Star Alliance***	***WOW Group***	***LAN Group***
Korean	Singapore	Singapore	MAS Air Cargo
Delta/Northwest	Lufthansa	JAL	British Airways
Air France	Air New Zealand	Lufthansa	Florida West Intl.
China Southern	All Nippon Airways		LAN Peru
KLM	Variglog		LAN Airlines
Alitalia	Thai Airways		
Aeromexico	Air Canada		

Ownership (Eight Groups/Pairs)

KLM	Delta	Lufthansa	DHL
Air France	Northwest	Swiss Intl.	ABX
Martinair		Jade	Astar
China Airlines	China Cargo Airlines	EVA Airways	Singapore Airlines
Yangtze	China Eastern	Shanghai Airlines	Great Wall

Source: Webber Air Cargo Inc.

1.4: Freight Forwarders

Also known as "indirect carriers" and "non asset-based operators", freight forwarders function as consolidators and retailers of space provided by air carriers. Freight forwarders are both service providers to industrial shippers for whom they directly provide logistics support, as well as shipper-customers to air carriers and trucking companies from whom they buy capacity.

Carriers depend heavily upon freight forwarders and integrators to sell much of their capacity. Belly cargo carriers may rely entirely on forwarders to act as de facto sales forces rather than have their own staff on-site. **Including integrators, freight forwarders control the vast majority of international shipments – about 76%** - and therefore have tremendous influence over carriers with individual forwarders able to single-handedly determine the success of individual routes operated by all-cargo airlines.

Dramatic consolidation has occurred among forwarders, leaving airports and their communities with fewer options to stimulate potential new international gateways. Units of integrated carriers –

through internal diversification and acquisitions – now dominate the forwarder industry, as Table 1.8 clearly delineates. Virtually all are multi-modal, serving not only the airfreight market but also rail, maritime and truck clients.

Table 1.8 **TOP FREIGHT FORWARDERS IN THE U.S. MARKET RANKED BY FORWARDER SPEND (AS OF OCTOBER 2007)**

RANK 2007	COMPANY	US $ Millions
1	DHL	253.15
2	Expeditors	139.69
3	UPS	129.88
4	BAX Global	109.12
5	EGL – Eagle Global	99.49
6	Panalpina	74.12
7	Kuehne & Nagel	72.28
8	Schenker	55.07
9	Uti	53.39
10	Nippon Express	51.72

Source: International Air Transport Association.

Detailed in the integrators section, UPS bought Emery Worldwide – a heavy freight specialist. Emery's former chief rival serving the auto manufacturing and other heavy freight sectors of logistics, **BAX Global**, now operates more as an "integrated forwarder" than a true integrator. Both the #4 and #8 freight forwarders in the US – BAX and Schenker, respectively, were acquired by Deutsche Bahn (German Railroad).

While DHL Express was responsible for routing international capacity to its own air hubs, more often DHL and its Danzas sister company rely heavily upon capacity flown by international commercial carriers. In addition to DHL and Danzas, Deutsche Post has acquired forwarders Exel and Air Express International (which had been acquired by Danzas), gaining extraordinary leverage with the carriers.

Panalpina in Huntsville is still the only example of a sustained forwarder-driven alternative gateway strategy succeeding. Variations have been attempted (and ultimately deserted) with EGL Eagle having attempted an ambitious scheduled-charter operation in Austin prior to the "factory recession" of late 2000. Danzas briefly "championed" scheduled-charter flights from Charlotte, North Carolina patterned after Panalpina's Huntsville operation but deserted the effort in less than a year. The Panalpina/Huntsville development will be explored in more detail in Section Three.

Depending on space availability, forwarders will have warehouse space either at or near the Airport. Air carriers are typically responsible only for transport between airports, while forwarders are responsible for ground transport. If the forwarder does not have its own facilities on-airport, it must arrange its own truck transport to off-airport facilities.

Forwarders' direct cargo income stems from the spread between what they pay airlines for capacity and what they charge to their shipper-customers. To maximize that spread, forwarders must negotiate the lowest rate from carriers possible but also must ensure shippers that capacity will be available. To find the right balance of carrier competition (driving down rates) and available capacity for the greatest number of customers, air forwarders favor the largest gateways. Carriers seek to offer the optimal mix of belly and freighter capacity, as well as the greatest number of frequencies and nonstop destinations to serve their customers without dumping so much capacity as to erode yields. Increasingly, such efforts involve leveraging the capacity of carrier partners in markets insufficient to support another carrier or frequency. Summarily, the unique mix of carriers, direct destinations, frequencies, as well as the ratemaking discipline imposed by all that competition, support traditional gateways and thwart would-be alternatives.

While forwarders rely on access to the greatest variety of carriers and destinations, as well as the highest number of frequencies to negotiate the best possible rates, also critical are potential 'recovery' options when shipments cannot be "flown as booked" due to mechanical issues or overbooking. While forwarders may casually voice support for prospective alternatives, tangible evidence of forwarders actually accepting the costs (including risk) to do so is very limited.

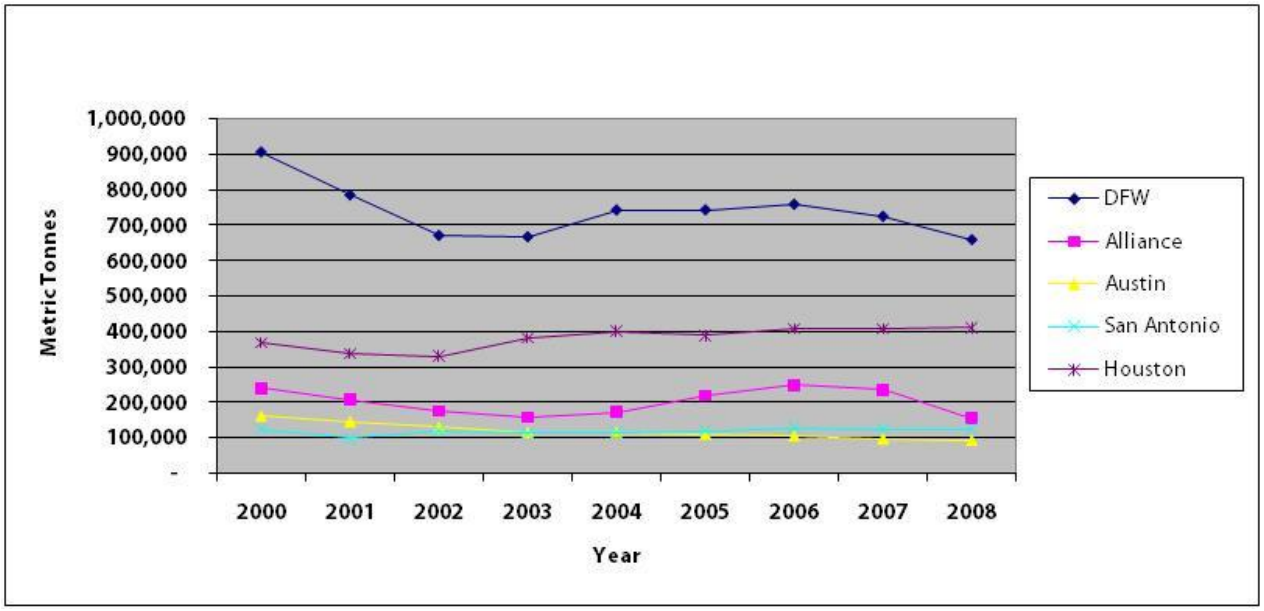
Section Two: Competition from Existing Sources of Airport Capacity

No alternative cargo airport development strategy is likely to be successful absent compelling evidence of the need for such an alternative. Most obvious would be demonstration of congestion at the principal gateway. For Lancaster, this would be difficult enough for DFW but then likely would also need to be the case for Ft. Worth Alliance Airport (AFW) as well.

To date, even the development of a secondary cargo airport in major markets has been highly selective. New York's JFK is the principal international freighter gateway while Newark has both a FedEx regional hub and a passenger hub for Continental. LAX and Chicago O'Hare have Los Angeles/Ontario and Rockford International Airports (respectively), which have regional hubs for UPS but no scheduled international carriers. As DFW has yielded a FedEx regional hub to Alliance, San Francisco International Airport has similarly been complemented by a FedEx regional hub at Oakland International Airport. What all these examples have in common is that one of the two integrators moved to the alternative. In the case of Lancaster, both FedEx and UPS already have regional hubs in the Dallas/Ft. Worth metroplex area, which leaves little cause for optimism that either might need significant local additional capacity.

In Los Angeles and Chicago – two metro economies with gross annual product larger than that of many countries – secondary airports have struggled without success to diversify beyond integrators. Neither market has approached needing a third cargo airport even though both LAX and Chicago O'Hare are universally perceived as much closer to reaching their absolute capacities than is DFW – perhaps the most land-rich of major U.S. international gateways. Moreover, freighter operations are more likely to be nighttime operations that are counter-cyclical to passenger peak operations, thereby contributing relatively little to peak hour airside congestion.

Figure 2.1 **TOTAL AIR CARGO AT TEXAS AIRPORTS 2000 – 2008**



Source: Airports Council International – North America.

Against all the doubt established by the preceding, proponents of an air cargo effort at Lancaster Regional Airport must also consider that rather than mounting congestion caused by growth, major airports around Texas have actually suffered losses in cargo volumes since 2000 (**Figure 2.1**). As domestic air freight has been affected both by a U.S. recession and the determination of integrators to divert freight to trucking, Alliance's air cargo volumes ended 2008 more than 37% below 2000 annual volumes while DFW was down a little more than 27% for the same period. Affected by national recession and with its high-tech industry hurt by the bursting of the dot.com economy specifically, Austin Bergstrom's air cargo fell almost 44% for the period. Relative to other Texas airports, San Antonio was fortunate to have experienced a 0.5% gain and Houston – aided by a surge in energy related industry had almost 12% growth, which for an 8-year period would normally be considered anemic but for this challenging period seems relatively robust. With all of the carrier consolidations and collapses – particularly the acquisition of Emery by UPS and consolidation then retreat of DHL (and Airborne) – what might have been a capacity deficit crisis a decade ago instead has turned into an unprecedented glut of vacant on-airport cargo space in North America.

2.1.1 Dallas/Ft. Worth International Airport (DFW)

According to Airports Council International – North America, DFW ended 2008 as the fourth largest passenger airport in North America with more than 57 million annual passengers and was the continent's tenth largest cargo airport with 658,544 metric tonnes of annual cargo. Year-on-year, both figures were annual decreases with a loss of 4.5% in annual passengers and 8.9% in annual cargo compared with 2007.

While DFW total cargo fell about 27% between 2000 and 2008, international cargo actually rose almost 113% for the same period. As a percentage of total cargo at DFW, international grew from 15% in 2000 to about 40% recently. While DFW's regional hub carrier, integrator UPS, has been diverting substantial amounts of domestic cargo to trucks, DFW has added international freighter carriers. DFW's success in attracting Asian carriers has been particularly notable with China Airlines (Taiwan) starting in 1986, Korean Air in 1997, EVA Air (Taiwan) in 1998, Singapore Airlines in 2001, China Cargo Airlines in 2004, Cathay Pacific (Hong Kong) in 2005 and Air China in 2006. In 2009, DFW will add Yangtze River Express. These operations were examined in Section One but cumulatively they pose a tremendous advantage for DFW in sealing off what Boeing projects as the fastest-growing cargo region in the world for the next 20 years.

As previously suggested, DFW is one of the least likely U.S. gateways to suffer severe congestion in the near to mid-term planning horizon. Airside, DFW is the only airport in the world capable of simultaneously accommodating a combination of seven takeoffs and landings. DFW hosts 24-hour operations with no slot constraints, no curfews and no restrictions. Moreover, DFW has continued adding cargo terminal capacity opening International Air Cargo Centre III and Logistics Centre in November 2005 to add 118,038 sq. ft. of warehouse space and three 747-400 parking positions. Recognizing the source of future air cargo growth, DFW has created an air service incentive program to offer landing fee rebates and marketing and launch support for new entrant cargo airlines.

2.1.2 Fort Worth Alliance Airport (AFW)

In the late 1980's, developer Hillwood acquired 15,000 acres (now 17,000 acres) of ranch land then donated it to the City to use as its matching share for a 90% construction contribution from the FAA. Fort Worth paid $76 million for infrastructure improvements and the Texas Department of Highways and Public Transportation paid for a $71 million highway extension. For purposes of accessing FAA funds and appeasing anxieties of DFW management and bond-holders, Alliance was initially represented as a non-competing reliever to DFW's long-term future airspace congestion.

Alliance Ft. Worth's early successes were consistent with the initial profile as a complement to DFW. First, DFW's hub carrier American Airlines chose Alliance for a $481 million maintenance and engineering center. While laying foundation for an emerging logistics hub, the decision by Burlington Northern Santa Fe Railway (BNSF) to locate its intermodal yard at Alliance suited the local council of governments troubled by the Metroplex's already disruptive urban rail operations.

Described in Section One's overview of the integrated carriers, FedEx chose AFW for its Southwestern regional hub which single-handedly has elevated AFW to being the 31st largest cargo airport (in annual tonnage) in North America with about 154,000 metric tonnes in 2008 after an almost 35% decrease from 2007. Until this drop, AFW had been on path to recover its post-9/11 losses but ended 2008 more than 36% below its calendar year 2000 volume. As with DFW, making the case that AFW could be approaching capacity limits has been made unthinkable by its having lost a decade's worth of growth. Moreover, absent any scheduled commercial passenger operations, AFW has relatively uncongested airspace conditions but for the FedEx operation.

UPS Logistics Group also operates a 320,000 square foot distribution and technology center at Alliance. UPS uses BNSF's rail operation but trucks airfreight to/from DFW. In terms of air and rail freight services, Alliance is more multimodal than intermodal. High-value/low-weight goods skew more to air, while heavier low-value commodities are more rail-friendly. The intersection happens with a shipper like Office Max who might use BNSF for computer desks and FedEx for memory cards.

Tom Harris, senior vice president of operations for Hillwood stated "we've done an analysis and believe that for a single day's operation, taking into consideration all of the standard costs, we can save a 747-400 freighter operator anywhere from $1.5 million to $2.2 million per year"[5]. Yet the air forwarder community has remained at DFW given their reliance on supplemental passenger belly lift

[5] "Cargo in the Middle" by Douglas Nelms, Air Cargo World, April 2008.

capacity and Alliance has yet to attract another all-cargo air carrier apart from FedEx and its contract carriers.

After several years and considerable investment at San Bernardino International Airport (formerly Norton Air Force Base) where Hillwood opened its "Alliance California" development, the airport has yet to attract a single scheduled air carrier, but has attracted distribution tenants such as Kohl's who rely on other regional airports for air cargo lift. Whether in the Dallas/Ft. Worth metroplex or Southern California's "Inland Empire", Hillwood has been successful in attracting attractive distribution operations but air carriers have been far more elusive.

Whenever DFW does finally face limits to its capacity, Hillwood has improved Alliance's infrastructure to complement an already enviable base of local shippers. In justifying a $90 million runway extension of both runways from 9,600 feet to 11,000 feet in the Dallas Business Journal[6], Hillwood Properties president Mike Berry observed "in terms of development around Alliance, it (the runway extension) will allow you to handle more diverse international cargo activity, particularly activity tied to the Asian marketplace." Hillwood has also developed the Alliance Air Trade Center offering a 99,000 sq. ft. facility with cross-dock capabilities and direct taxiway access for multiple wide body aircraft. Alliance also has on-site U.S. Customs and Border Protection, an on-site Centralized Examination Station and third-party cargo handling services provided by Cargo Airport Services (CAS), USA.

2.1.3 Other Texas Airports

No other airports pose such immediate competition for air cargo business in the Greater Dallas/Ft. Worth metroplex than do DFW and AFW. In all likelihood, judgments about adding air cargo service to other airports in the state are discrete from service to either DFW or Alliance, although undoubtedly cargo is trucked between markets as big as Houston and Dallas. In fact, to the extent it has been suggested growth in South Dallas might encourage air cargo operators to consider air cargo operations there, it bears noting that cargo is already trucked daily to/from DFW from as far away as Kansas City. So trucking from one side of the Metroplex to the other is unlikely to be perceived as a compelling hardship.

[6] "Alliance Gets Federal Cash to Lengthen Runways" by Kerry Curry, Dallas Business Journal, 11/8/00.

For domestic cargo carriers, Austin (AUS) and San Antonio (SAT) have often been perceived as largely the same market, so wild fluctuations have occurred between the two airports as carriers have decided to operate from one or the other and yet when the two markets' volumes are combined, the experience appears much smoother. For a brief while, Austin had scheduled charter international flights arranged by freight forwarder EGL Global Logistics largely to serve Dell. However when the dot.com boom burst, this service was quickly abandoned with Austin's international freight again trucked to/from either Houston or DFW depending on the destination/origin. As of the October 2008 Airports Directory published by Air Cargo World, AUS reported only 60% occupancy in its 229,000 sq. ft. cargo warehouse facilities and 1.4 million sq. ft. of cargo ramp. With less space available (in total), SAT reported 86% occupancy in 124,780 sq. ft. of warehouse and 1,115,327 sq. ft. of cargo ramp. Even given the relatively smaller quantity of finished space, such occupancy rates may be exaggerated due to long-term leases that keep tenants "occupying" space beyond actual utilization.

Houston Intercontinental Airport (IAH) ended 2008 as North America's #8 passenger airport with 41.7 million annual passengers and #17 cargo airport with over 412,000 metric tonnes of annual cargo. While a slight (0.4%) decrease from the preceding year, IAH still fared better than most U.S. airports, notably DFW, for the year. With its abundance of time-sensitive industries related to energy and its Continental Airlines hub which has increasingly grown as a gateway to/from Latin America, IAH is perceived as a discrete choice from DFW by many carriers. In fact, IAH has service from several carriers that do not serve DFW, including European all-cargo airline Cargolux and Middle Eastern passenger carriers Emirates, Qatar Airways, as well as scheduled freighters from Saudia Arabian Airlines.

Section Three: Case Studies of Alternative Cargo Gateways

That so few would-be alternative gateways have sustained success speaks to the difficulty of attracting and then supporting air service. It is instructive to examine aspects of dissimilar efforts to build a composite of success and failure, as well as contextual circumstances. The cases presented in this section examine developments led by a specific forwarder (Huntsville) and industrial shippers (Dell in Nashville & pharmaceuticals in Indianapolis). Other airports have exploited logistics-related opportunities for economic development not limited to aircraft operators. While the preceding are full commercial airports, all-cargo airports Rickenbacker International Airport (LCK) and Alliance (AFW) illustrate how property development and job creation can occur at airports interested in logistics-related jobs but not necessarily requiring an immediate payoff in enplaned air cargo.

In contrast, Illinois' MidAmerica Airport offers a cautionary tale of a "build it and they will come" approach. Failures MidAmerica and North Carolina's Global TransPark were offered as *alternatives* where no *need* existed, informed by unrealistic assumptions and implemented with a shotgun approach to carrier recruitment. Neither was subjected to the unbiased considerations that Lancaster has invited here.

3.1 Forwarder-Led Development: Huntsville

Huntsville International Airport (HSV) in Alabama is an alternative gateway with international flights dependent upon the commitment of Swiss-German forwarder **Panalpina**. Of about 79,000 tonnes of cargo in 2007 - ranking #66 in air cargo in North America - about 71,000 were attributable to the international operation. HSV is a full commercial airport with other aerospace operations on airport and local industries attractive to the European forwarder and carrier.

Since around 1990, HSV has served as an air cargo hub for consolidations by Panalpina's Air Sea Broker division. The operation – dubbed **Dixie Jet** – grew from a single weekly freighter to as many as ten weekly Boeing 747-400 freighter departures initially to Europe. Flights are operated by Luxembourg-based Cargolux and U.S.-based Atlas Air.

Panalpina uses HSV to provide dedicated freighter capacity to the region's time-sensitive shippers. The freighters are filled with a combination of Panalpina's local customers and freight trucked in from around the region. A dominant global freight forwarder building regional consolidations can effectively offset the limitations of a small local market. Panalpina trucks freight from as far away as the Chicago area to maximize payload.

Beginning with two 8,000 ft. runways, the Airport Authority expanded one runway to 10,000 feet when Panalpina initiated its international freight operations in 1990. In May 2004, the Authority cut the ribbon on its newly extended (at a cost of $31 million) 12,600 ft. runway, accommodating fully loaded Boeing 747-400 aircraft at an airport with relatively modest passenger operations to domestic hubs.

HSV has 200,000 sq. ft. of cargo warehouse on-airport and plans to add another 75 – 100,000 sq. ft. of additional space to its International Air Cargo Center. The two existing 100,000 sq. ft. air cargo terminals comprise one facility dedicated solely to Panalpina and a multi-tenant facility for all other cargo carriers (DHL, FedEx and UPS) are operating at the Airport. HSV is also adding 245,000 sq. ft. to an existing 1,242,000 sq. ft. of ramp.

The Port of Huntsville entails the Huntsville International Airport, the International Intermodal Center (IIC) and JetPlex Industrial Park. The IIC combines air transport with rail and trucking. Huntsville's is the only freight rail center in America owned and operated by an Airport Authority. The Airport's rail center is connected by spur to the mainline operations of Norfolk Southern Railroad. Once at the IIC, containers are transferred to chassis or to the depot yard, using either one of the yard's two 45-ton overhead gantry cranes. The IIC handles approximately 30,000 rail lifts annually and stores around 1,000 containers at a time but has capacity for approximately three times that volume. The IIC occupies 45 acres of land and six miles of track. While hundreds of miles inland from the nearest deep-water, the IIC's utilization as an intermodal container transfer center by 25 steamship lines more than justifies the name Port of Huntsville.

The Huntsville Airport Authority also operates the JetPlex Industrial Park with tenants including the Boeing Company, International Diesel, Daimler Chrysler, Futaba and LG Electronics. The JetPlex occupies 4,000 acres of land between the airport's runways.

The search for the "next Huntsville" has seen a series of false starts. In Victorville, California, Southern California Logistics Airport (SCLA) had commercial cargo operations only for a few months and has been without since 2001. Unlike HSV, which serves as an efficient alternative to Atlanta's Hartsfield International Airport, SCLA is an inferior option to several other regional airports vying to support LAX overflow. Mentioned in Section Two, forwarder EGL Eagle attempted a scheduled-charter operation in Austin prior to the "factory recession" of late 2000 but has since rerouted shipments of computer manufacturing clients over traditional gateways Dallas and

Houston. Danzas briefly "championed" scheduled-charter flights from Charlotte, North Carolina patterned after Panalpina's HSV operation but deserted the effort after only a few flights.

3.2 Shipper-Driven Development: Nashville International Airport (BNA)

In the shadow of dominant gateway Hartsfield Jackson International Airport (ATL), **Nashville International Airport (BNA)** has three parallel runways and one crosswind 11,000 ft. international runway. The Nashville Air Cargo Link – as the air cargo complex is known – dates to 1999, when the Airport Authority bought the original 30 year-old multi-tenant cargo terminal comprising 89,638 sq. ft. of warehouse and 435,600 sq. ft. of ramp. The Authority commenced a $12 million enhancement/expansion project. In August 2000, the multi-phase cargo improvement program commenced with $6.6 million in rehabilitation and improvements to the existing cargo facility, cargo apron, taxiway, landside truck terminal and parking lots.

In 2001, BNA invested another $5.5 million ($4 million of which was federal funding) for a cargo apron expansion to accommodate multiple wide-body freighters. In Phase II completed in 2003, BNA added a new 24,000 square foot terminal with 762,300 sq. ft. of ramp on the Airport's west side to accommodate China Airlines. In June 2006, third party developer **Aeroterm** completed a dedicated facility for FedEx Express that relieves pressure on the multi-tenant capacity. The FedEx facility comprises 71,500 sq. ft. of warehouse and sufficient apron for 2-3 wide body aircraft.

In August 2001, China Airlines began service to BNA initially to serve Dell Computers, but area forwarders have supplemented Dell's with other regional consolidations. The international service began as four weekly Taipei-Nashville-Taipei flights using Boeing 747-400 freighters. In 2003, the service was increased to six weekly freighters. Dell Computers' initial primary logistics provider was Eagle Global Logistics (EGL), which later moved its principal airfreight division to Huntsville. More recently, Dell has been handled by UPS Global Logistics. Although this division retained the China Airlines flights, UPS downgraded its own domestic operation, trucking to the Louisville hub.

The Air Cargo Link is five minutes from Interstate-40 and the Nashville metro is served by I-40, I-65 and I-24. Utilizing more than 150 truck terminals – including one on-site at BNA – I-40 freight trucking companies serve Nashville. Averitt, which has an airfreight division – is based in Nashville.

Although lacking the comprehensive array of global forwarders operating in Atlanta, Nashville does host offices of more than twenty international freight forwarders.

One of Nashville's strengths is its economic base. The State of Tennessee has been aggressive in courting major manufacturers and succeeded in attracting Dell Computers, as well as major auto expansions from Saturn and Nissan. In 2003, Moody's Investors Service ranked Nashville #8 among the U.S.' most diversified local economies and Forbes magazine ranked it #25 among top places for business and careers. According to the Nashville Chamber of Commerce, Nashville's biggest manufacturing employers are Dell (3,000 area workers), Saturn (7,600) and Nissan (6,500). While the Dell-driven China Airlines service is notable, BNA ranks only #60 among U.S. airports in total cargo. The loss of UPS air service is almost certainly more directly relevant to many area shippers than are the Dell-intensive China freighters.

3.3 Shipper-Driven Development: Indianapolis International Airport (IND)

Indianapolis International Airport (IND) is an integrator-driven airport with almost 94% of its total cargo being domestic. Hosting the second largest hub in FedEx' system, IND was already among the U.S.' top ten cargo airports before limited international service from all-cargo airline Cargolux. Again indicating regional divergences, in 2008 IND's international freight increased about 8.5%, while domestic freight fell 6.0%.

Evidenced by **Cargolux's** decision, international flights may serve a particularly strong local niche, such as Indianapolis' pharmaceuticals industry. In both the IND case and the Rickenbacker case (with The Gap) explored next, the "alternative" is the local airport of corporations driving the demand. The benefit for local behemoths is control, particularly important in pharmaceuticals but appreciated in fashion and high-dollar electronics. Absent local "champions" sufficient to justify dedicated freighters, consolidations go to traditional gateways where these "niches" simply become part of the regional mix supporting regularly scheduled services. This is particularly true for durable goods.

While there can be little doubt about the correlation between pharmaceuticals and air transport demand, its' low weight has often prevented it from being an effective anchor for establishing charters – let alone, scheduled freighter service – except for emergency conditions. Apart from

Indianapolis, there is continued willingness to truck shipments hundreds of miles to reach gateways. With a pharmaceuticals presence only slightly less than that of Indianapolis, Kansas City has failed for years to attract international cargo service. Demonstrating the flexibility of the logistics industry, Kansas City's manufacturers such as German companies Bayer and Hoechst are likely to have their products trucked to/from Chicago O'Hare or flown on a domestic passenger flight.

3.4 Logistics Development: Rickenbacker International Airport (LCK)

Columbus, Ohio's Rickenbacker International Airport is a relatively successful all-cargo airport that benefited from legacy carrier relationships and a local industrial shipper base. In 2007, FedEx accounted for 61%, UPS for 13% and chartered flights for another 13% of total cargo. About 14% of LCK's total cargo was international freight.

LCK's origin as a former Air Force Base left a superior airfield and infrastructure, including twin 12,000 ft. runways and a Category II Landing System for all-weather operating capabilities. LCK was closed as an Air Force Base in 1980 and its first success came in 1985 when Flying Tigers (acquired in 1989 by FedEx to whom its hub operation was transferred) established its regional air cargo hub and bulk sorting facility there. Success for the surrounding Rickenbacker Industrial Park came later with the 1992 opening of the Spiegel/Eddie Bauer and Siemens distribution centers.

In March 2008, Norfolk Southern (NS) Railroad opened a $63 million intermodal (truck-rail) facility on 175 acres. As with Alliance, teaming the airport and rail yard provides access to the most time-effective but expensive option (air) and much less costly but also less timely rail service. Again it is multi-modal more than inter-modal, as virtually no freight moves between the air and rail operations.

The larger area surrounding LCK encompasses 30 million sq. ft. of development, 13 industrial parks and more than 100 companies, including several Fortune 500 corporations. The global distribution center for the Gap, Inc. accounts for a substantial seasonal chartered freighter operation, as do such companies as Limited Brands Inc and Abercrombie & Fitch. Much of the development at Rickenbacker has been through private investment accounting for 11 million sq. ft. of development at the airport and even more in the 15,000 acres beyond. Rickenbacker partnered with Duke Realty to develop its Global Logistics Park - 1,600 acres of airport land identified as not necessary for aviation purposes. The site will accommodate distribution and light manufacturing primarily spurred by the NS intermodal facility.

The Rickenbacker Air Cargo Terminal complex is comprised of four multi-tenant air cargo terminal buildings with 212,800 square feet of space and direct airside access. As of July 2007, the original three buildings had occupancy of only 56% - even before an additional 48,000 sq. ft. building was added. The FedEx regional hub is in its own dedicated facility with 275,000 sq. ft. originally developed for Flying Tigers in 1989. In September 2006, Forward Air expanded its trucking hub from 61,000 to 125,000 sq. ft. airside facility serving non-integrated all-cargo airlines and freight forwarders. LCK is also the national trucking hub for Eagle Global Logistics.

3.5 Cautionary Tales: MidAmerica (St. Louis) Airport

Located 25 minutes from downtown St. Louis in Belleville, Illinois, MidAmerica Airport opened in November 1997 built with $60 million in funding from the state of Illinois, $30 million from St. Clair County and $154 million in federal money. MidAmerica has two commercial-length runways (10,000 and 8,000 ft. in length) with Category II Instrument Landing Systems, immediate access to Interstate-64 and potential access to a Norfolk Southern rail spur contiguous to the Airport's south edge.

A cargo ramp of 258,000 sq. ft. (5.9 acres) was built on a purely speculative basis and a 200-acre air cargo terminal site prepared adjacent to the ramp. A $6.3 million, 50,000 sq. ft. air cargo terminal was built on the site. Airport management noted that would accommodate one 747-size planeload of cargo each day. "In terms of pounds", Mid-America director Tim Cantwell observed: "that works out to 350,000 pounds of product a day. That'll max us out in terms of the cargo facility that's being built."

Mid-America has never landed a substantial scheduled carrier, but did get a few charters in 2007 with Centurion Airlines flying 144,000 pounds of corn seed. In October 2008, MidAmerica began to receive weekly DC-10 flower shipments from Bogota, Colombia through a heavily subsidized arrangement with Miami-based Teqflor International Logistics, which gets free use for a decade of 50,000 sq. ft. of warehouse facilities that cost $8 million to build. In addition, the St. Clair County board agreed to spend $3 million of its own funds to buy refrigeration units for use by Teqflor, which signed a 20-year lease paying the county $365,000/year for reimbursement of the refrigeration units. For the public, investment in refrigeration equipment is risky because specialized facilities are difficult to market should the venture fail.

Since its inception, MidAmerica has cost more than $300 million in public funds and inspired a 1998 segment called "Gateway to Nowhere" on NBC Nightly News' "Fleecing of America" series. By way of cost/benefit analysis for those $300 million in public funds, the Teqflor venture was reported by the Belleville News-Democrat to have created four full-time and 20 part-time jobs.

3.6 Cautionary Tales: North Carolina's Global TransPark

The governor announced plans to merge manufacturing with air cargo transportation in a massive industrial complex that would meet the demands of the new global economy and restore the sagging economy of the eastern part of the state. Two large runways surrounded by factories to facilitate 'just in time' manufacturing would allow freighters to fly raw materials and parts in for assembly into finished products, then flown out. From that start in 1991, the Carolina Journal Online has since described the 2,000-acre North Carolina Global TransPark (GTP) in Kinston, North Carolina as:

> "A boondoggle from the start … possibly the largest government waste and failure in North Carolina state history, a failed cargo-airport project that has brought false hopes but little impact to Kinston and Eastern North Carolina."

Rather than the 55,000 logistics jobs promised in its original "feasibility study", employment peaked at 320 jobs. Rather than the $2.8 billion annual economic impact projected, it drained more than $140 million in federal, state and county funds without landing a single major air cargo tenant.

The State of North Carolina spent roughly $53 million on runway improvements at the GTP. Although the GTP never convinced a single scheduled cargo carrier to fly from Kinston even to a North American cargo hub, its primary runway was expanded to 11,500 ft. to accommodate freighter flights to Europe. The runway length exceeds any at US Airways hub Charlotte and former American Airlines hub Raleigh-Durham – both of which have actually had international service.

GTP had more than 6,000 sq. ft. of office space and 30,000 sq. ft. of airside warehouse but in spite of having only a 50% occupancy rate for warehouse (none of it used for air cargo operations), the GTP developed an additional 120,000 sq. ft. warehouse in 2005.

According to a report released in January 2008 by the State Auditor, the GTP might go bankrupt because of its inability to pay an outstanding $32 million loan from the state Escheat Fund. According to an article[7] in the Carolina Journal, "(If) the Authority declares bankruptcy, funding received to date from the Federal Aviation Administration may be required to be paid back." The amortized potential liability of the GTP to the FAA was about $18.1 million.

After receiving $2 million in local and state support to locate at the GTP, Workhorse Aviation Manufacturing LLC (opened in December 2005) closed in February 2008. State Representative Paul Stam, R-Wake, observed about the GTP "It's been a lot of money and with precious little to show for it. We should stop adding money to the losses."[8]

3.7: Carrier-Led Development

Rather than forwarder and shipper-led models just reviewed, a carrier-led approach to cargo development might seem to be the logical starting point for a prospective undertaking such as Lancaster's. However while Lancaster may lack resources imperative to the preceding examples, not one example exists of a currently successful North American all-cargo airport that was not anchored by one of the integrated carriers.

Worse still, even that number has shrunk as a couple of examples to be cited were anchored by DHL, which is pulling down its U.S. domestic network. **Sacramento's Mather Field (MHR)** is managed by the Sacramento Airport System, which also manages the local gateway airport limited by both land availability and highly restrictive noise prohibitions for nighttime operations. MHR has an excellent airfield with twin commercial runways, the longest of which is 11,300 feet in length. Austin-based private developer LYNXS Holdings constructed the Sacramento CargoPort in 1999 with 33,000 sq. ft. of warehouse and 1.5 million sq. ft. of adjacent ramp. In 2008, MHR ranked #59 in North America with more than 60,000 metric tonnes of cargo. While MHR has attracted integrators from Sacramento International Airport, it has not drawn international carriers from relatively nearby cargo gateways Oakland and San Francisco.

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[7] "Audit: GTP in Bankruptcy Danger" by David N. Bass, Carolina Journal, 1/3/2008.
[8] "Firm Closes Global TransPark Operation", WRAL on-line, 2/4/2008.

Located in Riverside, California, **March Inland Port** signed LYNXS as master developer of the entire former Air Force Base approximately 60 miles from the Los Angeles Basin. LYNXS successfully attracted major manufacturers like Phillips Electronics to March several years ago but its biggest success came when March was selected as West Coast Regional Hub for DHL. While LA/Ontario is already home to the West Coast regional air and truck hubs for UPS – an operation approximately seven times larger than what was envisioned for DHL – winning this hub competition was perceived as absolutely critical for any of three other alternatives to establish credibility as prospective air cargo airports. DHL's contraction in the U.S. leaves March without an obvious substitute for such a large facility and also bodes poorly for occupancy at Mather.

The UPS regional air hub at the Greater Rockford Airport (65 miles northwest of O'Hare) occupies a 520,000 square-foot warehouse and sufficient ramp parking for 30 aircraft. The hub employs 1,500 full and part-time workers and an additional 200 are employed for the package center that operates a fleet of ground delivery vans. The air hub handles 34 daily UPS flights and processes 130,000 to 170,000 packages nightly. The regional hub serves a multi-state region for which all intra-regional shipments go only through the Rockford hub, whereas shipments moving to other domestic regions and internationally are routed from Rockford to/from Louisville.

A cargo-focused airport with only nominal passenger activities, Rockford is perhaps a more accessible example to Lancaster than integrator regional hubs located at substantial commercial airports such as Oakland (FedEx) and Los Angeles/Ontario (UPS). In serving as a reliever to Chicago O'Hare, Rockford presumably fills a similar role to how Oakland served San Francisco and LA/Ontario serves LAX. As noted earlier, while Alliance's FedEx hub might be perceived in similar fashion, DFW's UPS hub is something of an exception in having a large integrator regional hub at a major hub. FedEx's regional hub at Newark and UPS' regional hub at Philadelphia compare. However, only DFW seems to have the 30-year capacity outlook that integrators typically seek in establishing regional hubs in order to accommodate intricate hub-and-spoke delivery systems.

3.8: Comparability of Alternative Gateways to Lancaster

For Lancaster, the implications of **Table 3.1** are possibly discouraging. While other carriers might potentially follow an integrator to an all-cargo airport, only the regional hub of an integrated carrier has the resources necessary to support a stand-alone operation for an extended period of time. Integrated carriers not only bring their aircraft but also have the proprietary trucking resources, in-house forwarding divisions and even ground-handling to support the air operation. They also have the unique scale of operations in terms of internal volumes to potentially justify the extraordinary capital costs to make such a move. The Dallas/Ft. Worth metroplex – uniquely – already hosts regional hubs for both of the remaining two integrated carriers and therefore the carrier-driven approach is perhaps the least likely avenue to air cargo development at Lancaster.

Table 3.1 **NORTH AMERICAN ALTERNATIVE CARGO AIRPORTS**

Airport (2008 North America rank)	Integrators	Type of Development
Oakland, CA (12)	FedEx regional hub	Commercial Airport
Ontario, California (16)	UPS regional hub	Commercial Airport
Fort Worth Alliance (31)	FedEx regional hub	Greenfield
Rickenbacker (45)	FedEx, UPS	Base Conversion
Sacramento Mather (59)	DHL, UPS	Base Conversion
March (Riverside, CA)	DHL regional hub	Base Conversion
Rockford, IL	UPS regional hub	Base Conversion
Global TransPark	None	Greenfield
MidAmerica	None	Greenfield*

Source: Webber Air Cargo Inc.
** Commercial parcels were Greenfield but airfield split with joint-use activity.*
***Note:** Greenfield sites are typically a previously undeveloped portion of land that is currently left to nature or used for agricultural or landscape design purposes.*

The most likely near to mid-term prospect for development by either carrier at Lancaster Regional Airport would be either a ground operation or at best a very small feeder operation. For planning purposes, specific FedEx Ground terminals were described in Section One. The feeder operation would be along the lines of the Caravan operation of Martinaire (also included in Section One). Based on contractions during recent years and available capacity at both Alliance and DFW, such growth that another regional hub becomes necessary could only be contemplated in a very long planning horizon that may prove unreasonable (in terms of opportunity costs) to other possible developments at Lancaster Regional Airport.

Other air cargo development approaches explored earlier in this section do not portend much more favorably. The forwarder-led development by Panalpina in Huntsville (HSV) has not been replicated successfully in any other North American market – not even by Panalpina. Moreover, the aerospace and other air cargo-producing industry located around HSV does not exist in Lancaster, nor do the compromises in time and control in trucking to DFW from just south of Dallas equate to that of trucking from Huntsville, Alabama to Atlanta, Georgia. As was indicated in Section One, freight forwarders generally seek to maximize network connectivity by accessing the greatest possible mix of carriers, frequencies and direct international destinations – all of which keep even Alliance from obtaining air cargo service beyond FedEx and its contract carriers.

In the long run, the shipper-led approaches that have drawn international cargo flights to Nashville and Indianapolis are only scarcely more viable. Significant differences exist between successful efforts and Lancaster's situation. Presently, Lancaster has no local equivalent to Nashville's Dell computer manufacturing operation, nor Indianapolis' pharmaceuticals manufacturers. As with HSV's local aerospace industry, even if Lancaster did have such shippers, the compelling disadvantage of simply trucking from one side of the Metroplex to another does not compare to that of trucking from Indianapolis to Chicago or from Nashville to Atlanta. The air cargo industry is capable of effectively trucking air cargo much greater distances, as is done specifically by expedited trucking company Sterling Transportation Inc. (www.sterlingtransportation.com) which trucks Latin America-destined cargo from Southern California to Miami and Asia-destined cargo from Miami to LAX.

Summarily, Lancaster Regional Airport's future as an air cargo intensive airport is greatly compromised by a variety of compelling factors. The same Metroplex area is already served by one of the least congested major international gateways in North America in DFW, as well as an all-cargo airport in Alliance that also has tremendous remaining capacity. Both airports already have foundations of local air cargo users, as well as allied services that include air forwarders, ground-handlers and expedited trucking companies. Between the two, DFW and Alliance already host regional hubs for the only two carriers – FedEx and UPS – capable of supporting a substantial all-cargo airport operation. As explored earlier in this section, Lancaster lacks resources that have been critical to the success of other alternative gateways, such as Rickenbacker, Huntsville and Nashville. In the case of all three of these airports, it should also be noted that Rickenbacker was a legacy regional hub for FedEx and that its airport has never gained self-sufficiency (continuing to lose money) relying on land development and local public subsidies. Huntsville and Nashville (BNA) – as well as Indianapolis (IND) – are commercial airports largely sustained by other revenues as well. IND is also FedEx's second largest regional hub, while both HSV and BNA acknowledge that the relatively few cargo flights are only sustainable due to the contributions of passenger operations to airport overhead.

Section Four: Lancaster Regional Airport Cargo Forecasts

4.1: Forecast Methodology

Unlike airports with existing cargo operations, forecasts for Lancaster Regional Airport must rely entirely on assumptions about externalities, rather than the recent performance of Lancaster's airport itself. Lancaster Regional Airport's cargo potential depends entirely on taking market share from DFW and/or AFW – whether diverting current operations or capturing anticipated new growth for the region. As explored in depth in Section Two and revealed in Table C10, the period since calendar year 2000 has produced tremendous losses in air cargo volumes for the Metroplex area's two principal cargo airports. Combined, DFW and AFW (Alliance) have lost about 29% of their CY2000 total air cargo volumes. International volumes – entirely at DFW – more than doubled during the same period, while domestic volumes were responsible for all of the losses. At FedEx regional hub Alliance, volumes fell over 36%.

Table 4.1 **Cargo Volumes: 2000 – 2008 DFW & AFW (METRIC TONNES)**

Year	DFW		AFW		D/FW Metroplex	
	Total	Intl.	Total	Intl.	Total	Intl.
2000	904,994	137,288	241,460	375	1,146,454	137,663
2001	784,085	146,799	208,228	-	992,313	146,799
2002	670,310	156,186	176,429	-	846,739	156,186
2003	666,488	186,229	156,367	-	822,855	186,229
2004	742,289	242,764	172,046	-	914,335	242,764
2005	742,623	188,977	220,133	-	962,756	188,977
2006	757,856	224,700	250,478	-	1,008,334	224,700
2007	724,140	291,937	236,875	-	961,015	291,937
2008	658,544		154,118	-	812,662	-
% 2000-08	**-27.23%**	112.65%	**-36.17%**		**-29.12%**	112.07%

Source: Airports Council International – North America.

Forecasting airfreight demand typically relies upon: 1) historical/trend analysis; 2) econometric modeling; and 3) judgment informed by market and industry input. No single approach is ideal and each has discernible weaknesses. Regardless of methodology, forecasts become less reliable the further extended in years because change itself is simply inevitable – both with the underlying drivers for cargo demand and for how cargo traffic responds to them. While airport master plans often require a 20 to 30 year horizon, cargo forecasts should likely be updated at least every five years.

Historical trend analysis extrapolates historical experience into the future. Reliance on this approach requires confidence that factors shaping recent experience will continue to have the same influence in the future. This approach is best suited to mature markets experiencing little instability with only gradual changes over the last five to ten years. As revealed in Table 4.1, the period 2000 – 2008 has been anything but the stable, mature market recommended for trend analyses. The period's inception featured extraordinary economic growth for the U.S. toward the end of the dot.com boom but from 2001 to date, the economy has incurred ongoing recession, 9/11, wars and unprecedented fuel costs.

Econometric modeling entails quantifying associations between the forecasted element – air cargo – and one or more variables, such as gross domestic (GDP) or regional product, employment, population, income and/or fuel prices. However due to many of the same extraordinary events that compromised the reliability of historical trend analysis, correlates often used in multiple regression analysis have not had a conventional relationship with air cargo growth in North America recently. Air cargo models created by Boeing, Airbus and others traditionally held that each 1% increase in GDP correlates to a positive multiplier of 2% or more in air cargo but in recent years, air cargo has plummeted even as GDP continued to grow albeit at slower rates.

Econometric modeling works best with broadly defined markets, such as entire regions or countries, in which multiple factors influence aggregate growth and other variables can be held constant, but poorly suits individual airports. Econometric modeling assumes there are no constraints on supply of capacity, but at individual airports cargo capacity is constrained by the existing hub-and-spoke systems of carriers and limited aircraft fleets. Interchangeability of capacity between airports – such as the movement of freighters over gateways such as DFW and the FedEx regional hub at Alliance – and substitution of trucking for air transport also undercut the notion of unlimited supply of capacity.

Given recognizable imperfections of historical trend analysis and econometric modeling, forecasters must shape their judgments through **interviews** and/or surveys of local operators. This study effort involved interviews – both in-person and by phone – with airport management, economic developers and carriers already serving the Metroplex area. Judgment is particularly important in such a rapidly changing period for a narrowly defined market served by a proposed third air cargo option. That Lancaster Regional Airport presently has no scheduled air service and competes with an international gateway and regional cargo hub elevates the significance of judgment in forecasting. With such ready substitutes, Lancaster's potential air cargo development owes less to individual commodities which may easily be trucked to either of the other two gateways and therefore current local production is not used as a primary driver – although examples of potential industry that could change the industrial landscape were presented in Section Three. Rather, Lancaster's forecasts are largely calibrated by current cargo tonnages of actual carriers at other area airports.

Table 4.2 **COMPARATIVE REGIONAL AIR CARGO FORECASTS**

Time Frame	Boeing 2008-27	Seabury 2008-1212	OAG/Back 2008-17	Airbus 2007-26
Intra-NA	2.60%		1.40%	3.30%
NA-Asia	6.70%	2.60%	4.10%	4.70%
Asia-NA	6.60%	4.50%	3.90%	5.40%
NA-China	n/a	7.70%	8.50%	8.30%
China-NA	n/a	9.20%	10.10%	9.10%
NA-Europe	4.90%	0.60%	1.30%	4.20%
Europe-NA	5.40%	0.20%	2.10%	4.20%
NA-LAM	6.00%	1.70%	5.70%	6.00%
LAM-NA	5.70%	2.90%	5.20%	3.90%

Source: Webber Air Cargo Inc.

Table 4.2 summarizes cargo forecasts from aircraft manufacturers Boeing and Airbus, as well as OAG Analytical Services and Seabury Aviation & Aerospace. Generally, the two aircraft manufacturers are more optimistic. In all models, projected demand depends on economic activity in the importing region or country influenced by transportation costs, exchange rates, and relative prices. Anticipated changes in capacity and other modifications are introduced into forecast model adjustments. Boeing and others concede that while trend analysis and econometric modeling are effective for air cargo forecasting in markets such as countries and regions, applicability diminishes as market size narrows.

As Table 4.2 reveals, relatively low growth is anticipated in the North American domestic market, while trade with Asia (particularly China) is anticipated to fuel relatively higher growth.

4.2: Forecasts

Sections One through Three of this report made clear that Lancaster Regional Airport faces tremendous challenges to attract scheduled air cargo service. Not one North American all-cargo airport has sustained success without being anchored by a substantial (usually a regional hub) operation by one of the integrated carriers. Given the unique presence of hubs for both FedEx and UPS in the Metroplex area, ***the consultant projects the most likely forecast for Lancaster Regional Airport in terms of scheduled cargo tonnage is zero throughout the next 20 years.*** Given the combined remaining capacity – both in terms of airfield resources and developable land – at DFW and AFW, compelling justification for cargo carriers to support a third metroplex area cargo airport is lacking. While conventionally, the forecasted Base Case is also the most likely scenario; the "zero-cargo scenario" will be this forecast's Low Case.

4.2: Base Case: Domestic Cargo Operation

The Base Case forecast, the most likely forecast scenario for Lancaster Regional Airport, (presented in Table 4.3) is shaped by the following assumptions:

(A) Lancaster will only attract domestic cargo feeder service, while international service will continue to be accommodated at DFW and integrator traffic – apart from perhaps the Lancaster feeder flights - will remain split between DFW and AFW.

(B) Initial operating volumes were established using 2008 cargo totals for a small aircraft all-cargo carrier currently operating at DFW. Unlikely to split such a small operation, 100% of that carrier's total annual volume has been moved to Lancaster in this model;

(C) The average annual growth rate projected by Boeing (2.6%) is used for Years 2-10. From Year 11 through 20, the consultant projects an annual growth rate (3.0%) that is higher than that forecast by Boeing in recognition of exceptional economic growth anticipated by area developers for the southern part of the Metroplex area.

Table 4.3 **BASE CASE AIR CARGO FORECASTS LANCASTER REGIONAL AIRPORT (METRIC TONNES)**

Year	Domestic Freight	Annual Growth %	Annual Growth in tonnes
1	1,375	---	---
2	1,411	2.60%	36
3	1,447	2.60%	37
4	1,485	2.60%	38
5	1,524	2.60%	39
10	1,732	2.60%	44
15	2,008	3.00%	58
20	2,328	3.00%	68

Source: Webber Air Cargo Inc.

The product of the preceding methodology would be a Year One total of 1,375 metric tonnes of freight. In the context of ACI-NA's 2008 data, an airport with that volume would rank #136 in North America and be comparable to secondary markets such as Moline, Illinois. At Year Twenty, annual volumes would grow to 2,328 tonnes.

4.3: High Case: Domestic Cargo Operation plus International Carriers

The **High Case** forecast, (includes additional factors taken into consideration for this scenario than what was discussed in the Base Case), presented in Table 4.4, is shaped by the following assumptions:

(A) For Years One through Ten, Lancaster Regional Airport will attract only domestic cargo feeder service, as in the Base Case scenario but with slightly higher growth rates ultimately more aligned with domestic forecasts by Airbus;

(B) Beginning in Year Eleven and again in Year Sixteen, the forecasts have introduced the addition of additional freighter operators using annual tonnages roughly representative of actual carriers now operating at gateways;

(C) Between Years Eleven and Twenty, Domestic Cargo grows at the relatively lower growth rate typical of the mature North American market, but with a stimulus caused by access to air service for local shippers. Given the market forces described at length in earlier sections, even the High Case scenario ignores the possibility of Lancaster Regional Airport developing any international service, maintaining that the forwarder base and other forces of connectivity will keep such service at DFW.

Table 4.4 **HIGH CASE AIR CARGO FORECASTS LANCASTER REGIONAL AIRPORT (METRIC TONNES)**

Year	Domestic Freight	Annual Growth % Domestic	Annual Growth Tonnes
1	1,375	---	---
2	1,415	2.90%	40
3	1,456	2.90%	41
4	1,498	2.90%	42
5	1,542	2.90%	43
10	1,778	2.90%	50
11*	9,123	3.30%	7,345
12	9,424	3.30%	301
13	9,735	3.30%	311
14	10,056	3.30%	321
15	10,388	3.30%	332
16*	18,017	3.30%	7,629
17	18,612	3.30%	595
18	19,226	3.30%	614
19	19,860	3.30%	634
20	20,516	3.30%	655

Source: Webber Air Cargo Inc.
** Years in which growth rates are distorted by projected introduction of a new carrier.*

As with the Base Case, the product of the preceding methodology would be a Year One total of 1,375 metric tonnes of freight. However, the introduction of additional freighter operators in the forecast's second decade would cause annual tonnage to grow dramatically, producing a Year Twenty annual volume of 20,516 tonnes. Using 2008 ACI-NA rankings, such a volume would have Lancaster ranking #97, comparable to markets such as Albany, New York, for what would be essentially the Metroplex area's third option in air cargo.

4.4: Forecasts Conclusion

It bears repeating that the consultant believes even the perhaps modest volume of the High Case scenario is beyond reach of the Lancaster Regional Airport for the immediate 20-year planning horizon and that most likely Lancaster will develop no scheduled air cargo service or at a maximum, the Base Case scenario's small feeder aircraft. Given sustained losses throughout the industry during recent years, the near to mid-term planning intentions of the industry is to continue dropping capacity – quite the opposite from opening up a third cargo airport within one metropolitan area.

In discussions with airport management and local developers, it does not seem that the absence of scheduled air cargo service at Lancaster should be a detriment to local economic development but rather should aid in establishing realistic priorities for the Airport and its constituents. Both developers of nearby logistics parks suggested that their emphases had been on intermodal (rail/truck) service providers and users, while the possibility of air cargo service would be nothing more than a 'bonus'. One could reasonably argue that the Metroplex area already possesses such an advantage as shippers from as far away as Kansas City already have freight trucked to DFW with far greater challenges in terms of time and control than those faced by shippers in the southern suburbs of Dallas.

Given the focus of FedEx and UPS to maximize the productivity of their surface transportation systems in the U.S. domestic market, it still behooves Lancaster to market itself aggressively to the two integrators but initially emphasizing its rail and truck capabilities with the Airport's utilization as more of a long-term possibility.